ENVIRONMENTAL CHECKLIST IN SUPPORT OF CEQA GUIDELINES SECTION 15183 STREAMLINE
PROJECT CONSISTENT WITH A COMMUNITY PLAN OR ZONING

Environmental Checklist Form for:
Development Permit Application No. P22-02526

1.	**Project title:** Development Permit Application No. P22-02526
2.	**Lead agency name and address:** City of Fresno Planning and Development Department 2600 Fresno Street Fresno, CA 93721
3.	**Contact person and phone number:** ***Robert Holt, Supervising Planner*** City of Fresno Planning and Development Department (559) 621-8056
4.	**Project location:** ***7150 N Corporate Drive, Fresno, CA 93720 (northwest corner of E Locust Ave and N Corporate Dr)*** (APN: 303-201-11 and 303-201-17)
5.	**Project sponsor's name and address:** Tina Wehrmeister Kaiser Permanente National Facilities Services 1950 Franklin Street, 12th Floor Oakland, CA 94612
6.	**General & Community plan land use designation:** Employment - Office
7.	**Zoning:** O/EA/UGM (Office/Expressway Area Overlay/Urban Growth Management)

8. **Description of project:**

Development Permit Application No. P22-02526 was filed by ***Kaiser Permanente***. The Kaiser Permanente Fresno Medical Office Building (MOB) project ("proposed project") consists of the development of an approximately 147,000 square foot (sf) four-story Medical Office Building and surface parking. The proposed project is located in the northern portion of the City of Fresno (City) near the existing Kaiser Permanente Medical Center, as shown in Figure 1, Project Location. The project site is bordered to the south by E. Locust Avenue and a private driveway (N. Corporate Dr.) to the east. The 7-acre project site consists of two parcels (Assessor's Parcel Number [APN] 303-201-11 and 303-201-17) and has a General Plan designation and Zoning of Office (O).

The project site is vacant land that is annually disked. The site contains several soil stockpiles of unknown origin. There is one tree located in the northwest portion of the site but there are no structures or improvements made to the site. See Figure 2, Project Site.

The proposed project would provide 96 medical provider offices and 159 exam rooms, including services for adult medicine, obstetrics and gynecology, pediatrics, dermatology, vision care, and oncology. In addition, there would be a pharmacy, radiology laboratory space, a healthy living center, conference rooms, and a small café. The MOB would be centrally located on the site, providing new surface parking lots to the north and south of the MOB to include a total of 532 parking spaces (see Figure 3, Site Plan). The proposed land uses are listed in Table 1, below.

Table 1. Proposed Land Uses

Land Use	Square Footage (sf)
Parking	184,000 sf
Retail/Commercial	1,646 gross square feet (gsf)
Medical	144,379 gsf
Public Open Space (Outdoor Respite Space)[1]	700 gsf

Source: Cannon Design 2022.
Notes: [1] The Public Open Space land use would consist of an outdoor respite space for use by visitors, patients, and staff.

The building coverage of the proposed project would be approximately 0.95 acres, or 14% of the approximately 7-acre site. Paved areas including the surface parking lots would cover approximately 1.89 acres, or 27% of the site. Project landscaping would total 1.10 acres, for a site coverage of 16%. The four-story MOB roof deck is 58 feet in height and the decorative cupola/bell tower feature is 86 feet in height at its peak. The structure meets the City's allowable height limit of 60 feet in area zoned for Office with an allowable 10% deviation and 20-foot exception for decorative features (FMC Sec. 15-5602 and 15-2012). Illustrative drawings of the project are provided in Figures 4 and 5. The exterior building design materials would consist of aluminum, glass, tile, modular

façade panels, plaster, and various other materials with a white and terra cotta color theme.

The health care providers for the proposed project are currently located at the Fresno Medical Center and First Street Medical Offices and would relocate to the new MOB after the project is completed.

An overview of various project elements is included below.

Landscaping

The proposed project would remove one existing palm tree at the northwest project boundary. A total of 200 trees are proposed for planting. The tree species include a variety of ornamental trees such as Red Maple, Strawberry Tree, and Oklahoma Redbud. Per the City's requirements, trees would be planted facing all public street frontages. Additionally, a variety of low water use, flowering, evergreen, and deciduous shrubs and ground cover would be planted surrounding the MOB and surface parking lots.

Lighting

The proposed project would install overhead parking lot light poles between 15 and 20 feet (ft) tall, along with building lights, low-level security lights, and canopy lights. All lighting would be LED and shielded such that there would be minimal light trespass on surrounding lands.

Circulation System

Primary access to the project site would be provided at the existing intersections of E. Locust Avenue and First Street, and a private driveway (N. Corporate Dr., north of E. Locust Avenue) and First Street. The E. Locust Avenue and First Street intersection would provide left-in/left-out and right-in/right out access while the Private Driveway and First street intersection would provide left-in and right-in/right-out access only.

The project includes surface parking to accommodate up to 532 vehicles, with 17 accessible parking spaces and 54 electric vehicle charging stations. The project would also include 28 bicycle spaces and a service yard. Fire lanes would be located adjacent to the north, east and southern portions of the MOB.

Infrastructure

Water, Sewer and Storm Drainage

Water

There is an existing 8-inch water main located in E. Locust Avenue and an 8-inch water main located within an 84-foot Water and Sewer Main Easement along the eastern boundary of the project site, in N. Corporate Drive. The two 8-inch water stubs would be used to serve the project site. As a condition of approval, the City would require the applicant to install water meter(s).

Sewer

There is an existing 8-inch sewer main located in E. Locust Avenue. Connections to the City's infrastructure would be made via a private sewer main located in N. Corporate Drive. Per the City's Public Works Standard Drawing, a 48-inch manhole would be constructed approximately 500-feet north of E. Locust Avenue to include service to the new MOB.

Storm Drainage

The project's stormwater would be captured by an onsite storm drain system at low points within the parking lot and points of direct connection to the roof drain downspouts. Stormwater would be conveyed south to connect to the back of an existing Fresno Metropolitan Flood Control District drainage inlet located in E. Locust Avenue.

Energy Conservation

The project would be U.S. Green Building Council LEED certified and includes the following energy conservation features: photovoltaic canopies over most parking stalls; electric vehicle (EV) charging in 54 spaces; and all lighting would use efficient LED bulbs and be shielded and downward focused. The proposed project would fully conform with state and local energy requirements, including those in the California Building Standards Code (Title 24 of the California Code of Regulations).

Construction Schedule

Project construction is expected to commence in Fall 2023 and last approximately 21 months. The entire project is anticipated to be constructed in one phase. All construction equipment and construction worker vehicles would be staged (parked) on site during construction. The project would require the removal and disposal of approximately 200 cubic yards of stockpiled soil located on the southern portion of the site. No soil would be imported to the site.

9. **Surrounding land uses and setting:** Surrounding lands include a little league baseball park (River Park Little League) and detention basin to the west, a small office building to the north, a professional office complex including dental and optometry offices to the northeast, and undeveloped land located adjacent to the southeast portion of the site. Lincoln Elementary is the closest school located 0.5 miles to the northeast of the site. Fresno Yosemite International Airport, located 11.5 miles to the southeast, is the nearest airport.

	Existing Zoning	Existing Land Use
North	*O/UGM/cz (Office/Urban Growth Management/conditions of zoning)*	*Offices*
East	*O/EA/UGM (Office/Expressway Area Overlay/Urban Growth Management)*	*Vacant land*
South	*O/EA/UGM (Office/Expressway Area Overlay/Urban Growth Management)*	*Office*
West	*OS/UGM (Open Space/Urban Growth Management)*	*Ponding Basin, Baseball Park*

10. **Other public agencies whose approval is required (e.g., permits, financing approval, or participation agreement):**

The discretionary project approvals required from the City for this project include the following:

- Approval of a Development Permit and Minor Deviation
- Approval of a Tree Removal Permit

The following are Responsible Agencies that may issue permits required for the project:

- Fresno County Environmental Health Division
- Fresno Metropolitan Flood Control District
- San Joaquin Valley Air Pollution Control District
- State Water Resources Control Board

11. **Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code (PRC) Section 21080.3.1? If so, has consultation begun?**

	Pursuant to PRC Section 21080.3.1, prior to the release of any negative declaration, mitigated negative declaration or environmental impact report (EIR) for a project, the lead agency shall begin consultation with the California Native American tribe that is traditionally and culturally affiliated with the geographical area of the proposed project. The proposed environmental assessment is a 15183-streamline assessment, which is consistent with the development density established by existing zoning, community plan or general plan policies for which an EIR was certified. Therefore, tribal consultation is not required. However, on September 19, 2019, compliant with Assembly Bill (AB) 52 and Senate Bill (SB) 18, the City provided formal notification for the General Plan Program EIR (State Clearinghouse (SCH) #2019050005) to interested Native American tribes that may be culturally or traditionally affiliated with the project area and vicinity to conduct consultation. Two tribes were formally notified regarding AB 52 consultation and 13 tribes were formally notified regarding SB 18 consultation. None of the 15 tribes contacted responded via letter or telephone and indicated that consultation would not be requested. No other requests for consultation were received within the 30-day period, and as a result, AB 52 and SB 18 requirements were fulfilled for the Program EIR (SCH #2019050005).

PREVIOUS ENVIRONMENTAL ANALYSES OF THE PROPOSED PROJECT

One previous environmental analysis has been prepared and certified which is applicable to the proposed project. On September 30, 2021, the City adopted an update to the General Plan and certified the associated Program EIR (SCH #2019050005). The proposed project would be consistent with the General Plan designation of Employment – Office, as described above, which permits professional and medical offices up to a maximum floor area ratio of 2.0. The proposed project is a permitted use and proposes a floor area ratio of approximately 0.47 (assuming 147,000 square feet of development on the approximately 7.0-acre site), so it is consistent with the General Plan's use and density regulations. The Program EIR (PEIR) assumed full development and buildout of the project site, consistent with the uses and development standards proposed by the project. The cumulative impacts associated with buildout of the City of Fresno General Plan, including the project site, were fully addressed in the PEIR.

CEQA Guidelines Section 15183 Streamline Analysis

CEQA Guidelines Section 15183 allows a streamlined environmental review process for projects that are consistent with the densities established by existing zoning, community plan or general plan policies for which an EIR was certified. As noted above, the proposed project is consistent with the land use designation and densities established by the Fresno General Plan, for which an EIR was certified. The provisions contained in Section 15183 of the CEQA Guidelines are presented below.

15183. Projects Consistent with a Community Plan or Zoning

a) *CEQA mandates that projects which are consistent with the development density established by existing zoning, community plan, or general plan policies for which an EIR was certified shall not require additional environmental review, except as might be necessary to examine whether there are project-specific significant effects which are peculiar to the project or its site. This streamlines the review of such projects and reduces the need to prepare repetitive environmental studies.*

b) *In approving a project meeting the requirements of this section, a public agency shall limit its examination of environmental effects to those which the agency determines, in an initial study or other analysis:*
    1) *Are peculiar to the project or the parcel on which the project would be located,*
    2) *Were not analyzed as significant effects in a prior EIR on the zoning action, general plan, or community plan, with which the project is consistent,*
    3) *Are potentially significant off-site impacts and cumulative impacts which were not discussed in the prior EIR prepared for the general plan, community plan or zoning action, or*
    4) *Are previously identified significant effects which, as a result of substantial new information which was not known at the time the EIR was certified, are determined to have a more severe adverse impact than discussed in the prior EIR.*

c) *If an impact is not peculiar to the parcel or to the project, has been addressed as a significant effect in the prior EIR, or can be substantially mitigated by the imposition of uniformly applied development policies or standards, as contemplated by subdivision (e) below, then an additional EIR need not be prepared for the project solely on the basis of that impact.*

d) *This section shall apply only to projects which meet the following conditions:*
    1) *The project is consistent with:*
        A. *A community plan adopted as part of a general plan,*
        B. *A zoning action which zoned or designated the parcel on which the project would be located to accommodate a particular density of development, or*
        C. *A general plan of a local agency, and*
    2) *An EIR was certified by the lead agency for the zoning action, the community plan, or the general plan.*

e) *This section shall limit the analysis of only those significant environmental effects for which:*
    1) *Each public agency with authority to mitigate any of the significant effects on the environment identified in the planning or zoning action undertakes or requires others to undertake mitigation measures specified in the EIR which the lead agency found to be feasible, and*
    2) *The lead agency makes a finding at a public hearing as to whether the feasible mitigation measures will be undertaken.*

f) *An effect of a project on the environment shall not be considered peculiar to the project or the parcel for the purposes of this section if uniformly applied development policies or standards have been previously adopted by the City or county with a finding that the*

development policies or standards will substantially mitigate that environmental effect when applied to future projects, unless substantial new information shows that the policies or standards will not substantially mitigate the environmental effect. The finding shall be based on substantial evidence which need not include an EIR. Such development policies or standards need not apply throughout the entire City or county, but can apply only within the zoning district in which the project is located, or within the area subject to the community plan on which the lead agency is relying. Moreover, such policies or standards need not be part of the general plan or any community plan, but can be found within another pertinent planning document such as a zoning ordinance. Where a City or county, in previously adopted uniformly applied development policies or standards for imposition on future projects, failed to make a finding as to whether such policies or standards would substantially mitigate the effects of future projects, the decision-making body of the City or county, prior to approving such a future project pursuant to this section, may hold a public hearing for the purpose of considering whether, as applied to the project, such standards or policies would substantially mitigate the effects of the project. Such a public hearing need only be held if the City or county decides to apply the standards or policies as permitted in this section.

g) *Examples of uniformly applied development policies or standards include, but are not limited to:*
    1) *Parking ordinances.*
    2) *Public access requirements.*
    3) *Grading ordinances.*
    4) *Hillside development ordinances.*
    5) *Flood plain ordinances.*
    6) *Habitat protection or conservation ordinances.*
    7) *View protection ordinances.*
    8) *Requirements for reducing greenhouse gas emissions, as set forth in adopted land use plans, policies, or regulations.*

h) *An environmental effect shall not be considered peculiar to the project or parcel solely because no uniformly applied development policy or standard is applicable to it.*

i) *Where the prior EIR relied upon by the lead agency was prepared for a general plan or community plan that meets the requirements of this section, any rezoning action consistent with the general plan or community plan shall be treated as a project subject to this section.*
    1) *"Community plan" is defined as a part of the general plan of a City or county which applies to a defined geographic portion of the total area included in the general plan, includes or references each of the mandatory elements specified in Section 65302 of the Government Code, and contains specific development policies and implementation measures which will apply those policies to each involved parcel.*
    2) *For purposes of this section, "consistent" means that the density of the proposed project is the same or less than the standard expressed for the involved parcel in the general plan, community plan or zoning action for which an EIR has been certified, and that the project complies with the density-related standards contained in that plan or zoning. Where the zoning ordinance refers to the general plan or*

community plan for its density standard, the project shall be consistent with the applicable plan.

j) This section does not affect any requirement to analyze potentially significant offsite or cumulative impacts if those impacts were not adequately discussed in the prior EIR. If a significant offsite or cumulative impact was adequately discussed in the prior EIR, then this section may be used as a basis for excluding further analysis of that offsite or cumulative impact.

PROJECT-SPECIFIC ENVIRONMENTAL REVIEW

The Environmental Checklist includes a discussion and analysis of any peculiar or site-specific environmental impacts associated with construction and operation of the proposed project. The Environmental Checklist identifies the applicable City of Fresno development standards and policies that would apply to the proposed project during both the construction and operational phases and explains how the application of these uniformly applied standards and policies would ensure that no peculiar or site-specific environmental impacts would occur. None of the environmental factors below would be affected by this project, as indicated by the checklist on the following pages.

☐	Aesthetics	☐	Agriculture and Forestry Resources
☐	Air Quality	☐	Biological Resources
☐	Cultural Resources	☐	Energy
☐	Geology/Soils	☐	Greenhouse Gas Emissions
☐	Hazards and Hazardous Materials	☐	Hydrology/Water Quality
☐	Land Use/Planning	☐	Mineral Resources
☐	Noise	☐	Population/Housing
☐	Public Services	☐	Recreation
☐	Transportation	☐	Tribal Cultural Resources
☐	Utilities/Service Systems	☐	Wildfire
☐	Mandatory Findings of Significance		

CONCLUSION

As described above, Development Permit Application No. P22-02526 (proposed project) is consistent with the land use designation and development intensity assigned to the project site by the City of Fresno General Plan. Cumulative impacts associated with development and buildout of the project site, as proposed, were fully addressed in the City of Fresno PEIR (SCH #2019050005). Since the proposed project is consistent with the land use designation and development intensity for the site identified in the General Plan and analyzed in the PEIR,

implementation of the proposed project would not result in any new or altered cumulative impacts beyond those addressed in the PEIR.

The analysis in the following CEQA Environmental Checklist demonstrates that there are no site-specific or peculiar impacts associated with the project and identifies uniformly applied standards and policies that would be applied to the project. The Project Requirements identified in the attached environmental analysis include requirements that must be implemented by the proposed project in order to ensure that any site-specific impacts or construction-related impacts are reduced to a less-than-significant level. All Project Requirements identified in the attached Environmental Checklist shall be made a condition of project approval and shall be implemented within the timeframes identified.

Robert Holt 06/22/23

Robert Holt, Supervising Planner Date

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
I. AESTHETICS – Except as provided in PRC Section 21099, would the project:				
a) Have a substantial adverse effect on a scenic vista?			☒	
b) Substantially damage scenic resources, including, but not limited to, trees, rock out-croppings, and historic buildings within a state scenic highway?			☒	
c) In non-urbanized areas, substantially degrade the existing visual character or quality public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?			☒	
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?		☒		

ENVIRONMENTAL SETTING

The project site is located in the northern portion of the City near the existing Kaiser Permanente Medical Center. The project site is vacant land that is annually disked. There is one tree located in the northwest portion of the site but there are no structures or other improvements either on or made to the site. Existing sources of light from streetlights and building lights are visible at night from developed areas surrounding the project site, including industrial buildings to the south and southeast.

The General Plan identifies six locations along the San Joaquin River Bluffs as designated

vista points from which views should be maintained (City of Fresno 2022, pp. 5-19). According to the Caltrans State Scenic Highway Mapping System, there are no eligible or officially designated State Scenic Highways within the City. The closest officially designated scenic highway is a portion of State Route (SR) 180 beginning approximately 20 miles southeast of the project site east of Sanger and continuing into the Sequoia National Forest (Caltrans 2023). However, the City's General Plan designates several local scenic corridors within Policy MT-3-a (City of Fresno 2022, p.4-36).

Listed below are policies from the General Plan relevant to the discussion below (City of Fresno 2014):

Policy LU-5-g: **Scale and Character of New Development.** Allow new development in or adjacent to established neighborhoods that is compatible in scale and character with the surrounding area by promoting a transition in scale and architectural character between new buildings and established neighborhoods, as well as integrating pedestrian circulation and vehicular routes.

Policy MT-3-a: **Scenic Corridors.** Implement measures to preserve and enhance scenic qualities along scenic corridors or boulevards, including:

- Van Ness Boulevard - Weldon to Shaw Avenues
- Van Ness Extension - Shaw Avenue to the San Joaquin River Bluff
- Kearney Boulevard - Fresno Street to Polk Avenue
- Van Ness/Fulton couplet - Weldon Avenue to Divisadero
- Butler Avenue - Peach to Fowler Avenues
- Minnewawa Avenue - Belmont Avenue to Central Canal
- Huntington Boulevard - First Street to Cedar Avenue
- Shepherd Avenue - Friant Road to Willow Avenue
- Audubon Drive - Blackstone to Herndon Avenues
- Friant Road - Audubon to Millerton Roads
- Tulare Avenue - Sunnyside to Armstrong Avenues
- Ashlan Avenue- Palm to Maroa Avenues

Policy POSS-7-f: **River Bluffs.** Preserve the river bluffs as a unique geological feature in the San Joaquin Valley by maintaining and enforcing the requirements of the "BP" Bluff Preservation Overlay Zone District, maintaining the bluff area setback for buildings, structures, decks, pools and spas (which may be above or below grade), fencing, and steps, and maintaining designated vista points.

DISCUSSION

a) Have a substantial adverse effect on a scenic vista?

A scenic vista is generally defined as a public vantage point with an expansive view of a significant landscape feature. An impact on scenic vistas is considered significant if it substantially diminishes, blocks, or impedes an expansive view of a significant landscape feature from a public vantage point. The General Plan identifies six locations along the San Joaquin River Bluffs as designated vista points from which views should be maintained (City of Fresno 2014, p.5-19), and the "BL" Overlay Zone District specifies appropriate setbacks and other design guidelines to protect these views (Policy POSS-7-f). However, the General Plan PEIR determined that since existing development in the City already inhibits views of scenic vistas, impacts from new development under the General Plan would be less than significant.

The proposed project is located on flat land surrounded by urban development, including the existing Kaiser Permanente Fresno Medical Center. The project site contains no views of significant landscape features such as the San Joaquin River Bluffs. The proposed MOB would be similar to nearby buildings in height and scale and would not further impact any scenic vistas. Therefore, the proposed project would result in a less-than-significant impact and would not result in any new or more severe impacts than what was analyzed in the General Plan PEIR. No further analysis is required.

b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

As stated in the Environmental Setting, there are no eligible or officially designated State Scenic Highways within the City. However, the City does identify scenic corridors within Policy MT-3-a. The General Plan PEIR determined that although new development would occur, continued implementation of General Plan policies would preserve and enhance the scenic qualities along these scenic corridors. For example, Policy MT-3-b states the need to preserve street trees lining scenic corridors; if replacement is needed, trees should be similar in type and planted in a comparable pattern to existing plantings. Therefore, the General Plan PEIR determined that impacts would be less than significant.

The proposed project would build a new MOB and surface parking lots within a vacant lot surrounded by urban development. There are no designated scenic highways or County scenic corridors near the project site and the project site is not visible from any of these roads or corridors listed in Policy MT-3-a. The project would therefore have no adverse impact on any scenic resources within a state scenic highway or scenic corridor and would not result in any new or more severe impacts than what was analyzed in the General Plan PEIR. No further analysis is required.

c) In non-urbanized areas, substantially degrade the existing visual character or quality

of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?

The General Plan PEIR concluded that because development under the General Plan would result in increased density and intensification of land uses within the City, there would be significant and unavoidable impacts to visual character and quality of public views. The General Plan PEIR determined that no feasible mitigation measures would be available to mitigate this impact to a less-than-significant level.

The project site is located within an urbanized area, which includes incorporated cities of at least 100,000 persons (or with a population of less than 100,000 persons, if the population of that city and not more than two contiguous incorporated cities combined equals at least 100,000 persons). As of 2020, the City of Fresno had a population of approximately 542,107 (U.S. Census Bureau 2020), meeting the criteria for an urbanized area. Therefore, the analysis of this question focuses on potential conflicts with zoning and other regulations governing scenic quality. The project site is consistent with the underlying zoning and land use designation of Office, which provides for administrative, financial, business, professional, medical, and public offices. The MOB roof deck would be 58 feet in height and the decorative cupola/bell tower feature would be 86 feet in height at its peak, meeting the City's allowable height limit of 60 feet in area zoned for Office with an allowable 10% deviation and 20-foot exception for decorative features (City Code Section 15-5602 and 15-2012). The project would also have a floor area ratio (FAR) of 0.47, less than the maximum FAR of 2.0 allowed under the existing zoning. The project would comply with all development standards detailed in the City Code. Therefore, the proposed project would not result in new or more severe impacts than what was previously disclosed in the General Plan PEIR. No additional analysis is required.

d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

The General Plan PEIR determined that new development under the General Plan could increase the amount of light from streetlights, other exterior lighting, and vehicular headlights, which could result light pollution and light spillover onto adjacent properties. Mitigation Measures AES-4.1 through AES-4.4 were identified in order to reduce potential lighting impacts from development under the General Plan. These mitigation measures include requirements for lightning systems to be shielded and directed away from light sensitive land uses, and for materials used on building facades to be non-reflective. However, due to the intensity of planned development, the General Plan PEIR determined that the increase in light and glare would be considered a significant and unavoidable impact.

All new development in the City is required to comply with standards for light and glare

established in Section 15-2015 of the City Code. Specifically, all project lighting must be cut off or full cut off and shielded so as to not produce obtrusive glare onto the public right-of-way or adjoining properties. No lights or combination of lights shall cast light exceeding one foot candle onto a public street, or 0.5-foot candle onto a property containing residential uses. No residential uses are present near the project site, and a photometric plan is included in the project plan set demonstrating that the amount of light cast onto public streets would not exceed one foot candle. All proposed lights would comply with the standards described in Section 15-2015 of the City Code. The project would also be subject to Mitigation Measures (MM) AES-4.3 and AES-4.5 regarding shielded lighting and use of non-reflective building materials. Compliance with the City's lightning standards and applicable mitigation measures from the General Plan PEIR would ensure that the proposed project's light and glare impacts would be less than significant. Therefore, the proposed project would not result in new or substantially more severe impacts than identified in the General Plan PEIR and the criteria for requiring further CEQA review are not met.

Project Requirements

The proposed project shall implement and incorporate, as applicable, the aesthetics-related Project Requirements as identified below and in the Project Requirements Checklist.

MM AES-4.3 **Lighting for Non-Residential Uses.** Lighting systems for non-residential uses, not including public facilities, shall provide shields on the light fixtures and orient the lighting system away from adjacent properties. Low intensity light fixtures shall also be used if excessive spillover light onto adjacent properties will occur.

MM AES-4.5 **Use of Non-Reflective Materials.** Materials used on building facades shall be non-reflective.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
II. AGRICULTURE AND FORESTRY RESOURCES – In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?				☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?				☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?				☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?				☒

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?				☒

ENVIRONMENTAL SETTING

According to the California Department of Conservation (DOC) Farmland Mapping and Monitoring Program (FMMP), the City primarily consists of Urban and Built-Up land but contains areas of Important Farmland near the outer City limits (DOC 2022). The General Plan PEIR records 9,134 acres of Prime Farmland, 2,269 acres of Farmland of Statewide Importance, 3,224 acres of Unique Farmland, and 7,896 acres of Farmland of Local Importance within the planning area (City of Fresno 2020, p.4.2-6). Urban and Built-Up land covers 71,963 acres while other land (including nonagricultural, vacant, and rural residential land) covers the remaining 11,553 acres. There are approximately 2,546 acres of land under Williamson Act contracts, the majority of which are designated for non-agricultural land uses (City of Fresno 2020, p.4.2-7, p.4.2-15).

The entirety of the project site is designated as Urban and Built-Up land under the DOC FMMP, which is not considered Important Farmland. The project site does not include an active Williamson Act Contract. Based on a review of aerial imagery, it appears that the project site has experienced regular maintenance activities such as mowing and annual disking. The project site is vacant and contains no agricultural activities or uses.

> California Public Resources Code Section 12220(g) defines "forest land" for the purposes of CEQA as land that can support 10% native tree cover of any species, including hardwoods, under natural conditions, and that allows for management of one or more forest resources, including timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation, and other public benefits.

California Government Code Section 51104(g) defines "Timber," "Timberland," and "Timberland Production Zone" for the purposes of CEQA as either trees of any species maintained for eventual harvest for forest production purposes ("Timber"); privately owned land, or land acquired for State forest purposes, used for growing and harvesting timber ("Timberland"); or "Timberland Production Zone" which means an area zoned and used for

growing and harvesting timber.

There are no policies from the General Plan relevant to the proposed project.

DISCUSSION

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

The General Plan PEIR determined that implementation of the General Plan would result in the conversion of 14,627 acres of FMMP-designated farmland and 11,495 acres of existing farmland to non-agricultural uses (City of Fresno 2020, p.4.2-12). In order to reduce impacts to agricultural resources, the General Plan includes several policies and objectives for farmland preservation, and the General Plan PEIR proposes Mitigation Measure AG-1.1 to establish a Farmland Preservation Program requiring developers to mitigate the loss of farmland through methods including in-lieu fees, mitigation banks, conservation easements. However, the General Plan PEIR concluded that impacts would still be significant and unavoidable because the conversion of farmland to non-farmland uses would be a permanent loss of resources.

The proposed project would not convert Prime Farmland, Farmland of Statewide importance, or Unique Farmland to developed uses. As noted in the Environmental Setting, the entire project site is designated as Urban and Built-Up Land by the DOC FMMP, which is not considered Important Farmland (DOC 2022). Therefore, no conversion of Important Farmland would occur and Mitigation Measure AG-1.1 would not be applicable. The project would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

b) Conflict with existing zoning for agricultural use or a Williamson Act contract?

The General Plan PEIR determined that because non-agricultural uses would continue to be allowed on Williamson Act lands, impacts to Williamson Act contracts would be significant and unavoidable and no feasible mitigation measures are available to reduce this impact.

The project site is zoned for Office use, which does not allow agricultural activities. Additionally, the project site does not include a Williamson Act contract. Therefore, the proposed project would not conflict with existing zoning for agricultural use or a Williamson Act contract and no mitigation would be required. The proposed project would result in no impact and would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?

The General Plan PEIR determined that because there is no forest land or timberland within the planning area, development under the General Plan would result in no impact regarding conflict with zoning for forest land or timberland.

The project site is not zoned for forest land or timberland. Therefore, the proposed project would not conflict with zoning for forest land or timberland. The proposed project would result in no impact. The proposed project would not result in new or substantially more severe impacts than identified in the General Plan PEIR and the criteria for requiring further CEQA review are not met.

d) Result in the loss of forest land or conversion of forest land to non-forest use?

The General Plan PEIR determined that because there is no forest land or timberland within the planning area, development under the General Plan would result in no impact regarding loss or conversion of forest land to non-forest use.

The project site does not contain any forest land and therefore would not result in the loss or conversion of forest land to non-forest uses**.** The proposed project would result in no impact. The proposed project would not result in new or substantially more severe impacts than identified in the General Plan PEIR and the criteria for requiring further CEQA review are not met.

e) Involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?

The General Plan PEIR did not identify any other changes that could result in the conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use; therefore, it was determined that implementation of the General Plan would result in no impact related to this criterion.

As discussed in ‘a’ through ‘d’ above, the proposed project is in an area of the City zoned and designated for Office use. According to the General Plan, this designation is suitable for a range of administrative, financial, business, professional, medical, and public offices. The FMMP does not designate the project site as Important Farmland and the site is not zoned for forest land or agricultural uses. There are no agricultural or forest lands in the project vicinity or on the project site. Therefore, the proposed project would result in no impact and would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

Project Requirements

None applicable.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
III. AIR QUALITY – Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan (*e.g.*, by having potential emissions of regulated criterion pollutants which exceed the San Joaquin Valley Air Pollution Control Districts (SJVAPCD) adopted thresholds for these pollutants)?			☒	
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?			☒	
c) Expose sensitive receptors to substantial pollutant concentrations?			☒	
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?			☒	

ENVIRONMENTAL SETTING

An Air Quality and Greenhouse Gas Impact Assessment (AQ/GHG report) was prepared for the project in May 2020 by VRPA Technologies, included as Appendix A to this document. The AQ/GHG report identifies potential air quality impacts that may result from the proposed project, including short-term (construction) emissions, long-term emissions, toxic air contaminants (TAC), and odors. The following discussions are based on information contained in the AQ/GHG Report (see Appendix A for more detailed information).

The City and the proposed project are located within the San Joaquin Valley Air Basin (SJVAB). Topography surrounding the City includes foothills and mountains to the east and west, which direct air circulation and dispersion patterns. Temperature inversions can trap air within the Valley, thereby preventing the vertical dispersal of air pollutants. As a result, the SJVAB is highly susceptible to pollutant accumulation over time. In addition to topographic conditions, the local climate can also contribute to air quality problems. The regional climate is classified as Mediterranean, with moist cool winters and dry warm summers.

Agencies and Regulations

Air quality within the project area is addressed through the efforts of various federal, state, regional, and local government agencies. The U.S. Environmental Protection Agency (EPA) maintains federal ambient air quality standards, which identify the maximum levels of six “criteria” pollutants to protect public health and welfare. The six criteria pollutants include ozone, carbon monoxide (CO), nitrogen dioxide, sulfur dioxide, particulate matter (PM), and lead.

To ensure compliance with the NAAQS, EPA requires states to adopt State Implementation Plans (SIP) aimed at improving air quality in areas of nonattainment, or Maintenance Plans aimed at maintaining air quality in areas that have attained a given standard. In California, the SIPs must adhere to both the NAAQS and the California Ambient Air Quality Standards (CAAQS). States may establish their own standards, provided the State standards are at least as stringent as the NAAQS. The CAAQS have been established pursuant to California Health and Safety Code Section 39606(b) and its predecessor statutes.

The California Air Resources Board (CARB) is the agency responsible for coordination and oversight of state and local air pollution control programs in California. CARB combines its data with all local district data and submits the completed SIP to the EPA. The SJVAPCD is the agency responsible for monitoring and regulating air pollutant emissions from stationary, area, and indirect sources within Fresno County and throughout the SJVAB. The SJVAPCD has prepared the following plans to address ozone, PM10 (particulate matter 10 microns or less in diameter), and PM2.5 (2.5 microns or less in diameter):

- The 2016 Ozone Plan (2008 standard) was adopted by SJVAPCD on June 16, 2016 and subsequently adopted by CARB on July 21, 2016.

- The 2013 1-Hour Ozone Plan (revoked 1997 standard) was adopted by the SJVAPCD on September 19, 2013. EPA withdrew its approval of the plan due to litigation. SJVAPCD plans to submit a "redesignation substitute" to EPA to maintain its attainment status for this revoked ozone standard.
- The 2007 PM10 Maintenance Plan (as revised in 2015) was approved by EPA on July 8, 2016 (effective September 30, 2016).
- The 2012 PM2.5 Plan (as revised in 2015) was approved by EPA on August 16, 2016 (effective September 30, 2016).

The SJVAPCD also prepared the *Guide for Assessing and Mitigating Air Quality Impacts* (GAMAQI), dated March 19, 2015 (SJVAPCD 2015). The GAMAQI is an advisory document that provides Lead Agencies, consultants, and project applicants with analysis guidance and uniform procedures for addressing air quality impacts in environmental documents.

City Plans

The General Plan identifies numerous policies geared towards the improvement of air quality, including:

Policy RC-4-b: **Conditions of Approval.** Develop and incorporate air quality maintenance requirements, compatible with Air Quality Attainment and Maintenance Plans, as conditions of approval for General Plan amendments, community plans, Specific Plans, neighborhood plans, Concept Plans, and development proposals.

Policy RC-4-c: **Evaluate Impacts with Models.** Continue to require the use of computer models used by SJVAPCD to evaluate the air quality impacts of plans and projects that require such environmental review by the City.

DISCUSSION

a) Conflict with or obstruct implementation of the applicable air quality plan?

The primary way of determining consistency with the region's air quality plan (AQP) assumptions is determining consistency with the applicable General Plan to ensure that the proposed project's population density and land use are consistent with the growth assumptions used in the AQPs for the air basin. The Fresno Council of Governments (COG) uses growth projections and land use information in adopted General Plans to estimate future average daily trips and vehicle miles traveled, which are then provided to SJVAPCD to estimate future emissions in the AQPs. Therefore, it follows that a project determined to be consistent with the City's General Plan would be consistent with the AQP assumptions.

The General Plan PEIR determined that buildout under the General Plan is predicted to

occur at growth rates consistent with those used by the SJVAPCD to develop the AQPs. Additionally, the goals and policies of the General Plan were found to be consistent with applicable control measures in the AQPs. Therefore, it was concluded that impacts from the General Plan would be less than significant.

The proposed project is consistent with the land uses envisioned in the General Plan, and no General Plan amendment would be required for the project to be implemented. Based on the General Plan land use designation of the project site, emissions related to development of the project would have been included in growth forecasts for the current AQPs as Office development. As such, it follows that the proposed project would not result in growth and associated emissions unforeseen in any local or regional plans. Therefore, impacts would be less than significant, and the proposed project would not result in new or more severe impacts than what was previously disclosed in the General Plan PEIR. No additional analysis is required.

b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?

Fresno County is in nonattainment for ozone (1-hour and 8-hour), PM10 (state standards) and PM2.5. The SJVAPCD has prepared the 2016 and 2013 Ozone Plan, 2007 PM10 Maintenance Plan, and 2012 PM2.5 Plan to achieve federal and state standards for improved air quality in the SJVAB regarding ozone and PM. The General Plan PEIR projected that General Plan implementation would result in significant and unavoidable impacts due to an exceedance of SJVAPCD standards for reactive organic gases (ROG), nitrogen oxides (NO_x), PM10, and PM2.5 emissions.

As discussed in item ‘a’ above, the proposed project is consistent with the currently adopted General Plan and is therefore consistent with the growth assumptions used in the AQPs. The AQ/GHG report determined that the proposed project would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under current federal or state standards. Therefore, the project would result in less-than-significant impacts and would not result in new or more severe impacts than what was previously disclosed in the General Plan PEIR. No additional analysis is required.

c) Expose sensitive receptors to substantial pollutant concentrations?

Sensitive receptors refer to those segments of the population most susceptible to poor air quality (i.e., children, the elderly, and those with pre-existing serious health problems affected by air quality). Land uses that have the greatest potential to attract these types of sensitive receptors include schools, parks, playgrounds, daycare centers, nursing homes, hospitals, and residential communities. The General Plan PEIR determined that cumulative growth within the City could result significant and unavoidable impacts regarding exposure of sensitive receptors to TAC emissions (i.e., diesel emissions).

The proposed project may potentially place sensitive receptors (medical office staff and patients) in the vicinity of existing sources, as well as introduce a new source of pollutants to nearby schools and parks. The CARB Air Quality and Land Use Handbook includes recommended buffer distances associated with various types of common pollutant sources. A screening level analysis for the project included in the AQ/GHG report showed that TACs would not be a concern for the project, based on recommended buffer distances. Additionally, short-term (construction) emissions and long-term emissions were both determined to be less than SJVAPCD emission thresholds for criteria pollutants. Therefore, impacts would be considered less than significant. The project would not result in new or more severe impacts than what was previously disclosed in the General Plan PEIR and no additional analysis is required.

d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

The SJVAPCD requires that an analysis of potential odor impacts be conducted for the following two situations:

- Generators – projects that would potentially generate odorous emissions proposed to be located near existing sensitive receptors or other land uses where people may congregate, and
- Receivers – residential or other sensitive receptor projects or other projects built for the intent of attracting people located near existing odor sources.

The General Plan PEIR determined that new development under the General Plan could potentially result in sensitive receptor projects being constructed near existing odor sources. However, Mitigation Measure AIR-4.1 would require developers of such projects to prepare an odor impact assessment, reducing impacts to less-than-significant levels.

The proposed project would not generate odorous emissions given the nature of medical office developments. Additionally, the types of facilities known to produce odors (for example, landfills) would not be located near the project site. Therefore, the project would not be considered a Generator or Receiver requiring additional analysis of odor impacts and Mitigation Measure AIR-4.1 would not be applicable. The project would result in less-than-significant impacts regarding odors and no mitigation would be required. Therefore, the project would not result in new or more severe impacts than what was previously disclosed in the General Plan PEIR and the criteria for further CEQA analysis are not met.

Project Requirements

None applicable.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
IV. BIOLOGICAL RESOURCES – Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?		☒		
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?				☒
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?				☒
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?				☒

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?				☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?				☒

ENVIRONMENTAL SETTING

A Biological Resources Assessment (BRA) was prepared by Dudek in April 2020 for the proposed project, included as Appendix B to this document. The BRA includes the results of a preliminary site evaluation and reconnaissance-level field survey to identify existing biological conditions, including the presence of natural vegetation communities, aquatic resources (e.g., wetlands and other waters), sensitive habitats, and the potential for special-status plant and wildlife species to occur within the project site. The BRA also incorporates the results of aquatic resources delineation.

The land cover types present within the project site include Ruderal Grassland, Developed land (limited to the portion of N. Corporate Drive), and Non-Jurisdictional Seasonally Ponded Feature. Most of the site is Ruderal Grassland consisting of annual, mostly non-native grasses indicative of disturbed areas. Landscaped shrubs and trees were present along the northern and western boundaries of the project site, including ornamental cherry (*Prunus* sp.), Callery pear (*Pyrus calleryana*), wax-leaf privet (*Ligustrum japonicum*), tree-of-heaven (*Ailanthus altissima*), and one Mexican fan palm (*Washingtonia filifera*) among others. A small depression containing low-growing, hydrophytic vegetation was located within the northwestern corner of the project site.

Searches of the California Natural Diversity Database (CNDDB) and California Native Plant Society (CNPS) revealed 13 special-status plant species potentially present at the project site or vicinity. However, based on further site evaluation, none of these plant species would be expected to occur at the site due to lack of suitable habitat. Results of the CNDDB and U.S. Fish and Wildlife Services (USFWS) Information for Planning and Consultation (IPaC) database queries revealed 24 special-status wildlife species potentially present at the project site or vicinity. Of these species, only six are considered to have potential (low to moderate) to

occur at the project site. These species include tricolored blackbird (*Agelaius tricolor*), burrowing owl (*Athene cunicularia*), Swainson's hawk (*Buteo swainsoni*), pallid bat (*Antrozous pallidus*), spotted bat (*Euderma maculatum*), and San Joaquin kit fox (*Vulpes macrotis mutica*).

DISCUSSION

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?

The General Plan PEIR determined that new development under the General Plan would result in a potentially significant impact to special-status species due to habitat loss and modifications. However, compliance with Mitigation Measures BIO-1.1 through BIO-1.4 which include avoidance and construction precautions would reduce the impact to less than significant.

As discussed in the Environmental Setting, 13 special-status plant species have been documented in the project vicinity but none of these species are expected to occur in the project site due to past and ongoing disturbance, the absence of suitable habitat, and/or the project site's location outside of the elevational range of the species. There are 24 special-status wildlife species that have been documented in the project vicinity but 18 of these species are not expected to occur within the project site due to past and ongoing disturbance of the project site and the absence of suitable habitat. The remaining six species have a low to moderate likelihood of occurrence within the project site. Two of these special-status species, the tricolored blackbird and spotted bat may occasionally forage across the project site but would not nest or roost on site due to lack of suitable nesting habitat, and the project site provides only marginal foraging habitat at most for these species. These species are highly mobile while foraging and would not be disturbed by future project-related activities.

Evidence of burrowing owl and San Joaquin kit fox occupation of the project site was not observed during the field survey. However, if these species were to move onto the site at some point in the future, they could be vulnerable to construction-related mortality. Swainson's hawks are uncommon in the project vicinity; the BRA notes that the closest known nesting occurrence was mapped generally to the Fresno area in 1936. However, in the event that a pair of Swainson's hawks could be nesting adjacent to the project site, they may be disturbed by future project-related activities such that they would abandon their nest(s). Bat species including pallid bat have the potential to roost in the trees that surround a portion of the site.

Similarly, a variety of native and other common bird species have the potential to nest on or adjacent to the project site. Killdeer, mourning doves, and Canada geese all have the potential to nest in ground vegetation within the ruderal lands of the project site. The

adjacent office buildings and landscaped trees and shrubs could be used by a number of common species, including northern mockingbirds, black phoebes, and western kingbirds. If birds were to nest on or adjacent to the project site, future project-related activities could result in the abandonment of active nests or direct mortality to birds.

The project would be required to comply with Mitigation Measures BIO-1.1 through BIO-1-4 in order to reduce these impacts. Pre-construction and avoidance measures would ensure that construction of the project would not adversely impact any of the six special-status species or native birds with the potential to occur on the project site. Therefore, this impact would be less than significant with mitigation and would not result in new impacts or more severe impacts than described in the General Plan PEIR, and the criteria for further CEQA review are not met.

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?

The General Plan PEIR determined that development of the General Plan would have the potential to adversely affect riparian habitat or other sensitive natural communities within the planning area. Mitigation Measures BIO-2.1 through BIO-2.3 would require pre-construction clearance surveys to determine whether a proposed project under the General Plan would result in impacts to these resources. With implementation of these mitigation measures, the General Plan PEIR determined that impacts would be less than significant.

As indicated in Appendix B, there are no riparian areas or sensitive natural communities located within the project site. Most of the site is Ruderal Grassland consisting of mostly non-native grasses indicative of disturbed areas. There is a small depression containing low-growing, hydrophytic vegetation at the northwestern corner of the project site, but this is not considered riparian habitat. Therefore, the proposed project would have no impact to these resources and would not require mitigation. The project would not result in new or more severe impacts than described in the General Plan PEIR, and the criteria for further CEQA review are not met.

c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

The General Plan PEIR determined that new projects under the General Plan could result in significant alteration or fill of a federally protected wetland, and compliance with Mitigation Measures BIO-3.1 and BIO-3.2 would be required to reduce these impacts to less-than-significant levels. These mitigation measures require formal wetland delineations for such projects and implementation of wetland mitigation and best management practices.

The results of the wetland delineation prepared for the project show that there are no state-

or federally-protected wetlands located within the project site. Therefore, the proposed project would have no impact to these resources and mitigation measures BIO-3.1 and BIO-3.2 would not be required. The project would not result in new or more severe impacts than described in the General Plan PEIR, and the criteria for further CEQA review are not met.

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

The General Plan PEIR concluded that impacts to native resident or migratory fish/wildlife and wildlife corridors would be less than significant with no mitigation required because new development would primarily be focused within existing disturbed and developed areas in the City.

Wildlife corridors are linear and/or regional habitats that provide connectivity to other natural vegetation communities within a landscape fractured by urbanization and other development. There is existing development surrounding the project site, which would not allow for easy travel, migration, or breeding within the site. The project site does not function as a wildlife corridor and does not support any wildlife nursery sites. Thus, there would be no impact to wildlife corridors or wildlife nursery sites. The project would not result in new or more severe impacts than described in the General Plan PEIR, and the criteria for further CEQA review are not met.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

The General Plan PEIR determined that impacts related to potential conflicts with local policies protecting biological resources (such as tree preservation policies) would be less than significant. It is assumed that future development would be required to comply with Article 3 of Chapter 13 of the City Code, which maintains a Special Trees List and Section 15-2308 of the City Code which governs the preservation of protected trees in the City.

The project does not include removal of any street trees, heritage trees, or trees on the City's Special Trees List. The project would require removal of one palm tree (Mexican fan palm *Washingtonia filifera*) located in the northwest area of the site but this is not considered a protected tree under Section 15-2308 of the City Code, which includes historic trees, parkway trees, and trees 12 inches or greater in diameter (or 38 inches or greater in circumference). The project would apply for a Tree Removal Permit and comply with applicable tree removal specifications. Therefore, the project would not conflict with local policies or ordinances protecting trees. No impact would occur. The project would not result in new or more severe impacts than described in the General Plan PEIR, and the criteria for further CEQA review are not met.

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

The General Plan PEIR found no impact with regard to any adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other relevant plans because the planning area is not within the boundaries of any approved plan. Accordingly, the project site is not within the boundaries of any such plans and there would be no impact. The project would not result in new or more severe impacts than described in the General Plan PEIR, and the criteria for further CEQA review are not met.

Project Requirements

The project shall implement and incorporate, as applicable, the Project Requirements as identified below and in the Project Requirements Checklist.

MM BIO-1.1 Construction of a proposed project shall avoid, where possible, vegetation communities that provide suitable habitat for a special-status species known to occur within the Planning Area. If construction within potentially suitable habitat must occur, the presence/absence of any special-status plant or wildlife species must be determined prior to construction, to determine if the habitat supports any special-status species. If a special-status species are determined to occupy any portion of a project site, avoidance and minimization measures shall be incorporated into the construction phase of a project to avoid direct or incidental take of a listed species to the greatest extent feasible.

MM BIO-1.2 Direct or incidental take of any state or federally listed species shall be avoided to the greatest extent feasible. If construction of a proposed project will result in the direct or incidental take of a listed species, consultation with the resources agencies and/or additional permitting may be required. Agency consultation through the CDFW 2081 and USFWS Section 7 or Section 10 permitting processes shall take place prior to any action that may result in the direct or incidental take of a listed species. Specific mitigation measures for direct or incidental impacts to a listed species will be determined on a case-by-case basis through agency consultation.

MM BIO-1.3 Development within the Planning Area shall avoid, where possible, special-status natural communities and vegetation communities that provide suitable habitat for special-status species. If a proposed project will result in the loss of a special-status natural community or suitable habitat for special-status species, compensatory habitat-based mitigation is required under CEQA and CESA. Mitigation shall consist of preserving on-site habitat, restoring similar habitat or purchasing off-site credits from an approved mitigation bank.

Compensatory mitigation shall be determined through consultation with the City and/or resource agencies. An appropriate mitigation strategy and ratio shall be agreed upon by the developer and lead agency to reduce project impacts to special-status natural communities to a less than significant level. Agreed-upon mitigation ratios shall depend on the quality of the habitat and presence/absence of a special-status species. The specific mitigation for project level impacts shall be determined on a case-by-case basis.

MM BIO-1.4 Proposed projects within the Planning Area should avoid, if possible, construction within the general nesting season of February through August for avian species protected under Fish and Game Code 3500 and the Migratory Bird Treaty Act (MBTA), if it is determined that suitable nesting habitat occurs on a project site. If construction cannot avoid the nesting season, a pre-construction clearance survey shall be conducted by a qualified biologist to determine if any nesting birds or nesting activity is observed on or within 500- feet of a project site. If an active nest is observed during the survey, a biological monitor shall be on site to ensure that no proposed project activities would impact the active nest. A suitable buffer shall be established around the active nest until the nestlings have fledged and the nest is no longer active. Project activities may continue in the vicinity of the nest only at the discretion of the biological monitor. Prior to commencement of grading activities and issuance of any building permits, the Director of the City of Fresno Planning and Development Department, or designee, shall verify that all proposed project grading and construction plans include specific documentation regarding the requirements of the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code Section 3503, that preconstruction surveys have been completed and the results reviewed by staff, and that the appropriate buffers (if needed) are noted on the plans and established in the field.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
V. CULTURAL RESOURCES – Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?		☒		
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?		☒		
c) Disturb any human remains, including those interred outside of formal cemeteries?		☒		

ENVIRONMENTAL SETTING

A Cultural Resources Records Search Memorandum was prepared for the project in April 2020 by Dudek, included as Appendix C to this document. The memorandum summarizes the results of a records search completed for the project site and a 0.5-mile radius by Southern San Joaquin Valley Information Center (SSJVIC) staff at California State University, Bakersfield. This search included a review of their collection of mapped prehistoric, historical, and built-environment resources, Department of Parks and Recreation (DPR) Site Records, technical reports, historical maps, and local inventories. Additional consulted sources included the National Register of Historic Places (NRHP), California Register of Historical Resources (CRHR) and listed Office of Historic Preservation Archaeological Determinations of Eligibility, California Points of Historical Interest, and California Historical Landmarks.

SSJVIC records indicate that no archaeological or built-environment resources are on file within or adjacent to the project site. One resource was on file within the 0.5-mile records search area associated with a historic canal east of the project site but was found to be ineligible for listing in the National Register of Historic Places NRHP by the Federal Highway Administration in 2018.

DISCUSSION

a) Cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5?

The General Plan PEIR determined that development in accordance with the General Plan would result in potential impacts to unknown historic-era resources that are located subsurface. However, implementation of General Plan policies and Mitigation Measures CUL-1.1 and CUL-1.2 would reduce the impact to a less-than-significant level. These mitigation measures require construction to stop if previously unknown resources are encountered, and a qualified historical (or archeology) resources specialist to be consulted to make recommendations to protect the resources. Additionally, any discretionary project that could result in an adverse change to such resources would require a site-specific evaluation by a professional who meets the Secretary of Interior's qualifications.

The project site does not contain any buildings or structures and based on the records search, the potential to discover any historic-era resources is low. However, ground-disturbing construction activities could lead to the discovery of previously unknown resources. Therefore, the project would comply with Mitigation Measures CUL-1.1 and CUL-2.2 to reduce the impact to a less-than-significant level. The project would not result in new or more severe impacts than described in the General Plan PEIR, and the criteria for further CEQA review are not met.

b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?

Similar to the discussion above, the General Plan PEIR determined that potential impacts to archaeological resources could be mitigated by compliance with Mitigation Measure CUL-2, which describes proper procedure in the event archaeological resources are discovered during construction activities.

While it is unlikely that project construction would unearth any subsurface archaeological resources due to the disturbed nature of the site and vicinity and the results of the records search, the proposed project has the potential to damage or destroy unknown subsurface archeological resources during ground-disturbing construction activities. The project would comply with Mitigation Measure CUL-2 to reduce this potentially significant impact to a less-than-significant level. The project would not result in new or more severe impacts than described in the General Plan PEIR, and the criteria for further CEQA review are not met.

c) Disturb any human remains, including those interred outside of formal cemeteries?

The General Plan PEIR found no evidence of prehistoric cemeteries or Native American cemeteries and there is no record of isolated human remains or unknown cemeteries. However, there is always a possibility that ground-disturbing activities associated with future development may uncover previously unknown buried human remains. Therefore, the General Plan PEIR determined that this impact would be potentially significant requiring Mitigation Measure CUL-3, which is consistent with federal and state regulations regarding the discovery of human remains, specifically California Health Safety Code Section 7050.5

and Public Resources Code Section 5097.98. The proposed project would be required to comply with Mitigation Measure CUL-3 and would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

Project Requirements

The proposed project shall implement and incorporate, as applicable, the cultural resource related Project Requirements as identified below and in the Project Requirements Checklist.

MM CUL-1.1 If previously unknown resources are encountered before or during grading activities, construction shall stop in the immediate vicinity of the find and a qualified historical resources specialist shall be consulted to determine whether the resource requires further study. The qualified historical resources specialist shall make recommendations to the City on the measures that shall be implemented to protect the discovered resources, including but not limited to excavation of the finds and evaluation of the finds in accordance with Section 15064.5 of the CEQA Guidelines and the City's Historic Preservation Ordinance.

If the resources are determined to be unique historical resources as defined under Section 15064.5 of the CEQA Guidelines, measures shall be identified by the monitor and recommended to the Lead Agency. Appropriate measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds.

No further grading shall occur in the area of the discovery until the Lead Agency approves the measures to protect these resources. Any historical artifacts recovered as a result of mitigation shall be provided to a City-approved institution or person who is capable of providing long-term preservation to allow future scientific study.

MM CUL-1.2 Prior to approval of any discretionary project that could result in an adverse change to a potential historic and/or cultural resource, the City shall require a site-specific evaluation of historic and/or cultural resources by a professional who meets the Secretary of Interior's Qualifications. The evaluation shall provide recommendations to mitigate potential impacts to historic and/or cultural resources and shall be approved by the Directory of Planning and Development.

MM CUL-2 Subsequent to a preliminary City review of the project grading plans, if there is evidence that a project will include excavation or construction activities within previously undisturbed soils, a field survey and literature search for

prehistoric archaeological resources shall be conducted. The following procedures shall be followed.

If prehistoric resources are not found during either the field survey or literature search, excavation and/or construction activities can commence. In the event that buried prehistoric archaeological resources are discovered during excavation and/or construction activities, construction shall stop in the immediate vicinity of the find and a qualified archaeologist shall be consulted to determine whether the resource requires further study. The qualified archaeologist shall make recommendations to the City on the measures that shall be implemented to protect the discovered resources, including but not limited to excavation of the finds and evaluation of the finds in accordance with Section 15064.5 of the CEQA Guidelines. If the resources are determined to be unique prehistoric archaeological resources as defined under Section 15064.5 of the CEQA Guidelines, mitigation measures shall be identified by the monitor and recommended to the Lead Agency. Appropriate measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. No further grading shall occur in the area of the discovery until the Lead Agency approves the measures to protect these resources. Any prehistoric archaeological artifacts recovered as a result of mitigation shall be provided to a City-approved institution or person who is capable of providing long-term preservation to allow future scientific study.

If prehistoric resources are found during the field survey or literature review, the resources shall be inventoried using appropriate State record forms and submit the forms to the Southern San Joaquin Valley Information Center. The resources shall be evaluated for significance. If the resources are found to be significant, measures shall be identified by the qualified archaeologist. Similar to above, appropriate mitigation measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. In addition, appropriate mitigation for excavation and construction activities in the vicinity of the resources found during the field survey or literature review shall include an archaeological monitor. The monitoring period shall be determined by the qualified archaeologist. If additional prehistoric archaeological resources are found during excavation and/or construction activities, the procedure identified above for the discovery of unknown resources shall be followed.

MM CUL-3 In the event that human remains are unearthed during excavation and grading activities of any future development project, all activity shall cease immediately. Pursuant to Health and Safety Code (HSC) Section 7050.5, no further disturbance shall occur until the County Coroner has made the

necessary findings as to origin and disposition pursuant to PRC Section 5097.98(a). If the remains are determined to be of Native American descent, the coroner shall within 24 hours notify the Native American Heritage Commission (NAHC). The NAHC shall then contact the most likely descendent of the deceased Native American, who shall then serve as the consultant on how to proceed with the remains. Pursuant to PRC Section 5097.98(b), upon the discovery of Native American remains, the landowner shall ensure that the immediate vicinity, according to generally accepted cultural or archaeological standards or practices, where the Native American human remains are located is not damaged or disturbed by further development activity until the landowner has discussed and conferred with the most likely descendants regarding their recommendations, if applicable, taking into account the possibility of multiple human remains. The landowner shall discuss and confer with the descendants all reasonable options regarding the descendants' preferences for treatment.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VI. ENERGY – Would the project:				
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?			☒	
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?			☒	

ENVIRONMENTAL SETTING

Federal and state agencies regulate energy use and consumption through various means and programs. On the federal level, the US Department of Transportation, the US Department of Energy, and the US Environmental Protection Agency are three federal agencies with substantial influence over energy policies and programs. On the state level, the California Public Utilities Commission (CPUC) and the California Energy Commission (CEC) are two agencies with authority over different aspects of energy.

Listed below are policies from the General Plan relevant to the discussion below (City of Fresno 2014):

Policy RC-5-c: **GHG Reduction through Design and Operations.** Increase efforts to incorporate requirements for GHG emission reductions in land use entitlement decisions, facility design, and operational measures subject to City regulation through the following measures and strategies:

- Promote appropriate energy and water conservation standards and facilitate mixed-use projects, new incentives for infill development, and the incorporation of mass transit, bicycle and pedestrian amenities into public and private projects.

Policy RC-7-c: **Best Practices for Conservation.** Require all City facilities and all new private development to follow U.S. Bureau of Reclamation Best Management Practices for water conservation, as warranted and appropriate.

Policy RC-8-c: **Energy Conservation in New Development.** Consider providing an incentive program for new buildings that exceed California Energy Code requirements by fifteen percent.

Policy LU-2-a: **Infill Development and Redevelopment.** Promote development of vacant, underdeveloped, and re-developable land within the City Limits where urban services are available by considering the establishment and implementation of supportive regulations and programs.

DISCUSSION

a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

The General Plan PEIR determined that compliance with federal, state, and local standards regulating energy consumption, as well as General Plan policies focused on sustainability would result in less-than-significant impacts regarding the consumption of energy resources. It is also noted that the energy efficiency of buildings is expected to continue to increase and improve throughout time, as new energy efficiency standards are established.

The proposed project would be U.S. Green Building Council LEED certified and would be designed and constructed in accordance with the latest adopted edition of the California Code of Regulations (CCR) included in Title 24 Energy Efficiency Standards. Part 6 of Title 24 of the CCR establishes energy efficiency standards for residential and non-residential buildings constructed in California to reduce energy demand and consumption. Title 24 also includes Part 11, California's Green Building Standards (CALGreen). CALGreen institutes

mandatory minimum environmental performance standards for new construction. The proposed project would meet all applicable Title 24 and CALGreen standards to reduce energy demand and increase energy efficiency. Some of the project's energy conservation features include photovoltaic canopies over parking stalls, LED lighting, and EV charging. The project would be required to comply with applicable General Plan policies and would not result in new or more severe energy impacts than those disclosed in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

The General Plan PEIR determined that there would be no conflict with state or local plans for renewable energy or energy efficiency. As discussed above in item 'a', the project would be designed and constructed in accordance with Title 24 and CALGreen standards to reduce energy demand and increase energy efficiency. The project therefore would not result in new or more severe energy impacts than those disclosed in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

Project Requirements

None applicable.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VII. GEOLOGY AND SOILS – Would the project:				
a) Directly or Indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				☒
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.				☒

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
ii) Strong seismic ground shaking?			☒	
iii) Seismic-related ground failure, including liquefaction?			☒	
iv) Landslides?			☒	
b) Result in substantial soil erosion or the loss of topsoil?			☒	
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?			☒	
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?			☒	
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?				☒
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?			☒	

ENVIRONMENTAL SETTING

A Geotechnical Investigation was performed for the project site by Atlas Technical Consultants in October 2022 and is included as Appendix D to this document. The report evaluates the geotechnical conditions at the project site and provides engineering recommendations to ensure safety and compliance with the codes and regulations under the California Department

of Health Care Access and Information. The discussion and analysis below summarizes information and recommendations from the geotechnical report.

Compared to the rest of California, the City is located within one of the more geologically stable areas across the state. The City is not within an Alquist-Priolo Fault Zone or any known active earthquake fault zone (CGS 2022). No known active faults pass through the site and the risk of fault rupture is considered low. The San Andreas Fault zone, approximately 70 miles southwest of the site, as well as the Owens Valley Fault zone approximately 85 miles to the northeast of the site are the closest principal active faults to the site.

According to the report, soils on the project site consist of medium dense to very dense silty to clayey sands with very low to low expansion potential, and the risk of liquefaction at the project site is extremely low. The project site is flat, ranging from 330 – 335 feet above mean sea level.

Listed below are relevant policies from the City of Fresno General Plan (City of Fresno 2014):

Policy NS-2-a: **Seismic Protection**. Ensure seismic protection is incorporated into new and existing construction, consistent with the Fresno Municipal Code.

Policy NS-2-b: **Soil Analysis Requirement**. Identify areas with potential geologic and/or soils hazards and require development in these areas to conduct a soil analysis and mitigation plan by a registered civil engineer (or engineering geologist specializing in soil geology) prior to allowing on-site drainage or disposal for wastewater, stormwater runoff, or swimming pool/spa water.

DISCUSSION

a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

The General Plan PEIR determined that because no active faults occur within the General Plan area, impacts associated with fault rupture would be less than significant. Accordingly, a review of the most recent Alquist-Priolo Earthquake Fault Zoning Map indicates that the project site is not within an Alquist-Priolo Earthquake Fault Zone (CGS 2022). The proposed project would result in no impact and would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

ii. Strong seismic ground shaking?

Major active faults and fault zones occur at some distance to the east, west, and south of the City. However, the distance between the City and major faults minimizes this potential hazard. As discussed in the setting above, General Plan Policy NS-2-a requires that seismic protection is incorporated into new and existing construction, consistent with the City Code. The General Plan PEIR concluded that with implementation of the General Plan policies and compliance with the California Building Code (CBC) seismic standards, hazards associated with ground shaking would be less than significant. The proposed project would adhere to these requirements and recommendations, and impacts would not change from what was previously identified in the General Plan PEIR. The proposed project's impacts would be less than significant and there would be no new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

iii. Seismic-related ground failure, including liquefaction?

According to the General Plan PEIR, the potential for soil liquefaction ranges from very low to moderate due to the variable density of subsurface soils and presence of shallow groundwater within the City. The PEIR determined that compliance with General Plan Policies NS-2a through NS-2d, which require the City to minimize geological and seismic risks at new developments, would ensure that impacts are less than significant. Compliance with General Plan policies and City Code Section 11-101, which also requires compliance with the CBC, would result in less-than-significant soil liquefaction impacts. Therefore, the proposed project would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

iv. Landslides?

The General Plan PEIR notes that most of the City consists of flat topography with no risk of landslides. However, there is the potential for landslides along steep banks of rivers, creeks, or drainage basins such as the San Joaquin River bluff. The General Plan PEIR determined that compliance with applicable General Plan policies and the City Code would ensure that impacts are less than significant. As discussed in the setting above, the project site is relatively flat and is not located in an area that would be subject to landslides. Therefore**,** there would be no impact and the proposed project would not result in new or substantially more severe impacts than identified in the General Plan PEIR. No further CEQA review is required.

b) Result in substantial soil erosion or the loss of topsoil?

According to the General Plan PEIR, new development anticipated under the General Plan would be located in relatively flat areas that would not require substantial alteration of

topography causing erosion. Additionally, Section 15-1603 of the City Code presents grading and erosion control measures and Section 15-3302 requires projects to be conditioned on compliance with those requirements. Compliance with the City Code would ensure that impacts related to soil erosion, or the loss of topsoil, would be less than significant. Construction activities would result in loose soil temporarily exposed to erosive forces. However, the project would comply with the required grading and erosion control measures in order to ensure that project impacts would be less than significant. Because the project would disturb greater than one acre of land, compliance with Construction General Permit requirements and preparation of a Stormwater Pollution Prevention Plan (SWPPP) would also be required. The SWPPP would identify best management practices (BMPs) that are intended to prevent erosion during construction activity to avoid contributing sediment into local waterways. Therefore, the proposed project would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

Impacts associated with liquefaction and landslides are discussed under item ‘a’ above. As previously discussed, these impacts would be less than significant.

The General Plan PEIR notes that portions of the San Joaquin Valley have been subject to land subsidence or collapse due to groundwater and petroleum extraction. However, this is not a concern in the areas where new development designated under the General Plan would occur. Continued implementation of the aforementioned General Plan policies and City Code requirements would ensure that impacts related to this topic remain less than significant. Accordingly, the project would not be located in an area subject to these geologic hazards and would comply with relevant policies and City requirements. Therefore, the proposed project would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994, as updated), creating substantial direct or indirect risks to life or property?

Soil expansiveness is determined by shrink-swell potential, which represent the soil’s tendency for shrinking and swelling from moisture. According to the General Plan PEIR, there are some areas in the northern portion of the City that possess expansive clay soils and require unique construction standards for foundations and infrastructure. General Plan Policy NS-2-b requires the identification of areas with potential geologic and/or soils hazards and requires development within those identified areas to complete a soil analysis along with a mitigation plan. In accordance with the General Plan, City Code Section 12-

1022 also requires projects to prepare a preliminary soil report. The implementation of General Plan policies and compliance with Fresno Municipal Code would reduce potential impacts associated with unstable geologic conditions and expansive soils to a less-than-significant level.

In accordance with City requirements, a Geotechnical Investigation was conducted for the project (see Appendix D) which determined that the project site is underlain by soils with very low to low expansion potential. The project would comply with the recommendations of the Geotechnical Investigation as well as other regulations concerning the construction of new buildings, such as the CBC. Compliance with the CBC and site-specific recommendations in the Geotechnical Investigation would ensure that the proposed MOB would be designed and engineered to withstand impacts of expansive and unstable soils. Therefore, project impacts would be less than significant, as concluded in the General Plan PEIR. This impact has been adequately addressed and would not change from what was identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

The General Plan PEIR determined that because new septic tanks are prohibited by the City for development within the City limits, no impacts related to this criterion would not occur. The proposed project would not involve the use of septic tanks or alternative wastewater disposal systems and therefore would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

The General Plan PEIR determined that future construction activities have the potential to impact paleontological resources within previously undisturbed soils. The General Plan PEIR proposed Mitigation Measure GEO-6.1 which requires that if a project includes excavation or construction activities within previously undisturbed soils, a field survey and literary search for paleontological resources shall be conducted. If unique paleontological or geological resources are discovered during construction activities, construction is required to stop, and a qualified paleontologist shall be consulted to determine if the resources need to be further studied and if mitigation is needed. Compliance with Mitigation Measure GEO-6.1 would reduce the impact to a less-than-significant level.

The project site is vacant but appears to have been disturbed by regular mowing and other maintenance activities. The site is also surrounded by existing urban development, including an office complex to the northeast and a baseball park to the west. For these

reasons it appears the project site has low potential for unique paleontological resources. Nevertheless, the proposed project would be required to comply with Mitigation Measure GEO-6.1 which outlines the proper procedure in the event any paleontological resources are encountered. The proposed project would also comply with all federal and state regulations related to paleontological resources. Thus, the proposed project's impacts would be less than significant and would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

Project Requirements

The proposed project shall implement and incorporate, as applicable, the geology and soils related Project Requirements as identified below and in the Project Requirements Checklist.

MM GEO-6.1 Subsequent to a preliminary City review of the project grading plans, if there is evidence that a project will include excavation or construction activities within previously undisturbed soils, a field survey and literature search for unique paleontological/geological resources shall be conducted. The following procedures shall be followed:

- If unique paleontological/geological resources are not found during either the field survey or literature search, excavation and/or construction activities can commence. In the event that unique paleontological or geological resources are discovered during excavation and/or construction activities, construction shall stop in the immediate vicinity of the find and a qualified paleontologist shall be consulted to determine whether the resource requires further study. The qualified paleontologist shall make recommendations to the City on the measures that shall be implemented to protect the discovered resources, including but not limited to, excavation of the finds and evaluation of the finds. If the resources are determined to be significant, mitigation measures shall be identified by the monitor and recommended to the Lead Agency. Appropriate mitigation measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. No further grading shall occur in the area of the discovery until the Lead Agency approves the measures to protect these resources. Any paleontological/geological resources recovered as a result of mitigation shall be provided to a City-approved institution or person who is capable of providing long-term preservation to allow future scientific study.

- If unique paleontological/geological resources are found during the field survey or literature review, the resources shall be inventoried and evaluated for significance. If the resources are found to be significant,

mitigation measures shall be identified by the qualified paleontologist. Similar to above, appropriate mitigation measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. In addition, appropriate mitigation for excavation and construction activities in the vicinity of the resources found during the field survey or literature review shall include a paleontological monitor. The monitoring period shall be determined by the qualified paleontologist. If additional paleontological/geological resources are found during excavation and/or construction activities, the procedure identified above for the discovery of unknown resources shall be followed.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VIII. GREENHOUSE GAS EMISSIONS – Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?			☒	
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?			☒	

Environmental Setting

Assembly Bill (AB) 32 requires California to reduce greenhouse gas (GHG) emissions, statewide, to 1990 levels by the year 2020. The California Air Resources Board (CARB), under AB 32, is required to establish a program for statewide GHG emissions reporting, as well as monitoring and enforcement for the reporting program. In addition, Senate Bill (SB) 375, established through CARB, requires metropolitan planning organizations to prepare sustainable communities strategies to demonstrate how a region will meet CARB's GHG reduction targets. The Fresno COG 2022 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) was approved in July 2022 and addresses climate goals set by the state (Fresno COG 2022). The City also has a Greenhouse Gas Reduction Plan (GHG Plan) that was adopted as part of the General Plan Update in 2014.

Listed below are relevant policies from the City of Fresno General Plan (City of Fresno 2014):

Policy LU-2-a: **Infill Development and Redevelopment.** Promote development of vacant, underdeveloped, and re-developable land within the City Limits where urban services are available by considering the establishment and implementation of supportive regulations and programs.

Policy RC-5-a: **Support State Goal to Reduce Statewide GHG Emissions.** As is consistent with State law, strive to meet AB 32 goal to reduce greenhouse gas emissions to 1990 levels by 2020 and strive to meet a reduction of 80 percent below 1990 levels by 2050 as stated in Executive Order S-03-05. As new statewide GHG reduction targets and dates are set by the State update the City's Greenhouse Gas Reduction Plan to include a comprehensive strategy to achieve consistency with those targets by the dates established.

Policy RC-5-c: **GHG Reduction through Design and Operations.** Increase efforts to incorporate requirements for GHG emission reductions in land use entitlement decisions, facility design, and operational measures subject to City regulation through the following measures and strategies:

- Promote appropriate energy and water conservation standards and facilitate mixed-use projects, new incentives for infill development, and the incorporation of mass transit, bicycle and pedestrian amenities into public and private projects.

Policy RC-5-d: **SCS and CAP Conformity Analysis.** Ensure that the City includes analysis of a project's conformity to an adopted regional Sustainable Community Strategy or Alternative Planning Strategy (APS), an adopted Climate Action Plan (CAP), and any other applicable City and regional greenhouse gas reduction strategies in affect at the time of project review.

Policy RC-5-e: **Ensure Compliance.** Ensure ongoing compliance with GHG emissions reduction plans and programs by requiring that air quality measures are incorporated into projects' design, conditions of approval, and mitigation measures.

DISCUSSION

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

The General Plan PEIR determined that General Plan implementation would result in the generation of GHG emissions through the use of motor vehicles, electricity, natural gas,

solid waste, offroad equipment, and ozone depleting substance substitutes (refrigerants); however, the analysis concluded that even with increased growth under the General Plan, the City would reduce GHG emissions per capita due to compliance with state mandates. Therefore, the General Plan PEIR concluded that impacts related to GHG emissions would be less than significant.

The proposed project is not of sufficient scale or scope to result in a project- or site-specific impact with respect to GHG emissions, and therefore would not result in a direct or indirect significant impact on the environment. Moreover, because the proposed project is consistent with the General Plan PEIR, its implementation would not result in any new significant effects or increase the severity of previously identified environmental effects as compared with the General Plan PEIR. Thus, the criteria for requiring further CEQA review are not met.

b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

The General Plan PEIR determined that the General Plan would not conflict with applicable plans, policies, or regulations adopted for the purpose of reducing GHG emissions.

The City's GHG Plan is a comprehensive policy document adopted to achieve compliance with state mandates by focusing on feasible actions the City can take to minimize GHG emissions impacts. Moreover, the GHG Plan was adopted to assist with the streamlining of future projects' CEQA analysis, in that if an individual project demonstrates compliance with the GHG Plan it would have a less-than-significant effect on GHG emissions. The proposed project is consistent with the General Plan and would be required to comply with the City's GHG Plan and therefore would not result in any emissions beyond those analyzed in the General Plan PEIR. The project impact would be less than significant and the criteria for requiring further CEQA review are not met.

Project Requirements

None applicable.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
IX. HAZARDS AND HAZARDOUS MATERIAL – Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?			☒	
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?			☒	
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?			☒	
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?			☒	
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?			☒	

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?			☒	
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?			☒	

ENVIRONMENTAL SETTING

Hazardous materials and hazardous wastes are heavily regulated by federal, state and local agencies including the California EPA and the California Department of Toxic Substances Control (DTSC). A Phase 1 Environmental Site Assessment (ESA) was prepared by Terracon Consultants for the project in 2018 and is included as Appendix E to this document. The Phase 1 ESA states that the project site was historically used for agriculture from the late 1930s through the early 1970s. Due to the historical use of the land for agriculture, there is potential that agricultural chemicals such as pesticides, herbicides and fertilizers were used at some point in time. The Phase 1 ESA identified one Recognized Environmental Condition (REC) related to the unknown origin of soil stockpiles on the site. The project site is not listed in a hazardous materials site compiled pursuant to Government Code Section 65962.5, also known as the “Cortese List”.

The HazMat Compliance Program is under Fresno County’s designated Certified Unified Program Agency (CUPA) with the goal of protecting the public from hazardous materials accidents (Fresno County 2023). Under the CUPA there is a Hazardous Materials Business Plan (HMBP) program, which regulates the handling and storage of hazardous materials greater than or equal to 55 gallons of liquid, 500 pounds of solids, and 200 cubic feet of compressed gas. The HMBP is intended to protect the community and its first responders from accidents and fatalities. Fresno County also has an adopted Multi-jurisdictional Local Hazard Mitigation Plan which identifies risks and strategies for emergency response (Fresno County 2018).

The closest schools to the project site include Kids Kare River Park located 0.1 miles northeast, Fresno School of Music located approximately 0.4 miles southeast, Lincoln Elementary School located approximately 0.5-mile northeast and Kastner Intermediate School located 1.1 miles north of the project site. The project site is not within the Land Use Compatibility Area for the

Fresno-Yosemite International Airport, Fresno Chandler Executive Airport, nor the Sierra Sky Park. The project site is not subject to FAA-related restrictions.

The project site is not located in a High Fire or Moderate Fire Severity Zone. According to the CalFire Fire Hazard Severity Map for Fresno County, the nearest High Fire Severity Zone is located approximately 14 miles east of the Project site.

Listed below are relevant policies from the City of Fresno General Plan (City of Fresno 2014):

Policy PU-3-d: **Review all Development Applications.** Continue Fire Department review of development applications, provide comments and recommend conditions of approval that will ensure adequate on-site and off-site fire protection systems and features are provided.

Policy PU-3-e: **Building Codes.** Adopt and enforce amendments to construction and fire codes, as determined appropriate, to systematically reduce the level of risk to life and property from fire, commensurate with the City's fire suppression capabilities.

Policy NS-4-a: **Processing and Storage.** Require safe processing and storage of hazardous materials, consistent with the California Building Code and the Uniform Fire Code, as adopted by the City.

Policy NS-4-b: **Coordination.** Maintain a close liaison with the Fresno County Environmental Health Department, Cal-EPA Division of Toxics, and the State Office of Emergency Services to assist in developing and maintaining hazardous material business plans, inventory statements, risk management prevention plans, and contingency/ emergency response action plans.

Policy NS-4-c: **Soil and Groundwater Contamination Reports.** Require an investigation of potential soil or groundwater contamination whenever justified by past site uses. Require appropriate mitigation as a condition of project approval in the event soil or groundwater contamination is identified or could be encountered during site development.

Policy NS-4-d: **Site Identification.** Continue to aid federal, State, and County agencies in the identification and mapping of waste disposal sites (including abandoned waste sites), and to assist in the survey of the kinds, amounts, and locations of hazardous wastes.

Policy NS-4-e: **Compliance with County Program.** Require that the production, use, storage, disposal, and transport of hazardous materials conform to the standards and procedures established by the County Division of

Environmental Health. Require compliance with the County's Hazardous Waste Generator Program, including the submittal and implementation of a Hazardous Materials Business Plan, when applicable.

Policy NS-4-f: **Hazardous Materials Facilities.** Require facilities that handle hazardous materials or hazardous wastes to be designed, constructed, and operated in accordance with applicable hazardous materials and waste management laws and regulations.

Policy NS-4-g: **Hazmat Response.** Include policies and procedures appropriate to hazardous materials in the City's disaster and emergency response preparedness and planning, coordinating with implementation of Fresno County's Hazardous Materials Incident Response Plan.

DISCUSSION

a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

The General Plan PEIR determined that future development under the General Plan could involve the generation of hazardous materials as well as the routine use and handling of hazardous materials. However, implementation of General Plan policies in coordination with existing regulations regarding hazardous materials would reduce impacts to less-than-significant levels.

The proposed project would involve some handling of hazardous materials during construction and operation. Project construction activities would involve temporary use of hazardous materials, including fuel for construction equipment, paints, solvents, and sealants. Storage, handling, and use of these materials would occur in accordance with standard construction best management practices to minimize the potential for spill or release and ensure that any such spill or release would be controlled on site. Project construction contractors are required by state law to implement and comply with existing hazardous material regulations.

During operation, the new MOB would routinely store, use, handle, and dispose of a variety of medical waste that is considered hazardous. Pursuant to the State of California Medical Waste Management Act, the project would be required to prepare a medical waste management plan (MWMP) for submittal to the California Department of Public Health. The MWMP would describe the types and amounts of medical waste generated and how the waste would be disposed. Additionally, in accordance with California Health and Safety Code, Article 1, Chapter 6.95 for the business emergency plan, the project must also prepare a HMBP for submittal to the California Environmental Reporting System. Implementation of the MWMP and HMBP would reduce potentially significant impacts related to operational hazards and hazardous materials.

The proposed project would also comply with existing regulations related to the transport, use and disposal of hazardous materials. As described in the setting above, the project site has historically been used for agricultural purposes. The Phase 1 ESA prepared for the project noted that there was one REC present on the site associated with soil stockpiles of unknown origin. It is recommended that the project removes and disposes of approximately 200 cubic yards of the 2,000 cubic yards of stockpiled soil on the site. These stockpiles would be properly handled and disposed in accordance with local and state regulations, and thus would not result in a significant environmental concern. Project impacts would be less than significant and would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

The General Plan PEIR determined that future development under the General Plan would involve the use of hazardous materials, but implementation of General Plan policies in coordination with existing regulations regarding hazardous materials would reduce impacts to less-than-significant levels.

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

Future development under the General Plan is anticipated to occur within 0.25 miles of existing or proposed schools. However, compliance with the City's General Plan policies would ensure that potential impacts to proposed or existing schools would be reduced. Further, any generation, transport, or treatment of hazardous materials would be required to comply local, state, and federal requirements including the DTSC's Hazardous Waste Management Program and the California Accidental Release Prevention Program. Therefore, the General Plan PEIR concluded that impacts would be less than significant.

The proposed project includes development of a medical office building within 0.25 miles of an existing or proposed school. The closest schools to the project site are Kids Kare River Park located 0.1 miles northeast, Fresno School of Music located approximately 0.4 miles southeast, and Lincoln Elementary School located approximately 0.5 miles northeast of the site. However, it is assumed that the project would comply with all applicable state and local regulations regarding the use and storage hazardous materials or substances including General Plan policies. Therefore, the project impact would be less than significant would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

According to the General Plan PEIR, the majority of known contaminated sites within the City are associated with leaking underground storage tanks largely clustered south of Downtown Fresno. The General Plan PEIR states that while new development could be located on a contaminated site, the site would be required to be remediated to address any on-site hazardous materials, consistent with existing regulations and General Plan policies. This would ensure that impacts from future projects would be less than significant.

The Phase 1 ESA prepared for the project indicated that the project site is not listed in a list of hazardous materials sites compiled pursuant to Government Code Section 65962. The search of regulatory lists for hazardous materials sites in the vicinity of the project site did not identify any obvious potential sources of off-site contamination that could affect the project site. Therefore, impacts would not change from what was identified in the General Plan PEIR and project impacts would remain less than significant. The proposed project would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?

The project site is not within the Land Use Compatibility Area for the Fresno-Yosemite International Airport, Fresno Chandler Executive Airport, nor the Sierra Sky Park. The closest airport to the site is the Sierra Sky Park airport located approximately 6.3 miles west of the site. Thus, the project would not result in new impacts not analyzed in the General Plan PEIR and impacts would remain less than significant. The criteria for requiring further CEQA review are not met.

f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

As discussed in the setting above, Fresno County maintains the Multi-jurisdictional Local Hazard Mitigation Plan (Fresno County 2018). The City's General Plan also includes several policies ensuring an efficient and coordinated response to emergencies and natural disasters. For example, General Plan Policy NS-6-f requires that proposed developments maintain adequate access for emergency vehicles and equipment, including adequate widths, turning radii, and vertical clearance. The project would not include any components that would interfere with emergency evacuation or with the County's Multi-jurisdictional Local Hazard Mitigation Plan.

The project would include two access points at the existing intersections of E. Locust Avenue and First Street as well as N. Corporate Drive (private driveway) and First Street. Project plans would be submitted to the City's Fire Department for review and approval to ensure that emergency access is sufficient at the site. The proposed project would comply with California Fire Code requirements for emergency access which would ensure that the project would not result in new or more severe impacts than what was disclosed in the General Plan PEIR. No mitigation measures are required and the criteria for requiring further CEQA review are not met.

g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?

The City's General Plan policies address wildland fires and require the City to continue to improve firefighting capabilities, in addition to enforcing building codes to minimize fire risk. The General Plan PEIR concludes that with the continued implementation of General Plan policies, impacts regarding wildland fires would be reduced to less-than significant levels.

The project site consists of flat, vacant land that previously supported agricultural uses. As discussed in the setting above, the project site and land surrounding the project site are not within a Very High Fire Hazard Severity Zone. The nearest Very High Fire Hazard Severity Zone in a State Responsibility Area is located approximately 14 miles east of the project site (CAL FIRE 2023). Therefore, it is unlikely that the proposed project would expose people or structures to a significant risk of loss, injury or death involving wildland fires. The project would also be constructed consistent with California Fire Code requirements. Impacts would be less than significant, and the project would not result in new or more severe impacts than what was disclosed in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

Project Requirements

None applicable.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
X. HYDROLOGY AND WATER QUALITY – Would the project:				
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?			☒	
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?			☒	
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner which would:			☒	
i) Result in a substantial erosion or siltation on- or off-site;			☒	
ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site:			☒	
iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or			☒	
iv) impede or redirect flood flows?			☒	

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?			☒	
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?			☒	

ENVIRONMENTAL SETTING

The San Joaquin River and the Kings River are the principal rivers that influence the hydrology in the City's Planning Area. The Planning Area is underlain by the Kings River Sub-basin, which, along with six other sub-basins, comprises the San Joaquin Valley Groundwater Basin. The Kings River Sub-basin extends from the Sierra Nevada foothills on the east to the San Joaquin Valley trough on the west, and from the San Joaquin River on the north to roughly the Fresno County line on the south.

Historically, water demand within the Planning Area has been met by extracting groundwater from the Kings Sub-basin. Since the commissioning of the City's first surface water treatment facility (SWTF) in 2004, the City has expanded its surface water treatment capabilities and now has three SWTFs that provide approximately half of all potable water demand in the area (City of Fresno 2021).

The proposed project is designated as FEMA Flood Zone X, which represents areas of minimal flood hazard (FEMA 2009).

Listed below are relevant policies from the City of Fresno General Plan (City of Fresno 2014):

Policy POSS-6-b: **Effects of Stormwater Discharge.** Support efforts to identify and mitigate cumulative adverse effects on aquatic life from stormwater discharge to the San Joaquin River.

- Avoid discharge of runoff from urban uses to the San Joaquin River or other riparian corridors.
- Approve development on sites having drainage (directly or indirectly) to the San Joaquin River or other riparian areas only upon a finding that adequate measures for preventing pollution of

natural bodies of water from their runoff will be implemented.

- Periodically monitor water quality and sediments near drainage outfalls to riparian areas. Institute remedial measures promptly if unacceptable levels of contaminant(s) occur.

Policy PU-7-a: **Reduce Wastewater.** Identify and consider implementing water conservation standards and other programs and policies, as determined appropriate, to reduce wastewater flows.

Policy PU-8-b: **Potable Water Supply and Cost Recovery.** Prepare for provision of increased potable water capacity (including surface water treatment capacity) in a timely manner to facilitate planned urban development consistent with the General Plan. Accommodate increase in water demand from the existing community with the capital costs and benefits allocated equitably and fairly between existing users and new users, as authorized by law, and recognizing the differences in terms of quantity, quality and reliability of the various types of water in the City's portfolio.

Policy PU-8-c: **Conditions of Approval.** Set appropriate conditions of approval for each new development proposal to ensure that the necessary potable water production and supply facilities and water resources are in place prior to occupancy.

Policy PU-8-b: **Potable Water Supply and Cost Recovery.** Prepare for provision of increased potable water capacity (including surface water treatment capacity) in a timely manner to facilitate planned urban development consistent with the General Plan. Accommodate increase in water demand from the existing community with the capital costs and benefits allocated equitably and fairly between existing users and new users, as authorized by law, and recognizing the differences in terms of quantity, quality and reliability of the various types of water in the City's portfolio.

Policy PU-8-f: **Water Quality.** Continue to evaluate and implement measures determined to be appropriate and consistent with water system policies, including prioritizing the use of groundwater, installing wellhead treatment facilities, constructing above-ground storage and surface water treatment facilities, and enhancing transmission grid mains to promote adequate water quality and quantity.

Policy PU-8-b: **Potable Water Supply and Cost Recovery.** Prepare for provision of increased potable water capacity (including surface water treatment capacity) in a timely manner to facilitate planned urban development consistent with the General Plan. Accommodate increase in water demand from the existing community with the capital costs and benefits

allocated equitably and fairly between existing users and new users, as authorized by law, and recognizing the differences in terms of quantity, quality and reliability of the various types of water in the City's portfolio.

Policy PU-8-g: **Review Project Impact on Supply.** Mitigate the effects of development and capital improvement projects on the long-range water budget to ensure an adequate water supply for current and future uses.

Policy RC-6-b: **Water Plans.** Adopt and implement ordinances, standards, and policies to achieve the intent of the City of Fresno Urban Water Management Plan, Fresno-Area Regional Groundwater Management Plan, and City of Fresno Metropolitan Water Resources Management Plan to ensure a dependable supply of water.

Policy RC-6-g: **Protect Recharge Areas.** Continue to protect areas of beneficial natural groundwater recharge by preventing uses that can contaminate soil or groundwater.

Policy RC-7-h: **Landscape Water Conservation Standards.** Refine landscape water conservation standards that will apply to new development installed landscapes, building on the State Model Water Efficient Landscape Ordinance and other State regulations.

DISCUSSION

a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

The General Plan PEIR found that buildout of the General Plan would have a potentially significant impact associated with water quality standards. However, compliance with General Plan policies such as Policy PU-8-f to implement water quality measures, and compliance with the Clean Water Act and National Pollutant Discharge Elimination System (NPDES) permits would reduce the severity of the impact to less than significant.

The proposed project would convert a vacant 7-acre undeveloped parcel to a developed state, including the creation of impervious surfaces across approximately 41% of the site. The creation of new impervious surfaces as well as soil disturbance during construction could result in polluted runoff that could impact surface or groundwater quality. The proposed project would be required to prepare and implement a SWPPP in accordance with applicable federal and state requirements. The SWPPP would identify BMPs that are intended to prevent pollution in local waterways. These construction and operational features would ensure the proposed project would not violate water quality standards. Additionally, the project would comply with relevant General Plan policies regarding the protection of surface and groundwater quality. As such, the project would not result in new

or more severe impacts than what was disclosed in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

The General Plan PEIR evaluated groundwater supplies based on information from the City's 2015 Urban Water Master Plan (UWMP), which determined that water supply would be sufficient to meet General Plan buildout demand if there were an increase of groundwater pumping. Therefore, the General Plan was determined to have a potentially significant impact and Mitigation Measure HYD-2.1 would be required to reduce this impact to less than significant. Mitigation Measure HYD-2.1 states that the City shall be an active participant in the North Kings Groundwater Sustainability Agency and implementation of the Groundwater Sustainability Plan in order to ensure balanced levels of pumping and recharge.

As previously discussed, the proposed project would cover 41% of the 7-acre parcel with impervious surfaces, which could decrease the amount of groundwater recharge at the site. However, the project is infill development surrounded by urban uses which is not an important area for groundwater recharge. Developed areas of the City are served by the City's storm drain system which captures stormwater runoff and conveys it into local waterways. Specifically, the project's stormwater would be captured by an onsite storm drain system at low points within the parking lot and at roof drain downspouts. This water would then be conveyed to an existing drainage inlet located in E. Locust Avenue. The remaining 59% of the site would consist of pervious surfaces, such as landscaping. The project site is not a significant source of groundwater recharge and would comply with relevant policies and regulations, such as preparation of a SWPPP that would include BMPs for capturing stormwater. Therefore, the project impact would be less than significant, and the project would not result in new or more severe impacts than what was disclosed in the General Plan PEIR. Mitigation Measure HYD-2.1 would not be required for the project since it is not applicable to individual projects. The criteria for requiring further CEQA review are not met.

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner which would:

i. Result in substantial erosion or siltation on- or off-site?

The General Plan PEIR found that buildout of the General Plan would have a less-than-significant impact associated with erosion and siltation due to the numerous regulatory mechanisms in place, such as the Clean Water Act and the NPDES Construction General Permit. Development in the City would also be required to

obtain a grading permit, which requires proof that project plans would comply with the CBC and NPDES regulations, among other related requirements. Therefore, impacts were considered less than significant.

As previously discussed, the proposed project would be required to implement erosion and sedimentation control measures during construction and operation. The SWPPP would require development of an erosion site control plan and the project would be subject to a plan check process by the City. With consideration of these requirements, the project would not result in new or more severe impacts than what was disclosed in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

ii. Substantially increase the rate or amount of surface runoff in a manner, which would result in flooding on- or off-site?

The General Plan PEIR found that buildout of the General Plan would have a less-than-significant impact associated with surface runoff resulting in flooding due to permit requirements, compliance with General Plan policies, and adherence to existing regulations. As discussed, the proposed project would introduce new impervious surfaces to the site, but stormwater would be captured by an onsite storm drain system and 59% of the site would remain pervious. The project would comply with all permit requirements and would be subject to a plan check by the City. The project site is also located with FEMA flood zone X, which represents areas with minimal flood hazards. It is therefore anticipated that the project would not substantially increase surface runoff such that flooding would occur on- or off-site. The project would not result in new or more severe impacts than what was disclosed in the General Plan PEIR and the criteria for requiring further CEQA review are not met.

iii. Create or contribute runoff water, which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

The General Plan PEIR found that buildout of the General Plan would have a potentially significant impact associated with the increase in stormwater runoff. The PEIR proposed Mitigation Measure HYD-3.1 through HYD-3.5 which contain measures to reduce impacts on existing storm drainage systems. Compliance with these mitigation measures and General Plan policies regarding stormwater runoff would reduce the impact to less than significant.

As previously discussed, the proposed project would be required to prepare and implement a SWPPP in accordance with applicable federal and state requirements. The SWPPP would identify BMPs, including those that are intended to prevent runoff during construction. The project would keep more than half of the project site as a

pervious area, which would be able to absorb water during storms. The project would include an onsite storm drain system that would collect runoff at low points within the parking lot and at roof drain downspouts before being conveyed to an existing drainage inlet located in E. Locust Avenue. The volume of runoff generated by the project would not be large enough to exceed existing stormwater drainage capacity. The project would also be required to pay drainage fees prior to issuance of a building permit, which would contribute to the City's ability to maintain and upgrade the stormwater drainage system. Therefore, the project impact would be less-than-significant and would not require mitigation. The project would not result in new or more severe impacts than what was disclosed in the General Plan PEIR and the criteria for requiring further CEQA review are not met.

iv. Impede or redirect flood flows?

As discussed above under item 'ii', the General Plan PEIR found that buildout of the General Plan would have a less- than-significant impact associated with flooding due to permit requirements, compliance with General Plan policies, and adherence to existing regulations. The proposed project would introduce new impervious surfaces and structures to the site, but these components would not be of sufficient size or scale to substantially impede or redirect flood flows. Stormwater would be captured by an onsite storm drain system and 59% of the site would remain pervious. The project would comply with all permit requirements and would be subject to a plan check by the City. The project site is also located with FEMA flood zone X, which represents areas with minimal flood hazards. It is therefore anticipated that the project would not substantially impede or redirect flood flows. The project would not result in new or more severe impacts than what was disclosed in the General Plan PEIR and the criteria for requiring further CEQA review are not met..

d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?

The General Plan PEIR found that buildout of the General Plan would have a less-than-significant impact associated with inundation. It is highly unlikely that inundation from a seiche or tsunami would affect the City because there are no large bodies of water nearby that would pose these risks. Some areas of the City are subject to flooding, but compliance with the City's Flood Plain Ordinance and General Plan policies related to flood risks would ensure that impacts are less than significant.

The project site is located with FEMA flood zone X, which represents areas of minimal flood hazard (FEMA 2009). It is unlikely that the project would experience flooding resulting in inundation. Therefore, impacts would be less than significant, and the project would not result in new or more severe impacts than what was disclosed in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

The City is located within the jurisdiction of the North Kings Groundwater Sustainability Agency (NKGSA 2022). The NKGSA has adopted a groundwater sustainability plan (GSP) which describes a number of projects and management actions needed to reach sustainability of the groundwater basin by 2040. The General Plan PEIR determined that the City's continued participation in the NKGSA and implementation of General Plan policies related to groundwater conservation would ensure that impacts are less than significant.

As previously discussed, the project would not result in any significant adverse impacts to groundwater quality of recharge. The project would not involve any actions or project components that would conflict with the GSP. As such, the project would not result in new or more severe impacts than what was disclosed in the General Plan PEIR and the criteria for requiring further CEQA review is not met.

Project Requirements

None applicable.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XI. LAND USE AND PLANNING – Would the project:				
a) Physically divide an established community?				☒
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?			☒	

ENVIRONMENTAL SETTING

The City's General Plan is the primary planning document that presents a vision for the City's future development. The project site has a General Plan designation and zoning of Office. The Office designation is intended for administrative, financial, professional, medical, and public

offices (City of Fresno 2014). Areas surrounding the project site include lands zoned and designated for office (east), office and commercial (north and south), and open space (west).

Listed below are relevant policies from the Fresno General Plan:

Policy LU-6-c: **Appropriate Office Development**. Promote the establishment of development standards for new offices, addressing location, size, and intensity necessary to meet the City's needs. Integrate and support employment in adjacent and proximate neighborhoods.

- Locate office projects to provide a transition between more intensive commercial uses and residential areas;
- Facilitate office uses in conjunction with, and adjacent to, institutions and employment centers; and
- Avoid over concentrating office uses in any one part of Fresno when new office developments would create excessive vacancy rates in other established office areas.

Policy LU-11-c: **General Plan Consistency**. Pursue coordinated planning and development project reviews with relevant federal, State, and local public agencies to ensure consistency with this General Plan.

DISCUSSION

a) Physically divide an established community?

The General Plan PEIR determined that General Plan policies would reduce land use conflicts and provide for future orderly development, which would result in a less-than-significant impact to established communities. The project site is currently undeveloped and does not contain any buildings or structures. There are no established communities at the project site and access to nearby roads would not be impaired. Therefore, the proposed project would result in no impact and would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

The General Plan PEIR found that buildout of the General Plan would have a less-than-significant impact regarding conflicts with applicable land use plans because General Plan policies would promote the logical and orderly expansion of the City. The proposed project would be consistent with the land use designation for the project site evaluated in the General Plan PEIR. The project has been designed consistent with the City's General Plan

land use designation, goals and policies, and the City Code, and is therefore considered planned growth that would not conflict with the General Plan. Therefore, the proposed project would not conflict with any applicable land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect, and impacts would be less than significant. The proposed project would not result in new or substantially more severe impacts than identified in the General Plan PEIR and the criteria for requiring further CEQA review are not met.

Project Requirements

None applicable.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XII. MINERAL RESOURCES – Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?				☒
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?				☒

ENVIRONMENTAL SETTING

According to the General Plan PEIR, most mineral resources of value in the City are concentrated along the San Joaquin River corridor (City of Fresno 2014). Fresno has been a leading producer for a variety of minerals including aggregate, fossil fuels, metals, and other materials used in industrial or construction processes. The Surface Mining and Reclamation Act (SMARA) categorizes lands into four Mineral Resource Zones (MRZs):

- MRZ-1: An area where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence.
- MRZ-2: An area where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood exists for their presence.
- MRZ-3: An area containing mineral deposits, the significance of which cannot be evaluated.

- MRZ-4: An area where available information is inadequate for assignment to any other MRZ zone.

Of these four categories, lands classified as MRZ-2 are of the greatest importance. MRZ-2 zones within the City are located along the San Joaquin River and Kings River. According to the California Geologic Survey, there are three aggregate mines that are mapped in the City, all of which primarily produce sand and gravel (CGS 2016). The project site is located 7.5 miles south of the nearest aggregate mine. Furthermore, the site is located in a MRZ-3 zone, which is an area containing mineral deposits of unknown significance. Most of the City consists of MRZ-3 zones.

Listed below are relevant policies from the City of Fresno General Plan:

Policy RC-10-d: **Manage MRZ-2 Areas**. Prohibit land uses and development projects that preclude mineral extraction in potential high-quality mineral resource areas designated MRZ-2 by the California Department of Conservation Division of Mines and Geology.

DISCUSSION

a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

As discussed in the Environmental Setting above, the project site is classified as MRZ-3 for aggregate deposits, the significance of which cannot be evaluated from available data. Most of the City is classified MRZ-3. The project would involve infill development on a vacant site previously used for agriculture. There is no indication that the site contains valuable mineral resources. Furthermore, General Plan Policy RC-10-d directs the City to prohibit development projects in MRZ-2 areas where there are potential high-quality mineral resources. Therefore, the General Plan PEIR determined impacts would be less than significant. The proposed project would not affect any valuable mineral resources and therefore would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

The project site has never been classified as a mineral resources recovery site. Furthermore, there is no indication that the site contains valuable mineral resources The General Plan does not identify local important mineral resources outside of the MRZ-2 zones. Therefore, the project would have no impact and would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

Project Requirements

None applicable.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XIII. NOISE – Would the project result in:				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?			☒	
b) Generation of excessive groundborne vibration or groundborne noise levels?			☒	
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?			☒	

ENVIRONMENTAL SETTING

A Noise Study Report (NSR) was prepared for the project in May 2020 by VRPA Technologies, included as Appendix E to this document. The NSR identifies potential noise impacts related to the proposed project, including construction noise, long-term operational noise, and traffic noise. The discussion in this section uses the information provided in the NSR.

All sound levels reported are in A-weighted decibels (dBA). A-weighting de-emphasizes the very low and very high frequencies of sound in a manner similar to the human ear.

Listed below are relevant policies from the Fresno General Plan:

Policy NS-1-a: **Desirable and Generally Acceptable Exterior Noise Environment.** Establish 65 dBA Ldn or CNEL as the standard for the desirable maximum average exterior noise levels for defined usable exterior areas of residential and noise-sensitive uses for noise, but designate 60 dBA Ldn or CNEL (measured at the property line) for noise generated by stationary sources impinging upon residential and noise-sensitive uses. Maintain 65 dBA Ldn or CNEL as the maximum average exterior noise levels for non-sensitive commercial land uses, and maintain 70 dBA Ldn or CNEL as maximum average exterior noise level for industrial land uses, both to be measured at the property line of parcels where noise is generated which may impinge on neighboring properties.

Policy NS-1-j: **Significance Threshold.** Establish, as a threshold of significance for the City's environmental review process, that a significant increase in ambient noise levels is assumed if the project would increase noise levels in the immediate vicinity by 3 dB Ldn or CNEL or more above the ambient noise limits established in this General Plan Update.

Policy NS-1-k: **Proposal Review.** Review all new public and private development proposals that may potentially be affected by or cause a significant increase in noise levels, per Policy NS-1-i, to determine conformance with the policies of this Noise Element. Require developers to reduce the noise impacts of new development on adjacent properties through appropriate means.

Policy NS-1-l: **Enforcement.** Continue to enforce applicable State Noise Insulation Standards and Uniform Building Code noise requirements, as adopted by the City.

Policy NS-1-m: **Transportation Related Noise Impacts.** For projects subject to City approval, require that the project sponsor mitigate noise created by new transportation and transportation-related stationary noise sources, including roadway improvement projects, so that resulting noise levels do not exceed the City’s adopted standards for noise-sensitive land uses.

DISCUSSION

a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or in other applicable local, state, or federal standards?

The General Plan PEIR determined there would be a significant and unavoidable impact

due to the potential for new development under the General Plan to increase ambient noise levels above those established in the City Code.

According to the NSR, activities involved in building construction would generate short-term noise reaching 56 to 64 dBA Lmax at the nearest single-family residence1 to the east of the project site (575 feet). Considering the maximum sound level of 70 dBA Lmax established by the City, construction of the project would not impact neighboring residences or businesses. Traffic noise would also be lower than the City's criteria for the Existing Plus Project and Cumulative Year 2042 scenarios, generating 2 dB or less with the addition of project traffic to the surrounding roadway network. Overall, the NSR found that impacts under this criterion would all be less than significant with no mitigation required. The project would not result in new or substantially more severe impacts than identified in the General Plan PEIR and the criteria for requiring further CEQA review are not met.

b) Generation of excessive groundborne vibration or groundborne noise levels?

The General Plan PEIR determined that construction activities that would occur under the General Plan could result in exposure of sensitive land uses to excessive groundborne vibration. The PEIR proposed Mitigation Measure NOI-2, which would prohibit the use of heavy construction equipment within 25 feet of existing structures, to reduce this impact to less than significant.

According to the NSR, construction activities associated with the project would likely require the use of various types of equipment including bulldozers and dump trucks, but the use of this equipment would not result in vibration levels greater than 75 VdB at the nearest off-site structures. Therefore, there would be no increase in severity to the previously identified significant and unavoidable vibration impact, and Mitigation Measure NOI-2 would not be required because there are no structures within 25 feet of the site. The project would not result in new or substantially more severe impacts than identified in the General Plan PEIR and the criteria for requiring further CEQA review are not met.

c) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

The General Plan PEIR determined that compliance with the applicable ALUCP and General Plan policies related to airport noise would ensure that impacts from development of the General Plan would be less than significant. As previously discussed, the project site is not located within an airport land use plan or within the vicinity of a public use airport. The nearest airport is the Fresno Yosemite International Airport, located 11.5 miles to the southeast. Therefore, the proposed project would not expose people residing or working in

[1] Impacts to sensitive receptors, such as residences, are considered the 'worst case' scenario for analysis purposes.

the project area to excessive noise levels associated with airports and the impact is less than significant. The project would not result in new or substantially more severe impacts than identified in the General Plan PEIR and the criteria for requiring further CEQA review are not met.

Project Requirements

None applicable.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XIV. POPULATION AND HOUSING – Would the project:				
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?			☒	
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?				☒

ENVIRONMENTAL SETTING

The City's most recent Housing Element was adopted on April 13, 2017 and provides the City with a strategy to provide safe, decent, and affordable housing for the community (City of Fresno 2017). The Housing Element contains policies and programs that are consistent with policy directives in other General Plan elements. Per Section 65581 of the California Government Code, each city and county must prepare a housing element to contribute to attainment of a "decent home and suitable living environment" for every Californian.

The Department of Finance (DOF) estimates the City has a population at 543,660 people, a household count of 533,506 households, and a total of 186,993 housing units as of January 2022 (DOF 2022).

The 2035 projections under the General Plan horizon include 76,000 new housing units, 226,000 new residents, 108,000 new jobs, 18.3 million sf of new office space, 10.9 sf of new retail space, and 25.7 million sf of new industrial space (City of Fresno 2014).

Listed below are relevant policies from the City of Fresno General Plan:

- **LU-6-c Appropriate Office Development**. Promote the establishment of development standards for new offices, addressing location, size, and intensity necessary to meet the City's needs. Integrate and support employment in adjacent and proximate neighborhoods.

DISCUSSION

a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

The General Plan PEIR determined that implementation of the General Plan would not result in a growth in population that could not reasonably be accommodated by the projected number of planned housing units. Therefore, this impact would be less than significant.

The proposed project involves the development of a 145,909 sf MOB. The health care providers for the proposed project are currently located at the Fresno Medical Center and First Street Medical Offices and would relocate to the new MOB after the project is completed. Additionally, the development of the project was included in the General Plan growth assumptions for the City. The project does not include a residential component and would not extend any roads or infrastructure. Therefore, the project's impacts would be less than significant and would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

The General Plan PEIR concluded that impacts related to displacing housing or people would be less than significant. The project site is currently vacant and does not contain any buildings or structures. Development of the proposed project would not displace people or housing; thus, no impact would occur. Therefore, the proposed project would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

Project Requirements

None applicable.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XV. PUBLIC SERVICES – Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
Fire protection?			☒	
Police protection?			☒	
Schools?			☒	
Parks?			☒	
Other public facilities?			☒	

ENVIRONMENTAL SETTING

The City of Fresno Fire Department (FFD) provides fire prevention, suppression, urban search and rescue response, emergency medical care, and emergency preparedness planning. Fire Station 13 is the closest station to the site, located 1.4 miles north. The FFD currently employs a total of 401 members including 346 sworn firefighting personnel, 25 non-safety personnel, and 29 civilian positions. Within FFD there are 27 staffed companies that consist of 19 engines, 3 squads, and 5 ladder trucks, 2 rescue boats, 2 aircraft rescue apparatuses, as well as a variety of other equipment to assist in hazardous materials incidents and mutual-aid requests (City of Fresno 2023a). The City has an automatic aid agreement with the City of Clovis where the closest fire station responds to an emergency regardless of jurisdiction. The City also has a mutual aid system that requires the FFD to provide resources throughout the

State of California if requested (City of Fresno 2014).

The Fresno Police Department (FPD) provides law enforcement to the City, with a large range of services including uniformed patrol response for emergency and non-emergency calls, crime prevention, and crime investigation. FPD has a Police Headquarters location as well as 5 additional stations that correspond with the City's 5 policing districts (City of Fresno 2023b). The closest station to the project site is the Northeast Policing District Station located 2.5 miles northeast of the site.

The project site is located within the Clovis Unified School District (CUSD 2023). The closest schools to the project site include Lincoln Elementary School located approximately 0.5 miles to the northeast and Kastner Intermediate School located 1.1 miles north of the site.

Listed below are policies from the General Plan relevant to the discussion below (City of Fresno 2014):

Policy PU-2-a: **Unify Fire Protection.** Pursue long-range transfer of fire protection service agreements with adjacent fire districts that, in concert with existing automatic aid agreements, will lead to the eventual unification of fire protection services in the greater Fresno area.

Policy PU-2-d: **Station Siting**. Use the General Plan, community plans, Specific Plans, neighborhood plans, and Concept Plans, the City's Geographic Information Systems (GIS) database, and a fire station location program to achieve optimum siting of future fire stations.

Policy PU-1-d: **New Police Station Locations**. Consideration will be given to co-locating new police station facilities with other public property including, but not limited to, schools, parks, playgrounds, and community centers to create a synergy of participation in the neighborhood with the potential result of less vandalism and promotion of a better sense of security for the citizens using these facilities.

Policy PF-I-d: The County and school districts should work closely to secure adequate funding for new school facilities. The County shall support the school districts' efforts to obtain appropriate funding methods such as school impact fees.

DISCUSSION

a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could

cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:

i. Fire protection?

The General Plan PEIR determined that compliance with the General Plan policies, payment of the Fire Facilities Fee (Section 12-4.901 in the City Code), and implementation of Mitigation Measure PSR-1.1 requiring future fire facilities to meet CEQA environmental review requirements would reduce impacts to a less-than-significant level.

Compliance with General Plan policies would help minimize fire risks and ensure the adequate provision of fire protection and emergency medical response services to serve the project. In compliance with City Code Section 12-4.901, the proposed project would be required to pay a Fire Facilities Fee in order to mitigate the impacts caused by development in the City. The project does not contain any new fire facilities and therefore Mitigation Measure PSR-1.1 is not applicable. With consideration of the above discussion, project impacts would be less than significant and would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

ii. Police protection?

FPD would be the service provider for the proposed project. The General Plan PEIR determined that compliance with General Plan policies would ensure adequate police staffing is available to serve existing and future development in the City. The project would be required to pay a Police Facilities Fee per the City Code Section 12-4.801 to help offset the impact of new development. The proposed project would comply with General Plan policies related for maintaining adequate law enforcement services by paying developer impact fees. Therefore, project impacts would be less than significant and would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

iii. Schools?

Per the City Code section 12-805, new development in the City is required to pay a developer impact fee to reduce the impacts of new development. The General Plan PEIR concluded that impacts to the school district would be less than significant since payment of development fees has been deemed adequate to fully mitigate the impacts of new development on school facilities under Section 65996 of the California Government Code. The project does not include a residential component that would generate school age children but is still required to pay required developer fees to mitigate impacts to school facilities, therefore impacts would be less than

significant. The proposed project would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

iv. Parks?

Health care providers for the proposed project are currently located at the Fresno Medical Center and First Street Medical Offices and would relocate to the new MOB after the project is completed. As discussed below in Section XVI Recreation, the project would not induce population growth such that there would be a need for new parks or physical alteration of existing parks to serve the proposed project. Therefore, impacts related to the need for new parks or physical alteration of existing parks would be less than significant and the proposed project would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met..

v. Other public facilities?

Future development within the City could impact other public services including libraries. The General Plan PEIR concluded that compliance with General Plan policies would ensure that potential impacts from the construction or expansion of public facilities is reduced. The project is within the scope of projected growth under General Plan horizon year buildout and the anticipated uses on the site as assumed in the General Plan PEIR. The project is not anticipated to induce unplanned population growth that would impact public facilities. Therefore, project impacts would be less than significant and would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

Project Requirements

None applicable.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVI. RECREATION - Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?			☒	
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?				☒

ENVIRONMENTAL SETTING

The General Plan classifies parks into five categories: Pocket parks, Neighborhood parks, Community Parks, Regional Parks, and Trail/Greenway/Parkways (City of Fresno 2014). The City operates a park system that includes over 80 parks, regional parks, trails, neighborhood parks, community pools, splash parks, educational facilities, and dual-use ponding basins. Development and management of the City's park system is guided by the Fresno Parks Master Plan adopted in 2017 as an update to the previously adopted 1989 Parks Master Plan (City of Fresno 2017b). The City's parks department relies on grant funds for strategic repairs and the functioning of programs (City of Fresno 2016).

The nearest existing parks to the project site are River Little League Park located 0.8 miles to the northwest and is adjacent to the site and Kaiser Permanente Neighborhood Park, located 0.6 miles northwest of the site. The closest regional park to the site is Woodward Regional Park located 2.8 miles northwest of the site.

Listed below are policies from the General Plan relevant to the discussion below (City of Fresno 2014):

Policy POSS-2-c: **Review of Development Applications**. Coordinate review of all development applications (i.e., site plans, conditional use permits, and subdivision maps) in order to implement the parks and open space standards of this Plan.

DISCUSSION

a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

The General Plan projected that in 2035, the City's population is expected to approach 771,000 residents. To accomplish the City goal of providing parkland at a comparable rate to other cities in the valley, the parkland ratio goal is 5 acres per 1,000 residents, totaling a need for 3,855 acres of parks. As previously discussed, the health care providers for the proposed project are currently located at the Fresno Medical Center and First Street Medical Offices and would relocate to the new MOB after the project is completed. The project would not induce population growth such that there would be an acceleration to the deterioration of existing parks. Therefore, impacts related to existing parks and recreational facilities would be less than significant and the proposed project would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?

The General Plan PEIR acknowledges that recreational impacts would be project-specific and would require permitting and review in accordance with CEQA. The General Plan PEIR is a programmatic document and does not evaluate the environmental impacts of any project-specific development, thus it was concluded that the impact is less than significant.

The proposed project would not include any recreational facilities and would not induce substantial population growth such that expansion or construction of recreational facilities would be necessary. Therefore, there would be no impact and the proposed project would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

Project Requirements

None applicable.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVII. TRANSPORTATION – Would the project:				
a) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?			☒	
b) Conflict or be inconsistent with CEQA Guidelines § 15064.3, subdivision (b)?			☒	
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?			☒	
d) Result in inadequate emergency access?			☒	

ENVIRONMENTAL SETTING

SB 743, passed in 2013, required the California Governor's Office of Planning and Research (OPR) to develop new CEQA guidelines to address traffic impacts under CEQA. In December 2018, the Resources Agency adopted CEQA Guidelines Section 15064.3. Under this guideline, vehicle miles traveled (VMT) is the primary metric used to identify transportation impacts in CEQA documents. On July 1, 2020, the provisions of Section 15064.3 became effective statewide. The City adopted its own CEQA guidelines for VMT thresholds in June 2020 (City of Fresno 2020c).

A Traffic Impact Study (TIS) was prepared by VRPA Technologies for the project in May 2020 and is included as Appendix F to this document. Although no longer considered a transportation impact under CEQA, Level of Service (LOS) performance criteria are included in the General Plan policies.

Listed below are policies from the General Plan relevant to the discussion below (City of Fresno 2014):

Policy MT-2-c: Reduce VMT through Infill Development. Provide incentives for infill

development that would provide jobs and services closer to housing and multi-modal transportations corridors in order to reduce citywide vehicle miles travelled (VMT).

Policy MT-2-l: **Region-Wide Transportation Impact Fees.** Continue to support the implementation of metropolitan-wide and region-wide transportation impact fees sufficient to cover the proportional share of a development's impacts and need for a comprehensive multi-modal transportation system that is not funded by other sources. Work with the Council of Fresno County Governments, transportation agencies (e.g. Caltrans, Federal Transportation Agency) and other jurisdictions in the region to develop a method for determining:

- Regional transportation impacts of new development;
- Regional highways, streets, rail, trails, public transportation, and goods movement system components, consistent with the General Plan, necessary to mitigate those impacts and serve projected demands;
- Projected full lifetime costs of the regional transportation system components, including construction, operation, and maintenance; and
- Costs covered by established funding sources.

Policy MT-1-n: **Peak Hour Vehicle LOS.** For planning purposes and implementation of Capital Improvement Projects, maintain a peak-hour vehicle LOS standard of D or better for all roadway areas outside of identified Activity Center and Bus Rapid Transit Corridor districts, unless the City Traffic Engineer determines that mitigation to maintaining this LOS would be infeasible and/or conflict with the achievement of other General Plan policies.

Policy MT-2-m: **Use VMT Analysis for CEQA.** For planning purposes and implementation of Capital Improvement Projects, maintain a peak-hour vehicle LOS standard of D or better for all roadway areas outside of identified Activity Center and Bus Rapid Transit Corridor districts, unless the City Traffic Engineer determines that mitigation to maintaining this LOS would be infeasible and/or conflict with the achievement of other General Plan policies.

DISCUSSION

a) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

As stated in the setting above, the General Plan maintains LOS performance standards

for roadways and intersections within the City. The General Plan PEIR determined that full build out of the General Plan would result in a significant LOS impact at 12 roadways, with no feasible mitigation available to reduce the impact to less than significant.

According to the project TIS results, all of the study roadway segments would meet the minimum acceptable LOS criteria during both the AM and PM peak hour when considering the Existing Plus Project, Near-Term Plus Project, Cumulative Year 2042 Without Project and Cumulative Year 2042 Plus Project scenarios. Therefore, the project would have a less-than-significant impact regarding conflict with LOS standards in the General Plan. The TIS did not find any conflict with other plans addressing the circulation system such as the City's Active Transportation Plan, which identifies planned bikeway and pedestrian facilities within the City. As such, the proposed project would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

b) Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?

SB 743 requires that relevant CEQA analysis of transportation impacts be conducted using a metric known as VMT instead of LOS. VMT measures how much actual auto travel (additional miles driven) a proposed project would create on California roads. If the project adds excessive car travel onto our roads, the project may cause a significant transportation impact.

The State CEQA Guidelines were amended to implement SB 743, by adding Section 15064.3. Among its provisions, Section 15064.3 confirms that, except with respect to transportation projects, a project's effect on automobile delay shall not constitute a significant environmental impact. Therefore, LOS measures of impacts on traffic facilities is no longer a relevant CEQA criteria for transportation impacts.

CEQA Guidelines Section 15064.3(b)(4) states that "[a] lead agency has discretion to evaluate a project's vehicle miles traveled, including whether to express the change in absolute terms, per capita, per household or in any other measure. A lead agency may use models to estimate a project's vehicle miles traveled and may revise those estimates to reflect professional judgment based on substantial evidence. Any assumptions used to estimate used to estimate vehicle miles traveled and any revision to model outputs should be documented and explained in the environmental document prepared for the project. The standard of adequacy in Section 15151 shall apply to the analysis described in this section."

On June 25, 2020, the City adopted CEQA Guidelines for Vehicle Miles Traveled Thresholds, pursuant to Senate Bill 743 to be effective as of July 1, 2020. The thresholds described therein are referred to herein as the City of Fresno VMT Thresholds. The City of Fresno VMT Thresholds document was prepared and adopted consistent with the

requirements of CEQA Guidelines Sections 15064.3 and 15064.7. The December 2018 Technical Advisory on Evaluating Transportation Impacts in CEQA (Technical Advisory) published by OPR, was used as a reference and guidance document in the preparation of the Fresno VMT Thresholds.

The City of Fresno VMT Thresholds adopted a screening standard and criteria that can be used to screen out qualified projects that meet the adopted criteria from needing to prepare a detailed VMT analysis.

The City of Fresno VMT Thresholds Section 3.0 regarding Project Screening discusses a variety of projects that may be screened out of a VMT analysis including specific development and transportation projects. For development projects, conditions may exist that would presume that a development project has a less than significant impact. These may be size, location, proximity to transit, or trip-making potential. For transportation projects, the primary attribute to consider with transportation projects is the potential to increase vehicle travel, sometimes referred to as “induced travel.”

The proposed project is eligible to screen out because pursuant to the City of Fresno VMT Thresholds Section 3.0 (Project Screening), the project is within 0.5 miles of a Transit Priority Area or a High-Quality Transit Area, has a floor area ratio (FAR) less than 0.75 (proposed FAR at 0.47), and provides an excessive amount of parking (proposes 532 parking spaces when 531 is the minimum requirement).
Therefore, the project would result in a less-than-significant VMT impact and is consistent with CEQA Guidelines Section 15064.3(b).

c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

The General Plan PEIR determined that continued implementation of General Plan policies would result in a less-than-significant impact related to roadway hazards or incompatible uses. The proposed project would not propose any incompatible uses and is designed in accordance with applicable federal, state, and local standards. For example, the project would comply with General Plan policy NS-6-f which requires that proposed developments maintain adequate access for emergency vehicles, including adequate widths, turning radii, and vertical clearance. Project plans would be submitted to the City’s Fire Department for review and approval to ensure that emergency access is sufficient at the site and is compliant with California Fire Code requirements. There are no design features that would increase hazards, such as sharp curves. Therefore, this impact would be less than significant. The proposed project would not result in new or substantially more severe impacts than identified in the General Plan PEIR and the criteria for requiring further CEQA review are not met.

d) Result in inadequate emergency access?

The project would include two access points at the existing intersections of E. Locust Avenue and First Street as well as N. Corporate Drive (private driveway) and First Street. Project plans would be submitted to the City's Fire Department for review and approval to ensure that emergency access is sufficient at the site. The proposed project would comply with California Fire Code requirements for emergency access which would ensure that the project would not result in new or more severe impacts than what was disclosed in the General Plan PEIR. No mitigation measures are required and the criteria for requiring further CEQA review are not met.

Project Requirements

None applicable.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVII. TRIBAL CULTURAL RESOURCES – Would the project:				
a) Cause a substantial adverse change in the significance of a tribal cultural resource, defined in PRC section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:		☒		
i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in PRC section 5020.1(k), or,		☒		

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of PRC section 5024.1. In applying the criteria set forth in subdivision (c) of PRC section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.		☒		

DISCUSSION

a) Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

i. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or

The General Plan PEIR found that construction activities during buildout of the General Plan could have a potentially significant impact on historical resources. However, with implementation of Mitigation Measures CUL-1.1 and CUL-1.2, impacts would be reduced to less-than-significant levels.

The project site is not known to contain resources listed or eligible for listing in the CRHR or in a local register of historical resources. However, there is a chance for construction activities to unearth previously unknown historical resources. Mitigation Measures CUL-1.1 and CUL-1.2 would reduce the impact to a less-than-significant level. These mitigation measures require construction to stop if previously unknown resources are encountered, and a qualified historical resources specialist to be consulted to make recommendations to protect the resources. Additionally, any discretionary project that could result in an adverse change to such resources would require a site-specific evaluation by a professional who meets the Secretary of

Interior's qualifications.

ii. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

Pursuant to PRC Section 21080.3.1, prior to the release of any negative declaration, mitigated negative declaration or EIR for a project, the lead agency shall consult with any California Native American tribe that is traditionally and culturally affiliated with the geographical area of a proposed project. Projects consistent with the use and development density established for a property under an existing general plan or community plan for which an EIR has been certified, can take advantage of streamlining under Section 15183 of the CEQA Guidelines. Therefore, because the project's land use and development assumptions are consistent with the City's General Plan the Lead Agency (City of Fresno) is not required to examine environmental impacts that have already been adequately evaluated in the previously certified General Plan EIR if the project would not lead to new or substantially greater environmental impacts, or to a significant impact that is peculiar to the project or to the project site. Therefore, the requirement to conduct AB 52 tribal consultation is not required. However, on September 19, 2019, compliant with AB 52 and SB 18, the City provided formal notification for the General Plan PEIR to interested Native American tribes that may be culturally or traditionally affiliated with the project area and vicinity to conduct consultation. Two tribes were formally notified regarding AB 52 consultation and 13 tribes were formally notified regarding SB 18 consultation. None of the 15 tribes contacted responded via letter or telephone and indicated that consultation would not be requested. No other requests for consultation were received within the 30-day period, and as a result, AB 52 and SB 18 requirements were fulfilled for the General Plan PEIR.

Although no tribes requested consultation or indicated the presence of significant tribal cultural resources at the project site, the project would nonetheless comply with Mitigation Measures CUL-1, CUL-2, and CUL-3 in order to ensure that impacts to previously unknown cultural resources would be less than significant. Therefore, the proposed project would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

Project Requirements

The proposed project shall implement and incorporate, as applicable, the tribal cultural resource related Project Requirements as identified below and in the Project Requirements Checklist.

MM CUL-1.1 If previously unknown resources are encountered before or during grading activities, construction shall stop in the immediate vicinity of the find and a qualified historical resources specialist shall be consulted to determine whether the resource requires further study. The qualified historical resources specialist shall make recommendations to the City on the measures that shall be implemented to protect the discovered resources, including but not limited to excavation of the finds and evaluation of the finds in accordance with Section 15064.5 of the CEQA Guidelines and the City's Historic Preservation Ordinance.

If the resources are determined to be unique historical resources as defined under Section 15064.5 of the CEQA Guidelines, measures shall be identified by the monitor and recommended to the Lead Agency. Appropriate measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds.

No further grading shall occur in the area of the discovery until the Lead Agency approves the measures to protect these resources. Any historical artifacts recovered as a result of mitigation shall be provided to a City-approved institution or person who is capable of providing long-term preservation to allow future scientific study.

MM CUL-1.2 Prior to approval of any discretionary project that could result in an adverse change to a potential historic and/or cultural resource, the City shall require a site-specific evaluation of historic and/or cultural resources by a professional who meets the Secretary of Interior's Qualifications. The evaluation shall provide recommendations to mitigate potential impacts to historic and/or cultural resources and shall be approved by the Directory of Planning and Development.

MM CUL-2 Subsequent to a preliminary City review of the project grading plans, if there is evidence that a project will include excavation or construction activities within previously undisturbed soils, a field survey and literature search for prehistoric archaeological resources shall be conducted. The following procedures shall be followed.

If prehistoric resources are not found during either the field survey or literature

search, excavation and/or construction activities can commence. In the event that buried prehistoric archaeological resources are discovered during excavation and/or construction activities, construction shall stop in the immediate vicinity of the find and a qualified archaeologist shall be consulted to determine whether the resource requires further study. The qualified archaeologist shall make recommendations to the City on the measures that shall be implemented to protect the discovered resources, including but not limited to excavation of the finds and evaluation of the finds in accordance with Section 15064.5 of the CEQA Guidelines. If the resources are determined to be unique prehistoric archaeological resources as defined under Section 15064.5 of the CEQA Guidelines, mitigation measures shall be identified by the monitor and recommended to the Lead Agency. Appropriate measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. No further grading shall occur in the area of the discovery until the Lead Agency approves the measures to protect these resources. Any prehistoric archaeological artifacts recovered as a result of mitigation shall be provided to a City-approved institution or person who is capable of providing long-term preservation to allow future scientific study.

If prehistoric resources are found during the field survey or literature review, the resources shall be inventoried using appropriate State record forms and submit the forms to the Southern San Joaquin Valley Information Center. The resources shall be evaluated for significance. If the resources are found to be significant, measures shall be identified by the qualified archaeologist. Similar to above, appropriate mitigation measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. In addition, appropriate mitigation for excavation and construction activities in the vicinity of the resources found during the field survey or literature review shall include an archaeological monitor. The monitoring period shall be determined by the qualified archaeologist. If additional prehistoric archaeological resources are found during excavation and/or construction activities, the procedure identified above for the discovery of unknown resources shall be followed.

MM CUL-3 In the event that human remains are unearthed during excavation and grading activities of any future development project, all activity shall cease immediately. Pursuant to Health and Safety Code (HSC) Section 7050.5, no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to PRC Section 5097.98(a). If the remains are determined to be of Native American descent, the coroner shall within 24 hours notify the Native American Heritage Commission (NAHC). The NAHC shall then contact the most likely

descendent of the deceased Native American, who shall then serve as the consultant on how to proceed with the remains. Pursuant to PRC Section 5097.98(b), upon the discovery of Native American remains, the landowner shall ensure that the immediate vicinity, according to generally accepted cultural or archaeological standards or practices, where the Native American human remains are located is not damaged or disturbed by further development activity until the landowner has discussed and conferred with the most likely descendants regarding their recommendations, if applicable, taking into account the possibility of multiple human remains. The landowner shall discuss and confer with the descendants all reasonable options regarding the descendants' preferences for treatment.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XIX. UTILITIES AND SERVICE SYSTEMS – Would the project:				
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effect?			☒	
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?			☒	
c) Result in a determination by the waste water treatment provider, which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?			☒	

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
d) Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?			☒	
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?			☒	

DISCUSSION

a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

The General Plan PEIR found that buildout of the General Plan would result in significant and unavoidable impacts regarding water, wastewater, storm drainage, electric power, and natural gas facilities. The General Plan designates the project site for Office use and the proposed project is consistent with that land use designation. As previously discussed, the proposed project's consistency with the General Plan and zoning means that the project was previously considered in the planned growth projections in the General Plan. The project itself would not exceed the anticipated intensity of the site and would not cause the construction or relocation of such facilities that would cause significant environmental effects. Therefore, the project's contribution to the need for new or expanded water, wastewater, stormwater, electrical and natural gas facilities was previously considered by the General Plan PEIR. The project would also pay appropriate development impact fees that would contribute to the City's ability to construct and maintain facilities. For these reasons, the proposed project would not result in new or more severe impacts disclosed in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?

The General Plan PEIR found that buildout of the General Plan would have a less-than-significant impact associated with water supply from compliance with General Plan policies

and participation in the North Kings Groundwater Sustainability Agency.

The project site consists of undeveloped land. Therefore, the construction of the proposed project would increase water demand on-site. The General Plan designates the project site for Office use and the proposed project is consistent with that land use designation. Based on information in the City's 2015 UWMP, the General Plan PEIR found that the City could meet water supply demand through the General Plan buildout year of 2056. The proposed project is considered planned growth and to the extent that the proposed project would require additional water supply, this was previously considered by the General Plan PEIR. Nonetheless, the proposed project's individual water demand is estimated to be approximately 7,875 gallons per day (gpd) based on the water demand factor of 1,125 gpd per acre for Medical Center land uses from the Draft Metropolitan Water Resources Management Plan (P. Maraccini, personal communication, May 1, 2023). According to the City's latest 2020 UWMP, even in a drought period lasting five consecutive years from 2021 through 2025, the City would meet all water demands and would still have remaining water supply ranging from 26,149 acre-feet (AF) in 2023 to 104,407 AF in 2025 (City of Fresno 2020b). For these reasons, the proposed project would not result in new or more severe impacts disclosed in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

c) Result in a determination by the wastewater treatment provider, which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

The Fresno-Clovis Wastewater Reclamation Facility (RWRF) and the North Fresno Water Reclamation Facility and the associated wastewater collection system are owned and operated by the City. The General Plan PEIR found that buildout of the General Plan would have a potentially significant impact associated with wastewater treatment since these facilities would have to expand to serve anticipated development. The General Plan PEIR set forth mitigation measures to reduce the severity of the impact by evaluating discretionary projects' contribution to wastewater treatment demand. The General Plan PEIR concluded that the residual significance would be less than significant after implementation of mitigation.

The General Plan designates the project site for Office use, and the proposed project is consistent with that land use designation and is therefore considered within the planned growth projections. Additionally, existing health care providers at the Fresno Medical Center and First Street Medical Offices would relocate to the new MOB, as well as many of their patients, so wastewater demand would not be significantly greater than existing conditions. For these reasons, the proposed project would not result in new or more severe impacts disclosed in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

The General Plan PEIR found that buildout of the General Plan would have a potentially significant impact associated with solid waste. The General Plan PEIR set forth Mitigation Measure UTL-4.1 to reduce the severity of the impact by requiring the City to evaluate additional landfill locations at the time discretionary projects are submitted. The General Plan PEIR concluded that the residual significance would be less-than-significant after implementation of mitigation.

As previously discussed, the proposed project is considered planned growth under the General Plan. The proposed project would be required to comply with all federal, state, and local regulations regarding solid waste. To the extent that the proposed project would generate both construction and operational solid waste, this was previously considered by the General Plan PEIR. The project would also not result in a significant increase in solid waste generation since existing health care providers and their patients would move from other medical offices in the City. For these reasons, the project would not require any mitigation and would not result in new or more severe impacts disclosed in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

The General Plan PEIR determined that with development in accordance with the approved General Plan, solid waste would continue to be handled, transported, and disposed of according to all applicable federal, state, and local regulations pertaining to municipal waste disposal. The proposed project would be required to comply with all applicable regulations regarding solid waste and therefore would result in no impact. The project would not result in new or more severe impacts disclosed in the General Plan PEIR and the criteria for requiring further CEQA review are not met.

Project Requirements

None applicable.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XX. WILDFIRE – If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?			☒	
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?			☒	
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?			☒	
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?			☒	

ENVIRONMENTAL SETTING

The General Plan PEIR notes that according to the California Department of Forestry and Fire Protection's (CAL FIRE) Fire and Resource Assessment Program, the City does not contain any lands within the State Responsibility Area (SRA) or lands classified as Very High Fire Hazard Severity Zone (VHFHSZ) within the Local Responsibility Area (LRA). According to the CAL FIRE Fire Hazard Severity Map for Fresno County, the nearest VHFHSZ in the SRA is located approximately 14 miles east of the project site (CAL Fire 2022). Due to the flat

topography in the Central Valley and the distance from developed to undeveloped areas in the City, the primary concern is the potential for structure fires in developed areas.

Listed below are policies from the General Plan relevant to the discussion below (City of Fresno 2014):

Policy NS-6-f: **Emergency Vehicle Access**. Require adequate access for emergency vehicles in all new development, including adequate widths, turning radii, hard standing areas, and vertical clearance.

Policy PU-3-d: **Review All Development Applications.** Continue Fire Department review of all development applications, provide comments, and recommend conditions of approval that will ensure adequate on-site and off-site fire protection systems and features are provided.

DISCUSSION

a) Substantially impair an adopted emergency response plan or emergency evacuation plan?

As discussed previously, the City's emergency response plan is the County's Multi-jurisdictional Local Hazard Mitigation Plan (Fresno County 2018). The City's General Plan also includes several policies ensuring an efficient and coordinated response to emergencies and natural disasters. For example, General Plan Policy NS-6-f requires that proposed developments maintain adequate access for emergency vehicles and equipment, including adequate widths, turning radii, and vertical clearance. The project would not include any components that would interfere with emergency evacuation or with the County's Multi-jurisdictional Local Hazard Mitigation Plan. The project would include two access points at the existing intersections of E. Locust Avenue and First Street as well as N. Corporate Drive and First Street. The project would comply with General Plan policies related to reducing interference with adopted emergency response plans, including review by the City's Fire Department to ensure compliance with access requirements, and thus would not impair emergency access in the event of an evacuation. The proposed project would also be designed to comply with the CBC fire code standards. Therefore, impacts would be less than significant. The project would not result in new or substantially more severe impacts than identified in the General Plan PEIR and the criteria for requiring further CEQA review are not met.

b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

As discussed in the setting above, the project site is not located in a VHFHSZ or a SRA. The nearest VHFHSZ is located approximately 14 miles east of the project site. The proposed

project is in a developed area of the City, reducing the risk caused by the City's historically high temperatures and sunlight in the summer. The project site is also located on flat land and does not include any other factors associated with increased wildfire risks. Furthermore, the project plans would be reviewed by the Fire Department and City staff to ensure fire and emergency access would be maintained. Impacts would be less than significant. The project would not result in new or substantially more severe impacts than identified in the General Plan PEIR and the criteria for requiring further CEQA review are not met.

c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

The General Plan PEIR determined that future development may require the installation or maintenance of infrastructure, but this would not exacerbate fire risk or result in impacts to the environment. Although the proposed project would involve connection to utilities, this would not exacerbate fire risk as the project site is located in an area that is already served by existing utilities. Therefore, impacts would be less than significant. The project would not result in new or substantially more severe impacts than identified in the General Plan PEIR and the criteria for requiring further CEQA review are not met.

d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

The General Plan PEIR determined that continued implementation of General Plan policies would ensure that impacts associated with the exposure of people or structures to significant risks as a result of runoff, post-fire slope instability, or drainage changes would be less than significant.

The project site is located on flat land that would not expose people or structures to significant risks such as downslope or downstream flooding or landslides that can occur due to wildfire. Therefore, project impacts would be less than significant and would not result in new or substantially more severe impacts than identified in the General Plan PEIR. The criteria for requiring further CEQA review are not met.

Project Requirements

None required.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XIX. MANDATORY FINDINGS OF SIGNIFICANCE				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?		☒		
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?		☒		
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?		☒		

DISCUSSION

a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate

a plant or animal community, substantially reduce the number or restrict the range of an endangered, rare, or threatened species, or eliminate important examples of the major periods of California history or prehistory?

The General Plan PEIR found that General Plan buildout would have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a wildlife species, or eliminate important examples of the major periods of California history or prehistory. As discussed in this IS, the proposed project would not result in new or substantially more severe impacts than identified in the General Plan PEIR and would comply with applicable General Plan PEIR mitigation measures. The criteria for requiring further CEQA review are not met.

b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)

The proposed project would incrementally contribute to cumulative impacts in combination with other projects occurring within the City. However, all reasonably foreseeable future development in the City would be subject to environmental review and regulations similar to the proposed project. Furthermore, all private and public development projects are guided by the policies identified in the City's General Plan and by the regulations established in the City Code. As provided in the previous analysis for each resource area, this document demonstrates that the project's contribution to any existing cumulative impacts would be reduced to less-than-significant levels through compliance with General Plan policies and mitigation measures included in the General Plan PEIR and any contribution to an existing cumulative impact would not be considered cumulatively considerable. Therefore, the project would not have cumulatively considerable contributions to existing cumulative impacts resulting in a less-than-significant impact. Cumulative impacts were adequately addressed in the General Plan PEIR and no further CEQA review is required.

c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?

As provided in the previous analysis for each resource area, this document demonstrates that the project would not cause any substantial adverse effects on human beings that are not addressed by existing General Plan policies and compliance with existing regulations, such as statewide airborne toxic control measures, and the City Code that sets forth acceptable noise levels at sensitive receptors during day and night. The project would not produce any other environmental effect that would cause substantial adverse effects on human beings, and impacts would be less than significant. These impacts were adequately addressed in the City's General Plan PEIR and no further CEQA review is required.

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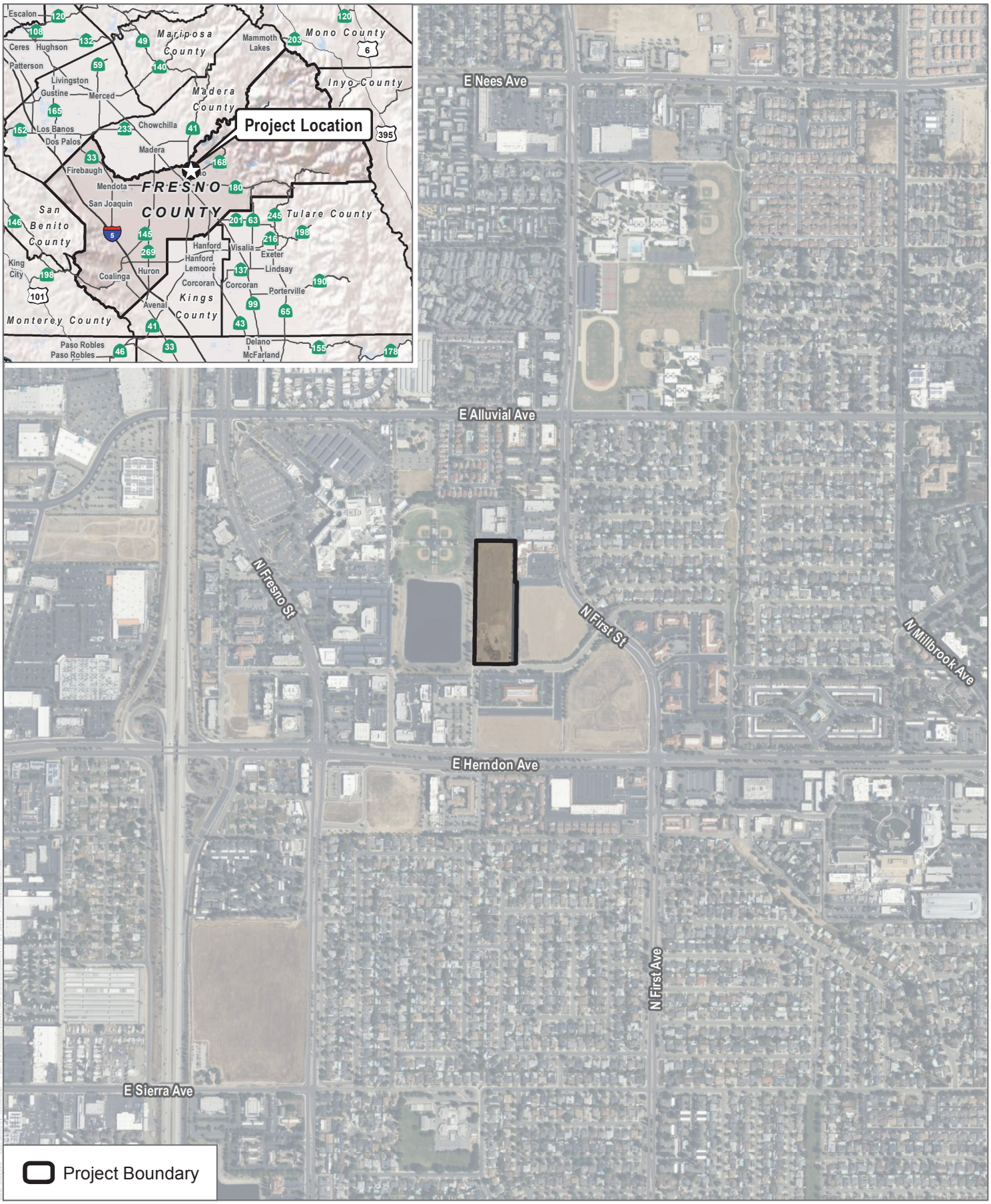
Figures



SOURCE: Bing Maps 2022, OpenStreetMap

DUDEK

0 500 1,000 Feet

FIGURE 1

Project Location

Kaiser Permanente Fresno Medical Office Building Project



SOURCE: Bing Maps 2022, OpenStreetMap

DUDEK

0 100 200 Feet

FIGURE 2

Project Site

Kaiser Permanente Fresno Medical Office Building Project



SOURCE: Cannon Design 2022

FIGURE 3

Site Plan

Kaiser Permanente Fresno Medical Office Building Project

DUDEK



SOURCE: Cannon Design 2023

FIGURE 4

East and South Elevations

Kaiser Permanente Fresno Medical Office Building Project

DUDEK



SOURCE: Cannon Design 2023

DUDEK

FIGURE 4

North and West Elevations

Kaiser Permanente Fresno Medical Office Building Project

Appendix A
AQ/GHG Report

Kaiser Permanente - Fresno Medical Office Building

Air Quality & Greenhouse Gas Impact Assessment
May 2020

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Kaiser Permanente - Fresno Medical Office Building
Air Quality & Greenhouse Gas Impact Assessment

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Table of Contents

Section	Description	Page
	Executive Summary	E-1
1.0	Introduction	1
1.1	Description of the Region/Project	3
1.2	Regulatory	3
1.2.1	Federal Agencies	3
1.2.2	Federal Regulations	7
1.2.3	State Agencies	8
1.2.4	State Regulations	9
1.2.5	Regional Agencies	15
1.2.6	Regional Regulations	17
1.2.7	Local Plans	18
2.0	Environmental Setting	20
2.1	Geographical Locations	20
2.2	Topographic Conditions	20
2.3	Climate Conditions	20
2.4	Anthropogenic (Man-made) Sources	22
2.4.1	Motor Vehicles	23
2.4.2	Agricultural and Other Miscellaneous	24
2.4.3	Industrial Plants	24
2.5	San Joaquin Valley Air Basin Monitoring	24
2.6	Air Quality Standards	27
2.6.1	Ozone (1-hour and 8-hour)	27
2.6.2	Suspended PM (PM10 and PM2.5)	29
2.6.3	Carbon Monoxide (CO)	30
2.6.4	Nitrogen Dioxide (NO2)	31
2.6.5	Sulfur Dioxide (SO2)	33
2.6.6	Lead (Pb)	33
2.6.7	Toxic Air Contaminants (TAC)	33
2.6.8	Odors	36
2.6.9	Naturally Occurring Asbestos (NOA)	37
2.6.10	Greenhouse Gas Emissions	37

3.0 Air Quality Impacts 39
3.1 Methodology 39
3.1.1 CalEEMod 39
3.1.2 California Line Source Dispersion Model (CALINE) 40
3.2 Short-Term Impacts 40
3.3 Long Term Emissions 41
3.3.1 Localized Operational Emissions Ozone/Particulate Matter 41
3.3.2 Localized Operational Emissions 42
3.3.3 Indirect Source Review 47

4.0 Impact Determinations and Recommended Mitigation 48
4.1 Air Quality 48
4.1.1 Conflict with or obstruct implementation of the applicable air quality plan 48
4.1.2 Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard 49
4.1.3 Expose sensitive receptors to substantial pollutant concentrations 50
4.1.4 Result in other emissions such as those leading to odors adversely affecting a substantial number of people 51
4.2 Greenhouse Gas Emissions 51
4.2.1 Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment 51
4.2.2 Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases 53

Appendices

Appendix A – CalEEMod Worksheets
Appendix B – CALINE Worksheets
Appendix C – ISR Worksheets

List of Tables

1	Ambient Air Quality Standards	12
2	Maximum Pollutant Levels at Clovis' N Villa Avenue Monitoring Station	25
3	Fresno County Attainment Status	26
4	Recommendations on Siting New Sensitive Land Uses Such As Residences, Schools, Daycare Centers, Playgrounds, or Medical Facilities	35
5	Screening Levels for Potential Odor Sources	37
6	SJVAPCD Air Quality Thresholds of Significance	39
7	Project Construction Emissions (tons/year)	41
8	Project Operational Emissions (tons/year)	41
9	Cumulative Year 2042 Plus Project Local Roadway Air Quality Segment Analysis (1 Hour and 8 Hour CO Concentration – PPM)	43
10	Project Operational Greenhouse Gas Emissions	47

List of Figures

1	Regional Location	5
2	Project Location	6
3	San Joaquin Valley Air Basin	11

Executive Summary

This Air Quality & Greenhouse Gas Impact Assessment has been prepared for the purpose of identifying potential air quality impacts that may result from the proposed Kaiser Permanente Fresno Medical Office Building ("MOB Project") in the City of Fresno. The MOB Project consists of the development of an approximately 145,000 square feet medical office building to be located west of the Locust Avenue and First Street intersection.

The City of Fresno is located in one of the most polluted air basins in the country – the San Joaquin Valley Air Basin (SJVAB). The surrounding topography includes foothills and mountains to the east and west. These mountain ranges direct air circulation and dispersion patterns. Temperature inversions can trap air within the Valley, thereby preventing the vertical dispersal of air pollutants. In addition to topographic conditions, the local climate can also contribute to air quality problems. Climate in Fresno is classified as Mediterranean, with moist cool winters and dry warm summers.

Air quality within the MOB Project area is addressed through the efforts of various federal, state, regional, and local government agencies. These agencies work jointly, as well as individually, to improve air quality through legislation, regulations, planning, policy-making, education, and a variety of programs.

IMPACTS

Short-Term (Construction) Emissions

Short-term impacts are mainly related to the construction phase of a project and are recognized to be short in duration. Construction air quality impacts are generally attributable to dust generated by equipment and vehicles. Table E-1 shows the estimated construction emissions that would be generated from the MOB Project. Results of the analysis show that emissions generated from the construction phase of the MOB Project will not exceed the San Joaquin Valley Air Pollution Control District (SJVAPCD) emission thresholds.

Table E-1
Project Construction Emissions (tons/year)

Summary Report	CO	NO_X	ROG	SO_X	PM_{10}	$PM_{2.5}$	CO2e
Project Site Construction Emissions Per Year	2.76	3.30	1.35	0.01	0.38	0.25	481.86
SJVAPCD Level of Significance	100	10	10	27	15	15	None
Does the Project Exceed Standard?	No	No	No	No	No	No	No

Source: CalEEMod Emissions Model

Long-Term Emissions

Long-Term emissions from the project are generated by mobile source (vehicle) emissions from the MOB Project site and area sources such as water heaters and lawn maintenance equipment.

1. Localized Mobile Source Emissions – Ozone/Particulate Matter

Operational emissions associated with the MOB Project are shown in Table E-2. Results indicate that the annual operational emissions from the MOB Project will be less than the SJVAPCD emission thresholds for criteria pollutants considering adherence to all applicable SJVAPCD Rules.

Table E-2
Project Operational Emissions (tons/year)

Summary Report	CO	NO_X	ROG	SO_X	PM_{10}	$PM_{2.5}$	CO2e
Project Operational Emissions Per Year	9.96	9.62	1.85	0.05	1.46	0.82	6252.10
SJVAPCD Level of Significance	100	10	10	27	15	15	None
Does the Project Exceed Standard?	No	No	No	No	No	No	No

Source: CalEEMod Emissions Model

2. Toxic Air Contaminants (TAC)

An evaluation of nearby land uses shows that the MOB Project will not place sensitive receptors in the vicinity of existing toxic sources. Therefore, TAC's from sources in the study area will not significantly impact the MOB Project. In addition, the MOB Project will not generate TAC's that would have a significant impact on the environment or adjacent sensitive receptors.

3. Odors

The proposed MOB Project will not generate odorous emissions given the nature or characteristics of medical office developments. The intensity of an odor source's operations and its proximity to sensitive receptors influences the potential significance of odor emissions. The SJVAPCD has identified some common types of facilities that have been known to produce odors in the SJV Air Basin. The types of facilities that are known to produce odors are not located within two (2) miles of the MOB Project, and therefore these existing odor sources will not affect the MOB Project or its future users.

4. Naturally Occurring Asbestos (NOA)

Asbestos is a term used for several types of naturally occurring fibrous minerals found in many parts of California. The most common type of asbestos is chrysotile, but other types are also found in California. Construction of the MOB Project may cause asbestos to become airborne due to the construction activities that will occur on site. The MOB Project would be required to

submit a Dust Control Plan under the SJVAPCD's Rule 8021. Compliance with Rule 8021 would limit fugitive dust emissions from construction, demolition, excavation, extraction, and other earthmoving activities associated with the MOB Project.

5. Greenhouse Gas Emissions

CARB, in consultation with MPOs, has provided each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035. For the Fresno COG region, CARB set targets at five (5) percent per capita decrease in 2020 and a ten (10) percent per capita decrease in 2035 from a base year of 2005. Fresno COG's 2018 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) projects that the Fresno County region would achieve the prescribed emissions targets.

In 2009, the SJVAPCD adopted the following guidance documents applicable to projects within the San Joaquin Valley:

- ✓ Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA (SJVAPCD 2009), and
- ✓ District Policy: Addressing GHG Emission Impacts for Stationary Source Projects Under CEQA When Serving as the Lead Agency (SJVAPCD 2009).

This guidance and policy are the reference documents referenced in the SJVAPCD's Guidance for Assessing and Mitigating Air Quality Impacts adopted in March 2015 (SJVAPCD 2015). Consistent with the District Guidance and District Policy above, SJVAPCD (2015) acknowledges the current absence of numerical thresholds, and recommends a tiered approach to establish the significance of the GHG impacts on the environment:

i. If a project complies with an approved GHG emission reduction plan or GHG mitigation program which avoids or substantially reduces GHG emissions within the geographic area in which the project is located, then the project would be determined to have a less than significant individual and cumulative impact for GHG emissions;
ii. If a project does not comply with an approved GHG emission reduction plan or mitigation program, then it would be required to implement Best Performance Standards (BPS); and
iii. If a project is not implementing BPS, then it should demonstrate that its GHG emissions would be reduced or mitigated by at least 29 percent compared to Business as Usual (BAU).

The City of Fresno GHG Plan, adopted December 2014, is a comprehensive municipal and community strategy to reduce GHG emissions within the City of Fresno and is consistent with the goals and strategies outlined in CARB regulations. As noted in the GHG Plan, the MOB Project's compliance with applicable City of Fresno General Plan policies and GHG Plan strategies would result in less than significant impacts for greenhouse gas emissions. The GHG Plan identifies

numerous strategies needed to achieve reduction targets for 2020 and beyond. Those strategies are categorized as follows:

- ✓ Land Use and Transportation
- ✓ Transportation Facilities Strategies
- ✓ Transportation Demand Strategies
- ✓ Energy Conservation Strategies for New and Existing Buildings
- ✓ Waste Diversion and Recycling and Energy Recovery
- ✓ Strategies for Existing Development
- ✓ Municipal Strategies

The GHG Plan determined that projects within a SCS Plan area that are consistent with the land use and development densities as well as design standards for the project area would be considered to have a less than significant impact on climate change. The proposed MOB Project is consistent with the currently adopted General Plan for the City of Fresno and the adopted 2018 RTP/SCS and is therefore consistent with the population growth and VMT applied in those plan documents.

The MOB Project site falls under the Employment District (E) Office (O) designation which allows for administrative, financial, business, professional, medical, and public offices. In addition, the MOB Project site is located within the Woodward Park Community Plan area. The proposed MOB Project includes the development of approximately 145,000 square feet of medical office space which is consistent with the site designation as defined in the *Fresno Municipal Code Chapter 15: Citywide Development Code*, December 2015. Applicable design standards included within the development code have been incorporated into the MOB Project design. Finally, the MOB Project is consistent with the guidelines and policies outlined in the Woodward Park Community Plan.

As a result, the MOB Project is considered to have a less than significant impact on climate change. The MOB Project will not conflict with or obstruct implementation of the GHG Plan and applicable SCS Plan area.

In December 2008, the South Coast Air Quality Management District (SCAQMD) Governing Board adopted the staff proposal for an interim GHG significance threshold for projects where the SCAQMD is lead agency. The SCAQMD guidance identifies a threshold of 10,000 MTCO2eq./year for GHG for construction emissions amortized over a 30-year project lifetime, plus annual operation emissions. Though the MOB Project is under SJVAPCD jurisdiction, the SCAQMD GHG threshold provides some perspective on the GHG emissions generated by the MOB Project. Table E-3 shows the yearly GHG emissions generated by the MOB Project as determined by the CalEEMod model, which is approximately 37% less than the threshold identified by the SCAQMD.

Table E-3
Project Operational Greenhouse Gas Emissions

Summary Report	CO_2e
Project Operational Emissions Per Year	6,268.2 MT/yr

Source: CalEEMod Emissions Model

CEQA ENVIRONMENTAL CHECKLIST

In accordance with the California Environmental Quality Act (CEQA), the effects of the MOB Project were evaluated to determine if they will result in Project-Specific significant adverse impacts on the environment that are peculiar to the MOB Project or its site that differ from those impacts already analyzed and disclosed in the City's General Plan EIR. The criteria used to determine the significance of an impact with respect to air quality and greenhouse gas emissions are summarized below.

1. Air Quality

The criteria used to determine the significance of an air quality impact are based on the following thresholds of significance, which come from Appendix G of the CEQA Guidelines. Accordingly, air quality impacts resulting from the MOB Project are considered significant if the MOB Project would:

- ✓ Conflict with or obstruct implementation of the applicable air quality plan?

The primary way of determining consistency with the air quality plan's (AQP's) assumptions is determining consistency with the applicable General Plan to ensure that the MOB Project's population density and land use are consistent with the growth assumptions used in the AQPs for the air basin.

As required by California law, city and county General Plans contain a Land Use Element that details the types and quantities of land uses that the city or county estimates will be needed for future growth, and that designate locations for land uses to regulate growth. Fresno COG uses the growth projections and land use information in adopted general plans to estimate future average daily trips and then VMT, which are then provided to SJVAPCD to estimate future emissions in the AQPs. Existing and future pollutant emissions computed in the AQP are based on land uses from area general plans. AQPs detail the control measures and emission reductions

required for reaching attainment of the air standards.

The applicable General Plan for the MOB Project is the City of Fresno's General Plan, which was adopted December 18, 2014. The MOB Project is consistent with the currently adopted General Plan for the City of Fresno and is therefore consistent with the population growth and VMT applied in the plan. Therefore, the MOB Project is consistent with the growth assumptions used in the applicable AQPs. As a result, the MOB Project will not conflict with or obstruct implementation of any air quality plans. Therefore, the MOB Project would have similar or reduced impacts as compared to the General Plan EIR, and no mitigation is needed.

- ✓ Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?

Fresno County is nonattainment for Ozone (1 hour and 8 hour) and PM10 (State standards) and PM2.5. The SJVAPCD has prepared the 2016 and 2013 Ozone Plan, 2007 PM10 Maintenance Plan, and 2012 PM2.5 Plan to achieve Federal and State standards for improved air quality in the SJVAB regarding ozone and PM. Inconsistency with any of the plans would be considered a cumulatively adverse air quality impact. As discussed in Section 4.1.1, the MOB Project is consistent with the currently adopted General Plan for the City of Fresno and is therefore consistent with the population growth and VMT applied in the plan. Therefore, the MOB Project is consistent with the growth assumptions used in the 2016 and 2013 Ozone Plan, 2007 PM10 Maintenance Plan, and 2012 PM2.5 Plan.

Results of the CALINE analysis (Section 3.3.2) show that the intersections of Herndon Avenue at SR 41 SB Off Ramp, Herndon Avenue at SR 41 NB Off Ramp, Herndon Avenue at Fresno Street, and Herndon Avenue at First Street are not expected to generate CO concentrations that would exceed the Federal or State 1-hour and 8-hour standards. Further, as indicated in Section 3.3.2, the MOB Project would not create objectionable odors affecting a substantial number of people. The MOB Project will not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard. The General Plan EIR projected that Plan implementation would result in significant and unavoidable impacts due to an exceedance of SJVAPCD standards for ROG, NOx, PM10, and PM2.5 emissions; however, the MOB Project would not exceed SJVAPCD standards for any criteria pollutant. Therefore, there would be no increase in severity to the previously-identified significant impact in the General Plan EIR, and MOB Project traffic will not result in Project-specific or site-specific significant adverse impacts from the net increase of any criteria pollutant within the Project study area. Accordingly, no mitigation measures are needed.

- ✓ Expose sensitive receptors to substantial pollutant concentrations?

Sensitive receptors refer to those segments of the population most susceptible to poor air quality

(i.e., children, the elderly, and those with pre-existing serious health problems affected by air quality). Land uses that have the greatest potential to attract these types of sensitive receptors include schools, parks, playgrounds, daycare centers, nursing homes, hospitals, and residential communities. From a health risk perspective, the proposed MOB Project is a Type B Project in that it may potentially place sensitive receptors (medical office staff) in the vicinity of existing sources.

The first step in evaluating the potential for impacts to sensitive receptors for TACs from the MOB Project is to perform a screening level analysis. For Type B Projects, one type of screening tool is found in the CARB Handbook: Air Quality and Land Use Handbook: A Community Perspective. This handbook includes recommended buffer distances associated with various types of common sources. The screening level analysis for the MOB Project shows that TACs are not a concern based upon the recommended buffer distances. An evaluation of nearby land uses considering CARB's Pollution Mapping Tool shows that the MOB Project will not place sensitive receptors in the vicinity of existing toxic sources. Therefore, TAC's from sources in the study area will not significantly impact the MOB Project. In addition, the MOB Project will not generate TAC's that would have a significant impact on the environment or adjacent sensitive receptors. Therefore, no mitigation is needed.

Short-Term Impacts

The annual emissions from the construction phase of the MOB Project will be less than the applicable SJVAPCD emission thresholds for criteria pollutants. Therefore, construction emissions associated with the MOB Project are considered less than significant.

Long-Term Impacts

Long-Term emissions from the MOB Project are generated primarily by mobile source (vehicle) emissions from the project site and area sources such as lawn maintenance equipment. Emissions from long-term operations generally represent a project's most substantial air quality impact. Results indicate that the annual operational emissions from the MOB Project will be less than the SJVAPCD emission thresholds for criteria pollutants considering adherence to all applicable SJVAPCD Rules. Therefore, operational emissions associated with the MOB Project are considered less than significant.

As discussed above, there would be no increase in severity to the previously-identified significant impact, and MOB Project operations will not result in Project-specific or site-specific significant adverse impacts from substantial pollutant concentrations within the Project study area. Accordingly, no mitigation measures are needed.

- ✓ Result in other emissions such as those leading to odors adversely affecting a substantial number of people?

The proposed MOB Project will not generate odorous emissions given the nature or characteristics of medical office developments. The intensity of an odor source's operations and its proximity to sensitive receptors influences the potential significance of odor emissions. The SJVAPCD has identified some common types of facilities that have been known to produce odors in the SJV Air Basin. The types of facilities that are known to produce odors are not located within two (2) miles of the MOB Project. Therefore, no mitigation is needed.

As summarized above, this Report shows that air quality impacts resulting from the MOB Project would be within the impacts analyzed in the General Plan EIR. Moreover, the Report demonstrates that with adherence to relevant air emission reduction policies included in General Plan Policies UF-1-c through HC-3-d and Chapter 10 of the Fresno Municipal Code, there would be no short-term or long-term Project- or site-specific air quality impacts with respect to construction or operation of the MOB Project.

2. *Greenhouse Gas Emissions*

The criteria used to determine the significance of a greenhouse gas impact are based on the following thresholds of significance, which come from Appendix G of the CEQA Guidelines. Accordingly, greenhouse gas impacts resulting from the MOB Project are considered significant if the MOB Project would:

- ✓ Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

The General Plan EIR concluded that cumulative impacts related to the growth under the City of Fresno General Plan are significant and unavoidable. The City of Fresno GHG Plan, adopted December 2014, is a comprehensive municipal and community strategy to reduce GHG emissions within the City of Fresno and is consistent with the goals and strategies outlined in CARB regulations. The GHG Plan determined that projects within a SCS Plan area that are consistent with the land use and development densities as well as design standards for the project area would be considered to have a less than significant impact on climate change. The proposed MOB Project is consistent with the currently adopted General Plan for the City of Fresno and the adopted 2018 RTP/SCS and is therefore consistent with the population growth and VMT applied in those plan documents.

The resulting permanent greenhouse gas increases related to MOB Project operations would be within the greenhouse gas increases analyzed in the General Plan EIR, so there would be no increase in severity to the previously-identified significant and unavoidable greenhouse gas impacts. Moreover, implementation of the MOB Project will adhere to the requirements of the City of Fresno GHG Plan, which will ensure that the MOB Project would not result in Project-specific or site-specific significant adverse impacts from greenhouse gas emissions within the

Project study area. Therefore, no mitigation measures are needed.

- ✓ Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

As noted above, the MOB Project's compliance with applicable City of Fresno General Plan policies and GHG Plan strategies would result in less than significant impacts for greenhouse gas emissions. The GHG Plan determined that projects within a SCS Plan area that are consistent with the land use and development densities as well as design standards for the project area would be considered to have a less than significant impact on climate change. The proposed MOB Project is consistent with the currently adopted General Plan for the City of Fresno and the adopted 2018 RTP/SCS and is therefore consistent with the population growth and VMT applied in those plan documents.

As a result, the MOB Project is considered to have a less than significant impact on climate change. The MOB Project will not conflict with or obstruct implementation of the GHG Plan and applicable SCS Plan area.

As summarized above, this Report shows that greenhouse gas impacts resulting from the MOB Project would be within the impacts analyzed in the General Plan EIR. Moreover, the Report demonstrates that with adherence to relevant greenhouse gas emission reduction policies included in General Plan Policies ED-1-c through HC-5-f, the GHG Plan, and Chapter 10 of the Fresno Municipal Code, there would be no site-specific greenhouse gas impacts with respect to construction or operation of the MOB Project.

1.0 Introduction

The City of Fresno ("City") adopted its current General Plan on December 18, 2014 and certified a Master Environmental Impact Report ("EIR") for the General Plan (State Clearinghouse Number 2012111015) (the "General Plan EIR"). The proposed Kaiser Permanente Medical Office Building ("MOB Project") would be located within the "Office" use designation under the General Plan, which permits professional and medical offices up to a maximum floor area ratio of 2.0. The MOB Project is a permitted use and proposes a floor area ratio of approximately 0.47 (assuming 145,000 square feet of development on the 7.1-acre site), so it is consistent with the General Plan's use and density regulations.

Public Resources Code Section 21083.3 and California Environmental Quality Act ("CEQA") Guidelines Section 15183 provide that proposed projects that are consistent with a "community plan" (including the General Plan) for which an EIR was certified is exempt from CEQA, "except as might be necessary to examine whether there are project-specific significant effects which are peculiar to the Project or its site." CEQA Guidelines Section 15183(c) specifies that "if an impact is not peculiar to the parcel or to the proposed Project, has been addressed as a significant effect in the prior EIR, or can be substantially mitigated by the imposition of uniformly applied development policies or standards…, then an EIR need not be prepared for the project solely on the basis of that impact."

In other words, projects consistent with the General Plan are exempt from subsequent CEQA review unless they would result in project-specific impacts. If a project's impacts are within the universe of effects previously covered in the General Plan EIR, or if they can be reduced to a less than significant level through the imposition of uniformly applied development standards (such as General Plan policies, zoning requirements, General Plan EIR mitigation measures, or standards from other plans), no new CEQA document (e.g., a Mitigated Negative Declaration or and EIR) is required.

Pursuant to CEQA Guidelines Section 15183, the analysis included in this report can be used by the City of Fresno to determine if the MOB Project would result in project-specific effects peculiar to the MOB Project or its site that differ from those impacts already analyzed and disclosed in the General Plan EIR. As discussed within this report, the analysis provides substantial evidence in support of the conclusion that the MOB Project would not result in any significant impacts that: (1) are peculiar to the MOB Project or its site; (2) were not identified as significant in the General Plan EIR; or (3) were previously identified significant effects but that would have a substantial increase in severity as compared to the General Plan EIR.

The General Plan EIR concluded that growth permitted under the General Plan would occur subject to numerous policies to reduce operational air pollutant emissions and increase energy efficiency, and therefore General Plan implementation would be consistent with the applicable control measures of the SJVAPCD attainment plan, resulting in a less than significant impact with

respect to the implementation of applicable air quality plans. Likewise, emissions from carbon monoxide were projected to decrease and sulfur dioxide emissions were projected to increase only slightly, resulting in a less than significant impact with respect to violations of air quality standards. However, even with the implementation of General Plan policies meant to reduce air pollution, the General Plan EIR concluded that the General Plan would result in a significant and unavoidable impact with respect to criteria pollutant emissions, because future development would cause an exceedance of SJVAPCD standards for ROG, NOx, PM10, and PM2.5 emissions. Mitigation measures AQ-1 through AQ-4 were identified to reduce exposure of sensitive receptors to substantial pollutant concentrations, but the General Plan EIR nevertheless determined that cumulative development would result in exposure to TAC emissions that would cause a significant and unavoidable impact. The General Plan EIR also relied on Mitigation Measure AQ-5 to reduce odor impacts, which would be less than significant with mitigation incorporated.

The MOB Project is consistent with the General Plan and would be required to comply with Mitigation Measures AQ-1 through AQ-5, as well as SJVAPCD standards. As shown by this study, the MOB Project specific impacts would be less than significant with adherence to these uniform standards, and therefore the MOB Project would not result in any new significant effects or increase the severity of previously identified environmental effects related to air quality as compared with the General Plan EIR.

The General Plan EIR identified that General Plan implementation would result in the generation of greenhouse gases through the use of motor vehicles, electricity, natural gas, waste, offroad equipment, and ozone depleting substance substitutes (refrigerants), however, the analysis concluded that the City's Greenhouse Gas Reduction Plan ("GHG Plan") demonstrates that, even with increased growth under the General Plan, the City would reduce greenhouse gas emissions and per capita emission rates. Therefore, the General Plan EIR concluded that impacts related to greenhouse gas emissions would be less than significant and the General Plan would not conflict with applicable plans, policies, or regulations adopted for the purpose of reducing greenhouse gas emissions.

The GHG Plan is a comprehensive policy document adopted to achieve compliance with state mandates regarding greenhouse gas emission reductions by focusing on feasible actions the City can take to minimize emissions impacts. Moreover, the GHG Plan was adopted so to assist with the streamlining of future projects' CEQA analysis, in that compliance with the GHG Plan demonstrates that an individual project would have a less-than-significant effect on greenhouse gas emissions. The MOB Project is consistent with the General Plan and would be required to comply with the City's GHG Plan and therefore would not result in any greenhouse gas emissions beyond those analyzed in the General Plan EIR.

The MOB Project is not of sufficient scale or scope to result in project- or site-specific impacts with respect to greenhouse gas emissions that would be peculiar to the MOB Project. Moreover, because the MOB Project is consistent with the project analyzed in the General Plan EIR, its

implementation would not result in any new significant effects or increase the severity of previously identified environmental effects as compared with the General Plan EIR.

1.1 Description of the Region/Project

This Air Quality & Greenhouse Gas Impact Assessment has been prepared for the purpose of identifying potential project-specific or site-specific air quality impacts that may result from the proposed MOB Project in the City of Fresno. The MOB Project consists of the development of an approximately 145,000 square feet medical office building to be located west of the Locust Avenue and First Street intersection.

The MOB Project lies within the central portion of the San Joaquin Valley, in the City of Fresno. Figures 1 and 2 show the location of the MOB Project along with major roadways and highways. Site access will be provided at the intersections of Locust Avenue at First Street and Private Driveway (north of Locust Avenue) at First Street.

The City of Fresno is located in one of the most polluted air basins in the country – the San Joaquin Valley Air Basin (SJVAB). The surrounding topography includes foothills and mountains to the east and west. These mountain ranges direct air circulation and dispersion patterns. Temperature inversions can trap air within the Valley, thereby preventing the vertical dispersal of air pollutants. In addition to topographic conditions, the local climate can also contribute to air quality problems. Climate in Fresno is classified as Mediterranean, with moist cool winters and dry warm summers.

1.2 Regulatory

Air quality within the MOB Project area is addressed through the efforts of various federal, state, regional, and local government agencies. These agencies work jointly, as well as individually, to improve air quality through legislation, regulations, planning, policy-making, education, and a variety of programs. The agencies primarily responsible for improving the air quality within the City of Fresno are discussed below along with their individual responsibilities.

1.2.1 *Federal Agencies*

- ✓ **U.S. Environmental Protection Agency (EPA)**

  The Federal Clean Air Bill first adopted in 1967 and periodically amended since then, established federal ambient air quality standards. A 1987 amendment to the Bill set a deadline for the attainment of these standards. That deadline has since passed. The other Clean Air Act (CAA) Bill Amendments, passed in 1990, share responsibility with the State in reducing emissions from mobile sources. The U.S. Environmental Protection Agency (EPA) is responsible for enforcing the 1990 amendments.

The CAA and the national ambient air quality standards identify levels of air quality for six "criteria" pollutants, which are considered the maximum levels of ambient air pollutants considered safe, with an adequate margin of safety, to protect public health and welfare. The six criteria pollutants include ozone, carbon monoxide (CO), nitrogen dioxide, sulfur dioxide, particulate matter, and lead.

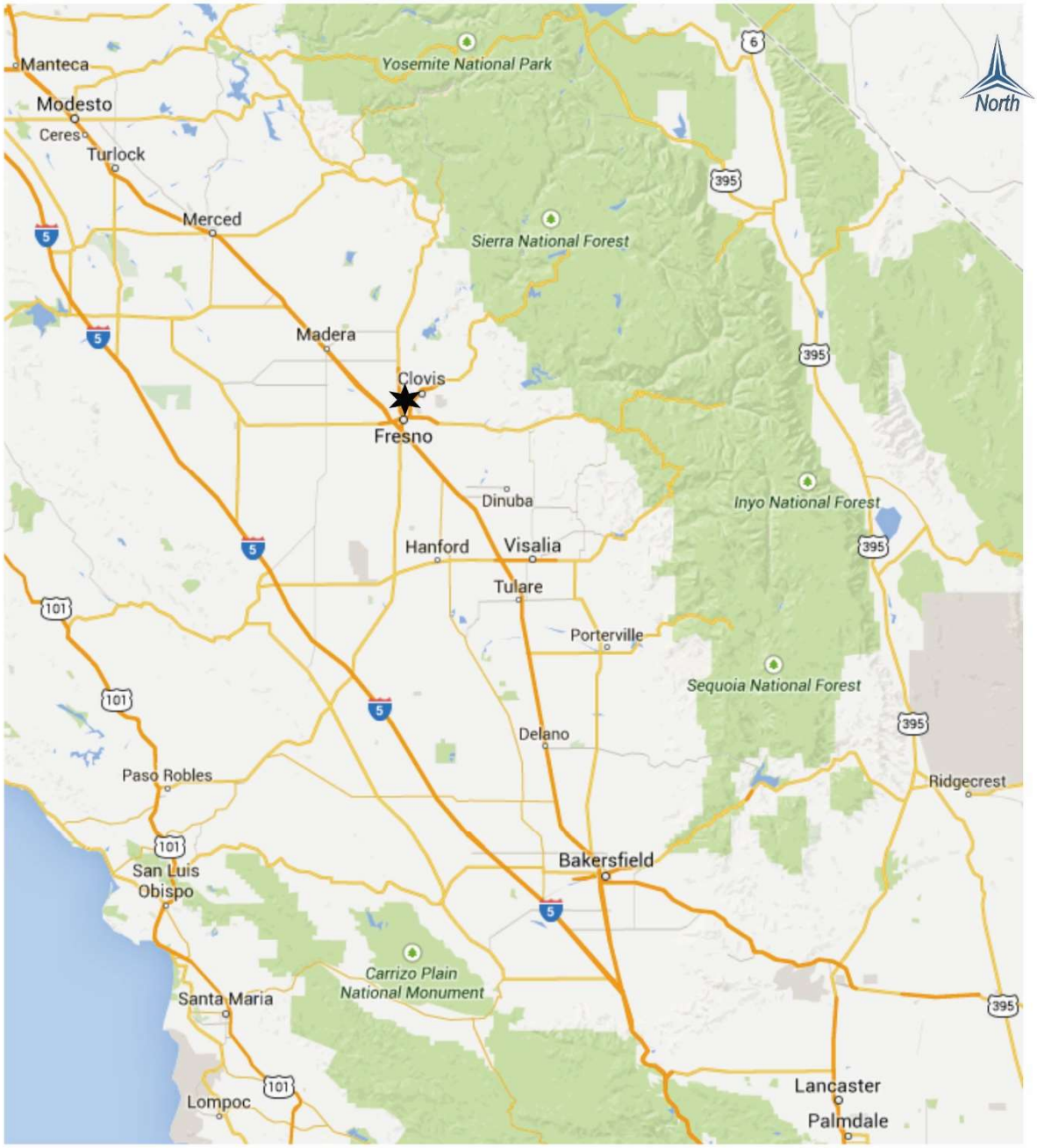
CAA Section 176(c) (42 U.S.C. 7506(c)) and EPA transportation conformity regulations (40 CFR 93 Subpart A) require that each new RTP and Transportation Improvement Program (TIP) be demonstrated to conform to the State Implementation Plan (SIP) before the RTP and TIP are approved by the Metropolitan planning organization (MPO) or accepted by the U.S. Department of Transportation (DOT). The conformity analysis is a federal requirement designed to demonstrate compliance with the National Ambient Air Quality Standards (NAAQS). However, because the State Implementation Plan (SIP) for particulate matter 10 microns or less in diameter (PM10), particulate matter 2.5 microns or less in diameter (PM2.5), and Ozone address attainment of both the State and federal standards, for these pollutants, demonstrating conformity to the federal standards is also an indication of progress toward attainment of the State standards. Compliance with the State air quality standards is provided on the pages following this federal conformity discussion.

The EPA approved San Joaquin Valley reclassification of the ozone (8-hour) designation to extreme nonattainment in the Federal Register on May 5, 2010, even though the San Joaquin Valley was initially classified as serious nonattainment for the 1997 8-hour ozone standard. In accordance with the CAA, EPA uses the design value at the time of standard promulgation to assign nonattainment areas to one of several classes that reflect the severity of the nonattainment problem; classifications range from marginal nonattainment to extreme nonattainment. In the Federal Register on October 26, 2015, the EPA revised the primary and secondary standard to 0.070 parts per million (ppm) to provide increased public health protection against health effects associated with long- and short-term exposures. The previous ozone standard was set in 2010 at 0.075 ppm.

The City of Fresno is located in a nonattainment area for the 8-hour ozone standard, 1997, 2006 and 2012 PM2.5 standards, and has a maintenance plan for PM10 standard.

Kaiser Permanente - Fresno Medical Office Building
Regional Location

Figure 1

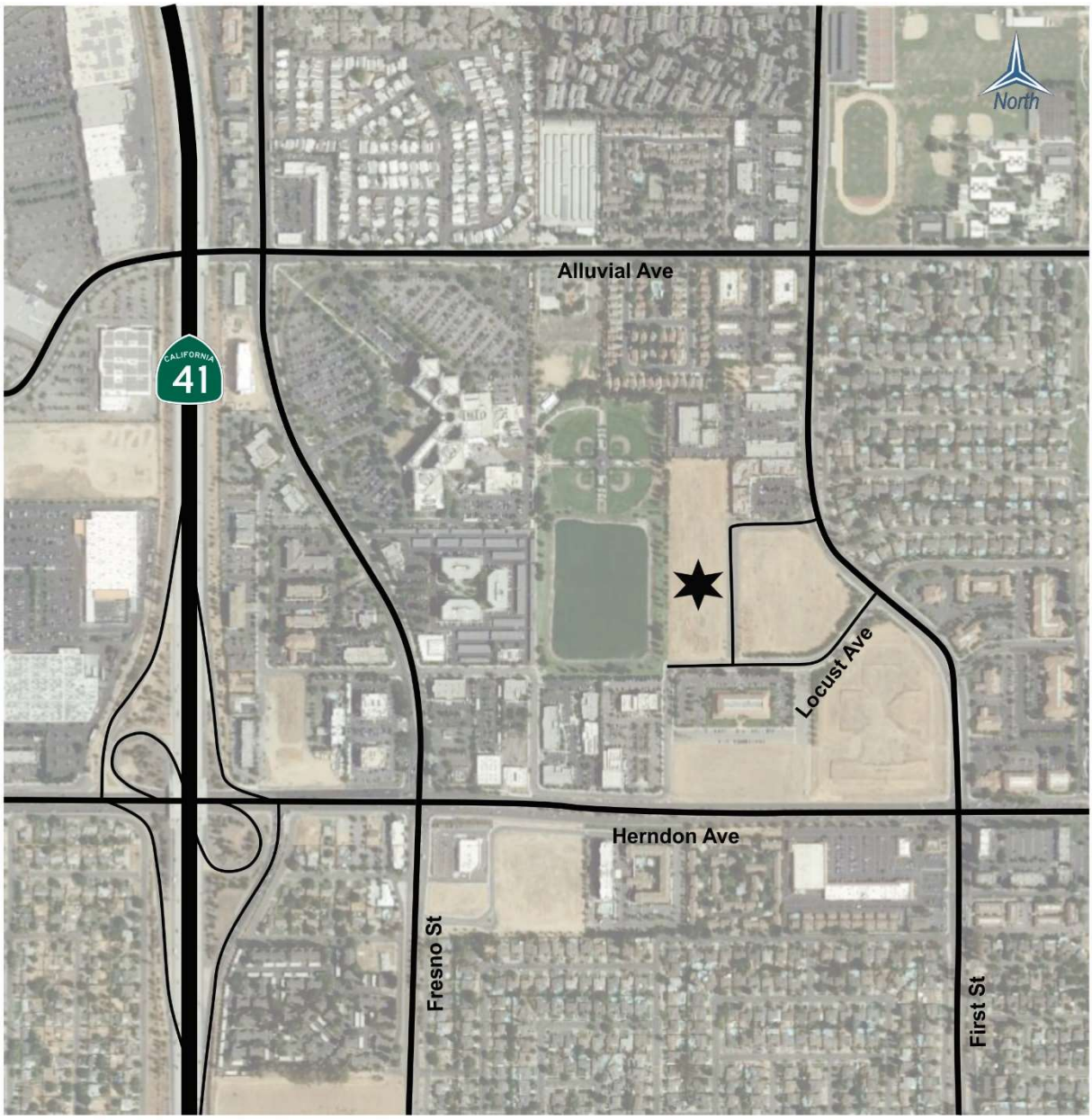


LEGEND

★ Project Location

VRPA TECHNOLOGIES, INC.

Kaiser Permanente - Fresno Medical Office Building **Figure 2**
Project Location



1.2.2 *Federal Regulations*

✓ **State Implementation Plan (SIP)/ Air Quality Management Plans (AQMPs)**

To ensure compliance with the NAAQS, EPA requires states to adopt SIP aimed at improving air quality in areas of nonattainment or a Maintenance Plan aimed at maintaining air quality in areas that have attained a given standard. New and previously submitted plans, programs, district rules, state regulations, and federal controls are included in the SIPs. Amendments made in 1990 to the federal CAA established deadlines for attainment based on an area's current air pollution levels. States must enact additional regulatory programs for nonattainment's areas in order to adhere with the CAA Section 172. In California, the SIPs must adhere to both the NAAQS and the California Ambient Air Quality Standards (CAAQS).

To ensure that State and federal air quality regulations are being met, Air Quality Management Plans (AQMPs) are required. AQMPs present scientific information and use analytical tools to identify a pathway towards attainment of NAAQS and CAAQS. The San Joaquin Valley Air Pollution Control District (SJVAPCD) develops the AQMPs for the region where the Fresno Council of Governments (Fresno COG) operates. The regional air districts begin the SIP process by submitting their AQMPs to the California Air Resources Board (CARB). CARB is responsible for revising the SIP and submitting it to EPA for approval. EPA then acts on the SIP in the Federal Register. The items included in the California SIP are listed in the Code of Federal Regulations Title 40, Chapter 1, Part 52, Subpart 7, Section 52.220.

✓ **Transportation Control Measures**

One particular aspect of the SIP development process is the assessment of available transportation control measures (TCMs) as a part of making progress towards clean air goals. TCMs are defined in Section 108(f)(1) of the CAA and are strategies designed to reduce vehicle miles traveled, vehicle idling, and associated air pollution. These goals are generally achieved by developing attractive and convenient alternatives to single-occupant vehicle use. Examples of TCMs include ridesharing programs, transportation infrastructure improvements such as adding bicycle and carpool lanes, and expansion of public transit.

✓ **Energy Policy Act of 1992 (EPAct)**

The Energy Policy Act of 1992 (EPAct) was passed to reduce the country's dependence on foreign petroleum and improve air quality. EPAct includes several parts intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. EPAct requires certain federal, state, and local government and private fleets to purchase a percentage of light duty AFVs capable of running on alternative fuels each year. In addition, financial incentives are included in EPAct. Federal tax deductions will be allowed for businesses and individuals to cover the incremental cost of alternative fueled vehicles (AFVs). States are also required by the act to consider a variety of incentive programs to help

promote AFVs.

1.2.3 *State Agencies*

✓ **California Air Resources Board (CARB)**

CARB is the agency responsible for coordination and oversight of State and local air pollution control programs in California and for implementing its own air quality legislation called the California Clean Air Act (CCAA), adopted in 1988. CARB was created in 1967 from the merging of the California Motor Vehicle Pollution Control Board and the Bureau of Air Sanitation and its Laboratory.

CARB has primary responsibility in California to develop and implement air pollution control plans designed to achieve and maintain the NAAQS established by the EPA. Whereas CARB has primary responsibility and produces a major part of the SIP for pollution sources that are statewide in scope, it relies on the local air districts to provide additional strategies for sources under their jurisdiction. CARB combines its data with all local district data and submits the completed SIP to the EPA. The SIP consists of the emissions standards for vehicular sources and consumer products set by CARB, and attainment plans adopted by the Air Pollution Control Districts (APCDs) and Air Quality Management District's (AQMDs) and approved by CARB.

States may establish their own standards, provided the State standards are at least as stringent as the NAAQS. California has established California Ambient Air Quality Standards (CAAQS) pursuant to California Health and Safety Code (CH&SC) [§39606(b)] and its predecessor statutes.

The CH&SC [§39608] requires CARB to "identify" and "classify" each air basin in the State on a pollutant-by-pollutant basis. Subsequently, CARB designated areas in California as nonattainment based on violations of the CAAQSs. Designations and classifications specific to the SJVAB can be found in the next section of this document. Areas in the State were also classified based on severity of air pollution problems. For each nonattainment class, the CCAA specifies air quality management strategies that must be adopted. For all nonattainment categories, attainment plans are required to demonstrate a five-percent-per-year reduction in nonattainment air pollutants or their precursors, averaged every consecutive three-year period, unless an approved alternative measure of progress is developed. In addition, air districts in violation of CAAQS are required to prepare an Air Quality Attainment Plan (AQAP) that lays out a program to attain and maintain the CCAA mandates.

CARB, in consultation with MPOs, has provided each affected region with reduction targets for Greenhouse Gases (GHGs) emitted by passenger cars and light trucks in the region for the years 2020 and 2035. For the Fresno Council of Governments (Fresno COG) region, CARB set

targets at five (5) percent per capita decrease in 2020 and a ten (10) percent per capita decrease in 2035 from a base year of 2005. Fresno COG's 2018 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) projects that the Fresno County region would achieve the prescribed emissions targets. CARB Executive Order G-19-092 (October 2019) accepts FCOG's determination that the SCS adopted by the FCOG Board of Directors on July 26, 2018, would achieve the 2020 and 2035 GHG emissions reduction targets established by CARB when implemented.

Other CARB duties include monitoring air quality. CARB has established and maintains, in conjunction with local APCDs and AQMDs, a network of sampling stations (called the State and Local Air Monitoring [SLAMS] network), which monitor the present pollutant levels in the ambient air.

Fresno County is in the CARB-designated, SJVAB. A map of the SJVAB is provided in Figure 3. In addition to Fresno County, the SJVAB includes Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare Counties. Federal and State standards for criteria pollutants are provided in Table 1.

1.2.4 *State Regulations*

- ✓ **CARB Mobile-Source Regulation**

The State of California is responsible for controlling emissions from the operation of motor vehicles in the State. Rather than mandating the use of specific technology or the reliance on a specific fuel, CARB's motor vehicle standards specify the allowable grams of pollutant per mile driven. In other words, the regulations focus on the reductions needed rather than on the manner in which they are achieved.

- ✓ **California Clean Air Act**

The CCAA was first signed into law in 1988. The CCAA provides a comprehensive framework for air quality planning and regulation, and spells out, in statute, the state's air quality goals, planning and regulatory strategies, and performance. The CCAA establishes more stringent ambient air quality standards than those included in the Federal CAA. CARB is the agency responsible for administering the CCAA. CARB established ambient air quality standards pursuant to the CH&SC [§39606(b)], which are similar to the federal standards. The SJVAPCD is one of 35 AQMDs that have prepared air quality management plans to accomplish a five percent (5%) annual reduction in emissions documenting progress toward the State ambient air quality standards.

- ✓ **Tanner Air Toxics Act**

California regulates Toxic Air Contaminants (TACs) primarily through the Tanner Air Toxics Act (AB 1807) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588).

The Tanner Act sets forth a formal procedure for CARB to designate substances as TACs. This includes research, public participation, and scientific peer review before CARB can designate a substance as a TAC. To date, CARB has identified more than 21 TACs and has adopted EPA's list of Hazardous Air Pollutants (HAPs) as TACs. Once a TAC is identified, CARB then adopts an Airborne Toxics Control Measure (ATCM) for sources that emit that particular TAC. If there is a safe threshold for a substance at which there is no toxic effect, the control measure must reduce exposure below that threshold. If there is no safe threshold, the measure must incorporate Best Available Control Technology (BACT) to minimize emissions.

AB 2588 requires that existing facilities that emit toxic substances above a specified level prepare a toxic-emission inventory, prepare a risk assessment if emissions are significant, notify the public of significant risk levels, and prepare and implement risk reduction measures. CARB has adopted diesel exhaust control measures and more stringent emission standards for various on-road mobile sources of emissions, including transit buses and off-road diesel equipment (e.g., tractors, generators).

These rules and standards provide for:

- More stringent emission standards for some new urban bus engines, beginning with 2002 model year engines.
- Zero-emission bus demonstration and purchase requirements applicable to transit agencies
- Reporting requirements under which transit agencies must demonstrate compliance with the urban transit bus fleet rule.

✓ **AB 1493 (Pavley)**

AB 1493 (Pavley) enacted on July 22, 2002, required CARB to develop and adopt regulations that reduce greenhouse gases emitted by passenger vehicles and light duty trucks. Regulations adopted by CARB would apply to 2009 and later model year vehicles. CARB estimated that the regulation would reduce climate change emissions from light duty passenger vehicles by an estimated 18 percent in 2020 and by 27 percent in 2030 [Association of Environmental Professionals (AEP) 2007)]. In 2005, the CARB requested a waiver from U.S. EPA to enforce the regulation, as required under the CAA. Despite the fact that no waiver had ever been denied over a 40-year period, the then Administrator of the EPA sent Governor Schwarzenegger a letter in December 2007, indicating he had denied the waiver. On March 6, 2008, the waiver denial was formally issued in the Federal Register. Governor Schwarzenegger and several other states immediately filed suit against the federal government to reverse that decision. On January 21, 2009, CARB requested that EPA reconsider denial of the waiver. EPA scheduled a re-hearing on March 5, 2009. On June 30, 2009, EPA granted a waiver of CAA preemption to California for its greenhouse gas emission standards for motor vehicles beginning with the 2009 model year.

Kaiser Permanente - Fresno Medical Office Building **Figure 3**
San Joaquin Valley Air Basin

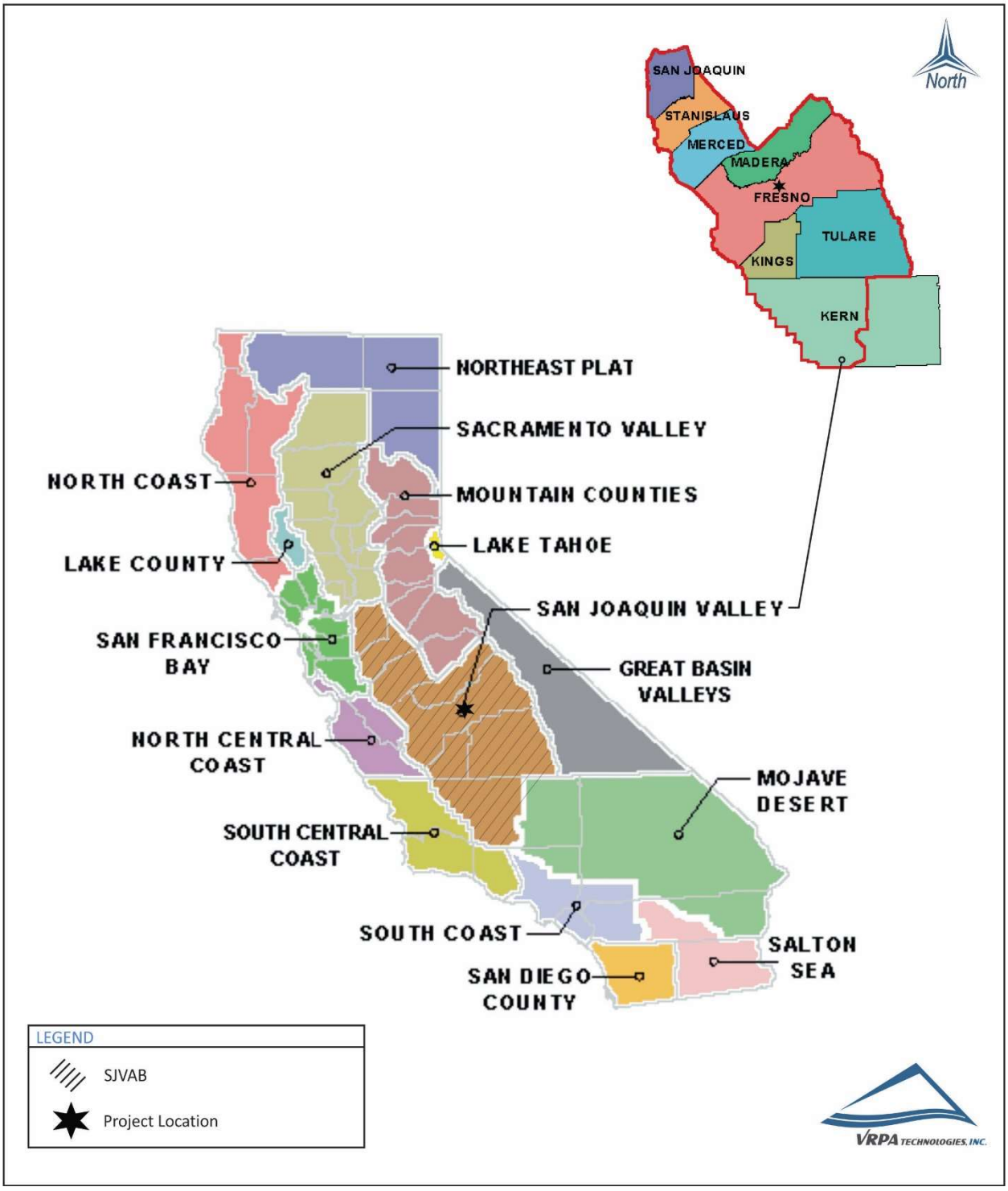


Table 1
Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1]		National Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3) [8]	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	--	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.070 ppm (137 µg/m^3)		
Respirable Particulate Matter (PM10) [9]	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		--		
Fine Particulate Matter (PM2.5) [9]	24 Hour	--	--	35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12.0 µg/m^3	15 µg/m^3	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	--	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	--	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		--	--	
Nitrogen Dioxide (NO_2) [10]	1 Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 µg/m^3)	--	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		0.053 ppm (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2) [11]	1 Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	--	Ultraviolet Fluorescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	--		--	0.5 ppm (1300 µg/m^3)	
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for cetain areas) [11]	--	
	Annual Arithmetic Mean	--		0.030 ppm (for cetain areas) [11]	--	
Lead [12,13]	30 Day Average	1.5 µg/m^3	Atomic Absorption	--	--	High Volume Sampler and Atomic Absorption
	Calendar Quarter	--		1.5 µg/m^3 (for certain areas) [11]	Same as Primary Standard	
	Rolling 3-Month Average	--		0.15 µg/m^3		
Visibility Reducing Particles [14]	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride [12]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

See footnotes on next page ...

Footnotes:

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m3 is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.
5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
7. Reference method as described by the U.S. EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the U.S. EPA.
8. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.
9. On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 µg/m3 to 12.0 µg/m3. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 µg/m3, as was the annual secondary standard of 15 µg/m3. The existing 24-hour PM10 standards (primary and secondary) of 150 µg/m3 also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.
10. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.
11. On June 2, 2010, a new 1-hour SO2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.
12. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
13. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 µg/m3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
14. In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

✓ **Assembly Bill 32 (California Global Warming Solutions Act of 2006)**

California passed the California Global Warming Solutions Act of 2006 (AB 32; California Health and Safety Code Division 25.5, Sections 38500 - 38599). AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and establishes a cap on statewide GHG emissions. AB 32 required that statewide GHG emissions be reduced to 1990 levels by 2020. December 31, 2020 is the deadline for achieving the 2020 GHG emissions cap. To effectively implement the cap, AB 32 directs CARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources. AB 32 specifies that regulations adopted in response to AB 1493 should be used to address GHG emissions from vehicles. However, AB 32 also includes language stating that if the AB 1493 regulations cannot be implemented, then CARB should develop new regulations to control vehicle GHG emissions under the authorization of AB 32.

AB 32 requires CARB to adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrived at the cap; institute a schedule to meet the emissions cap; and develop tracking, reporting, and enforcement mechanisms to ensure that the state reduces GHG emissions enough to meet the cap. AB 32 also includes guidance on instituting emissions reductions in an economically efficient manner, along with conditions to ensure that businesses and consumers are not unfairly affected by the reductions. Using these criteria to reduce statewide GHG emissions to 1990 levels by 2020 would represent an approximate 25 to 30 percent reduction in current emissions levels. However, CARB has discretionary authority to seek greater reductions in more significant and growing GHG sectors, such as transportation, as compared to other sectors that are not anticipated to significantly increase emissions.

CARB's 2017 Climate Change Scoping Plan builds on the efforts and plans encompassed in the initial Scoping Plan adopted in December of 2008. The current plan has identified new policies and actions to accomplish the State's 2030 GHG limit.

✓ **Senate Bill 375**

SB 375, signed in September 2008 (Chapter 728, Statutes of 2008), aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation. SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a Sustainable Communities Strategy (SCS) or Alternative Planning Strategy (APS) that will prescribe land use allocation in that MPO's regional transportation plan. CARB, in consultation with MPOs, has provided each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035. For the Fresno COG region, CARB set targets at five (5) percent per capita decrease in 2020 and a ten (10) percent per capita decrease in 2035 from a base year of 2005. CARB Executive Order G-19-092 (October 2019) accepts FCOG's determination that the SCS adopted by the FCOG Board of Directors on July 26, 2018, would achieve the 2020 and 2035 GHG emissions reduction targets established by CARB when implemented.

This law also extends the minimum time period for the regional housing needs allocation cycle from five years to eight years for local governments located within an MPO that meets certain requirements. City or county land use policies (including general plans) are not required to be consistent with the regional transportation plan (and associated SCS or APS). However, new provisions of CEQA incentivize (through streamlining and other provisions) qualified projects that are consistent with an approved SCS or APS, categorized as "transit priority projects."

✓ **Executive Order B-30-15**

Executive Order B-30-15, which was signed by Governor Brown in 2016, establishes a California greenhouse gas reduction target of 40 percent below 1990 levels by 2030 to ensure California meets its target of reducing greenhouse gas emissions to 80 percent below 1990 levels by 2050. Executive Order B-30-15 requires MPO's to implement measures that will achieve reductions of greenhouse gas emissions to meet the 2030 and 2050 greenhouse gas emissions reductions targets.

✓ **California Global Warming Solutions Act of 2006: emissions limit, or SB 32**

SB 32 is a California Senate bill expanding upon AB 32 to reduce greenhouse gas (GHG) emissions. The lead author is Senator Fran Pavley and the principal co-author is Assembly member Eduardo Garcia. SB 32 was signed into law on September 8, 2016, by Governor Brown. SB 32 sets into law the mandated reduction target in GHG emissions as written into Executive Order B-30-15. SB 32 requires that there be a reduction in GHG emissions to 40% below the 1990 levels by 2030. Greenhouse gas emissions include carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons, and perfluorocarbons. The California Air Resources Board (CARB) is responsible for ensuring that California meets this goal. The provisions of SB 32 were added to Section 38566 of the Health and Safety Code subsequent to the bill's approval. The bill went into effect January 1, 2017. SB 32 builds onto Assembly Bill (AB) 32 written by Senator Fran Pavley and Assembly Speaker Fabian Nunez passed into law on September 27, 2006. AB 32 required California to reduce greenhouse gas emissions to 1990 levels by 2020 and SB 32 continues that timeline to reach the targets set in Executive Order B-30-15. SB 32 provides another intermediate target between the 2020 and 2050 targets set in Executive Order S-3-05.

1.2.5 *Regional Agencies*

✓ **San Joaquin Valley Air Pollution Control District**

The SJVAPCD is the agency responsible for monitoring and regulating air pollutant emissions from stationary, area, and indirect sources within Fresno County and throughout the SJVAB. The District also has responsibility for monitoring air quality and setting and enforcing limits for source emissions. CARB is the agency with the legal responsibility for regulating mobile

source emissions. The District is precluded from such activities under State law.

The District was formed in mid-1991 and prepared and adopted the San Joaquin Valley Air Quality Attainment Plan (AQAP), dated January 30, 1992, in response to the requirements of the State CCAA. The CCAA requires each non-attainment district to reduce pertinent air contaminants by at least five percent (5%) per year until new, more stringent, 1988 State air quality standards are met.

Activities of the SJVAPCD include the preparation of plans for the attainment of ambient air quality standards, adoption and enforcement of rules and regulations concerning sources of air pollution, issuance of permits for stationary sources of air pollution, inspection of stationary sources of air pollution and response to citizen complaints, monitoring of ambient air quality and meteorological conditions, and implementation of programs and regulations required by the FCAA and CCAA.

The SJVAPCD has prepared the following State Implementation Plans to address ozone, PM-10 and PM2.5 that currently apply to Fresno non-attainment area:

- The 2016 Ozone Plan (2008 standard) was adopted by SJVAPCD on June 16, 2016 and subsequently adopted by ARB on July 21, 2016.
- The 2013 1-Hour Ozone Plan (revoked 1997 standard) was adopted by the SJVAPCD on September 19, 2013. EPA withdrew its approval of the plan due to litigation. The District plans to submit a "redesignation substitute" to EPA to maintain its attainment status for this revoked ozone standard.
- The 2007 PM-10 Maintenance Plan (as revised in 2015) was approved by EPA on July 8, 2016 (effective September 30, 2016).
- The 2012 PM2.5 Plan (as revised in 2015) was approved by EPA on August 16, 2016 (effective September 30, 2016).

The SJVAPCD Plans identified above represent SJVAPCD's plan to achieve both state and federal air quality standards. The regulations and incentives contained in these documents must be legally enforceable and permanent. These plans break emissions reductions and compliance into different emissions source categories.

The SJVAPCD also prepared the *Guide for Assessing and Mitigation Air Quality Impacts* (GAMAQI), dated March 19, 2015. The GAMAQI is an advisory document that provides Lead Agencies, consultants, and project applicants with analysis guidance and uniform procedures for addressing air quality impacts in environmental documents. Local jurisdictions are not required to utilize the methodology outlined therein. This document describes the criteria that SJVAPCD uses when reviewing and commenting on the adequacy of environmental

documents. It recommends thresholds for determining whether or not projects would have significant adverse environmental impacts, identifies methodologies for predicting project emissions and impacts, and identifies measures that can be used to avoid or reduce air quality impacts.

1.2.6 *Regional Regulations*

The SJVAPCD has adopted numerous rules and regulations to implement its air quality plans. Following, are significant rules that will apply to the MOB Project.

✓ **Regulation VIII – Fugitive PM10 Prohibitions**

Regulation VIII is comprised of District Rules 8011 through 8081, which are designed to reduce PM_{10} emissions (predominantly dust/dirt) generated by human activity, including construction and demolition activities, road construction, bulk materials storage, paved and unpaved roads, carryout and track out, landfill operations, etc. The proposed MOB Project will be required to comply with this regulation. Regulation VIII control measures are provided below:

1. *All disturbed areas, including storage piles, which are not being actively utilized for construction purposes, shall be effectively stabilized of dust emissions using water, chemical stabilizer/suppressant, covered with a tarp or other suitable cover or vegetative ground cover.*
2. *All on-site unpaved roads and off-site unpaved access roads shall be effectively stabilized of dust emissions using water or chemical stabilizer/suppressant.*
3. *All land clearing, grubbing, scraping, excavation, land leveling, grading, cut & fill, and demolition activities shall be effectively controlled of fugitive dust emissions utilizing application of water or by presoaking.*
4. *When materials are transported off-site, all material shall be covered, or effectively wetted to limit visible dust emissions, and at least six inches of freeboard space from the top of the container shall be maintained.*
5. *All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at the end of each workday. The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust emissions. Use of blower devices is expressly forbidden.*
6. *Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emissions utilizing sufficient water or chemical stabilizer/suppressant.*
7. *Within urban areas, track out shall be immediately removed when it extends 50 or more feet from the site and at the end of each workday.*

✓ **Rule 8021 – Construction, Demolition, Excavation, and Other Earthmoving Activities**

District Rule 8021 requires owners or operators of construction projects to submit a Dust Control Plan to the District if at any time the project involves non-residential developments of five or more acres of disturbed surface area or moving, depositing, or relocating of more than 2,500 cubic yards per day of bulk materials on at least three days of the project. The proposed MOB Project will meet these criteria and will be required to submit a Dust Control Plan to the District in order to comply with this rule.

✓ **Rule 4641 – Cutback, Slow Cure, and Emulsified Asphalt, Paving and Maintenance Operations**

If asphalt paving will be used, then paving operations of the proposed MOB Project will be subject to Rule 4641. This rule applies to the manufacture and use of cutback asphalt, slow cure asphalt and emulsified asphalt for paving and maintenance operations.

✓ **Rule 9510 – Indirect Source Review (ISR)**

The purpose of this rule is to fulfill the District's emission reduction commitments in the PM10 and Ozone Attainment Plans, achieve emission reductions from construction activities, and to provide a mechanism for reducing emissions from the construction of and use of development projects through off-site measures. The rule is expected to reduce nitrogen oxides and particulates throughout the San Joaquin Valley by more than 10 tons per day. Rule 9510 requires medical office development projects larger than 20,000 square feet to reduce smog-forming and particulate emissions generated by their projects. The proposed MOB Project includes the development of approximately 145,000 square feet of medical office space and will be required to comply with this rule.

1.2.7 *Local Plans*

✓ **City of Fresno General Plan**

California State Law requires every city and county to adopt a comprehensive General Plan to guide its future development. The General Plan essentially serves as a "constitution for development"— the document that serves as the foundation for all land use decisions. The City of Fresno's General Plan (Adopted December 18, 2014) identifies numerous policies geared towards the improvement of air quality in the City of Fresno. They include policy number LU-2-a, which promotes development of vacant, underdeveloped, and redevelopable land uses within the City Limits where urban services are available considering the establishment and implementation of supportive regulations and programs. The proposed MOB Project will be developed on a vacant parcel within city limits.

✓ **City of Fresno Greenhouse Gas Reduction Plan**

The City of Fresno Greenhouse Gas Reduction Plan (GHG Plan), adopted December 2014, was created to guide the development and enhancement of actions designed to reduce the City of Fresno's GHG emissions. The GHG Plan is a comprehensive municipal and community strategy to reduce GHG emissions within the City of Fresno, consistent with the goals and strategies outlined in the CARB regulations identified above. The GHG Plan identifies how reduction strategies will be implemented over time.

The City of Fresno recently circulated the *Fresno General Plan Public Review Draft Program Environmental Impact Report (State Clearinghouse Number: 2019050005)*, dated March 2020, which includes an update to the GHG Plan referenced above. The GHG Plan Update evaluates the GHG reduction targets included in the GHG Plan adopted in December 2014 and proposes new targets consistent with State policies.

2.0 Environmental Setting

This section describes existing air quality within the San Joaquin Valley Air Basin and in Fresno County, including the identification of air pollutant standards, meteorological and topological conditions affecting air quality, and current air quality conditions. Air quality is described in relation to ambient air quality standards for criteria pollutants such as, ozone, carbon monoxide, and particulate matter. Air quality can be directly affected by the type and density of land use change and population growth in urban and rural areas.

2.1 Geographical Location

The SJVAB is comprised of eight counties: Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare. Encompassing 24,840 square miles, the San Joaquin Valley is the second largest air basin in California. Cumulatively, counties within the Air Basin represent approximately 16 percent of the State's geographic area. The Air Basin is bordered by the Sierra Nevada Mountains on the east (8,000 to 14,492 feet in elevation), the Coastal Range on the west (4,500 feet in elevation), and the Tehachapi Mountains on the south (9,000 feet elevation). The San Joaquin Valley is open to the north extending to the Sacramento Valley Air Basin.

2.2 Topographic Conditions

Fresno County is located within the San Joaquin Valley Air Basin [as determined by the California Air Resources Board (CARB)]. Air basins are geographic areas sharing a common "air shed." A description of the Air Basin in the County, as designated by CARB, is provided in the paragraph below. Air pollution is directly related to the region's topographic features, which impact air movement within the Basin.

Wind patterns within the SJVAB result from marine air that generally flows into the Basin from the San Joaquin River Delta. The Coastal Range hinders wind access into the Valley from the west, the Tehachapi's prevent southerly passage of airflow, and the high Sierra Nevada Mountain Range provides a significant barrier to the east. These topographic features result in weak airflow that becomes restricted vertically by high barometric pressure over the Valley. As a result, the SJVAB is highly susceptible to pollutant accumulation over time. Most of the surrounding mountains are above the normal height of summer inversion layers (1,500-3,000 feet).

2.3 Climatic Conditions

Fresno County is located in one of the most polluted air basins in the country. Temperature inversions can trap air within the Valley, thereby preventing the vertical dispersal of air pollutants. In addition to topographic conditions, the local climate can also contribute to air quality problems. Climate in Fresno County is classified as Mediterranean, with moist cool winters and dry warm summers.

Ozone, classified as a "regional" pollutant, often afflicts areas downwind of the original source of precursor emissions. Ozone can be easily transported by winds from a source area. Peak ozone levels tend to be higher in the southern portion of the Valley, as the prevailing summer winds sweep precursors downwind of northern source areas before concentrations peak. The separate designations reflect the fact that ozone precursor transport depends on daily meteorological conditions.

Other primary pollutants, carbon monoxide (CO), for example, may form high concentrations when wind speed is low. During the winter, Fresno County experiences cold temperatures and calm conditions that increase the likelihood of a climate conducive to high CO concentrations.

Precipitation and fog tend to reduce or limit some pollutant concentrations. Ozone needs sunlight for its formation, and clouds and fog block the required radiation. CO is slightly water-soluble, so precipitation and fog tends to "reduce" CO concentrations in the atmosphere. PM10 is somewhat "washed" from the atmosphere with precipitation. Precipitation in the San Joaquin Valley is strongly influenced by the position of the semi-permanent subtropical high-pressure belt located off the Pacific coast. In the winter, this high- pressure system moves southward, allowing Pacific storms to move through the San Joaquin Valley. These storms bring in moist, maritime air that produces considerable precipitation on the western, upslope side of the Coast Ranges. Significant precipitation also occurs on the western side of the Sierra Nevada. On the valley floor, however, there is some down slope flow from the Coast Ranges and the resultant evaporation of moisture from associated warming results in a minimum of precipitation. Nevertheless, the majority of the precipitation falling in the San Joaquin Valley is produced by those storms during the winter. Precipitation during the summer months is in the form of convective rain showers and is rare. It is usually associated with an influx of moisture into the San Joaquin Valley through the San Francisco area during an anomalous flow pattern in the lower layers of the atmosphere. Although the hourly rates of precipitation from these storms may be high, their rarity keeps monthly totals low.

Precipitation on the San Joaquin Valley floor and in the Sierra Nevada decreases from north to south. Stockton in the north receives about 20 inches of precipitation per year, Fresno in the center, receives about 10 inches per year, and Bakersfield at the southern end of the valley receives less than 6 inches per year. This is primarily because the Pacific storm track often passes through the northern part of the state while the southern part of the state remains protected by the Pacific High. Precipitation in the San Joaquin Valley Air Basin (SJVAB) is confined primarily to the winter months with some also occurring in late summer and fall. Average annual rainfall for the entire San Joaquin Valley is approximately 5 to 16 inches. Snowstorms, hailstorms, and ice storms occur infrequently in the San Joaquin Valley and severe occurrences of any of these are very rare.

The winds and unstable air conditions experienced during the passage of storms result in periods of low pollutant concentrations and excellent visibility. Between winter storms, high pressure and light winds allow cold moist air to pool on the San Joaquin Valley floor. This creates strong

low-level temperature inversions and very stable air conditions. This situation leads to the San Joaquin Valley's famous Tule Fogs. The formation of natural fog is caused by local cooling of the atmosphere until it is saturated (dew point temperature). This type of fog, known as radiation fog is more likely to occur inland. Cooling may also be accomplished by heat radiation losses or by horizontal movement of a mass of air over a colder surface. This second type of fog, known as advection fog, generally occurs along the coast.

Conditions favorable to fog formation are also conditions favorable to high concentrations of CO and PM10. Ozone levels are low during these periods because of the lack of sunlight to drive the photochemical reaction. Maximum CO concentrations tend to occur on clear, cold nights when a strong surface inversion is present and large numbers of fireplaces are in use. A secondary peak in CO concentrations occurs during morning commute hours when a large number of motorists are on the road and the surface inversion has not yet broken.

The water droplets in fog, however, can act as a sink for CO and nitrogen oxides (NOx), lowering pollutant concentrations. At the same time, fog could help in the formation of secondary particulates such as ammonium sulfate. These secondary particulates are believed to be a significant contributor of winter season violations of the PM10 and PM2.5 standards.

2.4 Anthropogenic (Man-made) Sources

In addition to climatic conditions (wind, lack of rain, etc.), air pollution can be caused by anthropogenic or man-made sources. Air pollution in the SJVAB can be directly attributed to human activities, which cause air pollutant emissions. Human causes of air pollution in the Valley consist of population growth, urbanization (gas-fired appliances, residential wood heaters, etc.), mobile sources (i.e., cars, trucks, airplanes, trains, etc.), oil production, agriculture, and other socioeconomic activities. The most significant factors, which are accelerating the decline of air quality in the SJVAB, are the Valley's rapid population growth and its associated increases in traffic, urbanization, and industrial activity.

Carbon monoxide emissions overwhelmingly come from mobile sources in the San Joaquin Valley; on-road vehicles contributed 34 percent, while other mobile vehicles, such as trains, planes, and off-road vehicles, contribute another 20 percent in 2012 according to emission projections from the CARB. Motor vehicles account for significant portions of regional gaseous and particulate emissions. Local large employers such as industrial plants can also generate substantial regional gaseous and particulate emissions. In addition, construction and agricultural activities can generate significant temporary gaseous and particulate emissions (dust, ash, smoke, etc.).

Ozone is the result of a photochemical reaction between Oxides of nitrogen (NOx) and Reactive Organic Gases (ROG). Mobile sources contribute 84 percent of all NOx emitted from anthropogenic sources based on data provided in Appendix B of the Air District's 2016 Ozone

Plan. In addition, mobile sources contribute 26 percent of all the ROG emitted from sources within the San Joaquin Valley.

The principal factors that affect air quality in and around Fresno County are:

1. The sink effect, climatic subsidence and temperature inversions and low wind speeds
2. Automobile and truck travel
3. Increases in mobile and stationary pollutants generated by local urban growth

Automobiles, trucks, buses and other vehicles using hydrocarbon (HC) fuels release exhaust products into the air. Each vehicle by itself does not release large quantities; however, when considered as a group, the cumulative effect is significant.

Other sources may not seem to fit into any one of the major categories or they may seem to fit in a number of them. These could include agricultural uses, dirt roads, animal shelters; animal feed lots, chemical plants and industrial waste disposal, which may be a source of dust, odors, or other pollutants. For Fresno County, this category includes several agriculturally related activities, such as plowing, harvesting, dusting with herbicides and pesticides and other related activities. Finally, industrial contaminants and their potential to produce various effects depend on the size and type of industry, pollution controls, local topography, and meteorological conditions. Major sources of industrial emissions in Fresno County consist of agricultural production and processing operations, wine production, and marketing operations.

The primary contributors of PM10 emissions in the San Joaquin Valley are farming activities (22%) and road dust, both paved and unpaved (35%) in 2020 according to emission projections from the CARB. Fugitive windblown dust from “open” fields contributed 14 percent of the PM10.

The four major sources of air pollutant emissions in the SJVAB include industrial plants, motor vehicles, construction activities, and agricultural activities. Industrial plants account for significant portions of regional gaseous and particulate emissions. Motor vehicles, including those from large employers, generate substantial regional gaseous and particulate emissions. Finally, construction and agricultural activities can generate significant temporary gaseous and particulate emissions (dust, ash, smoke, etc.). In addition to these primary sources of air pollution, urban areas upwind from Fresno County, including areas north and west of the San Joaquin Valley, can cause or generate emissions that are transported into Fresno County. All four of the major pollutant sources affect ambient air quality throughout the Air Basin.

2.4.1 *Motor Vehicles*

Automobiles, trucks, buses and other vehicles using hydrocarbon fuels release exhaust products into the air. Each vehicle by itself does not release large quantities; however, when considered as a group, the cumulative effect is significant.

2.4.2 *Agricultural and Other Miscellaneous Activities*

Other sources may not seem to fit into any one of the major categories or they may seem to fit in a number of them. These could include agricultural uses, dirt roads, animal shelters, animal feed lots, chemical plants and industrial waste disposal, which may be a source of dust, odors, or other pollutants. For Fresno County, this category includes several agriculturally related activities, such as plowing, harvesting, dusting with herbicides and pesticides and other related activities.

2.4.3 *Industrial Plants*

Industrial contaminants and their potential to produce various effects depend on the size and type of industry, pollution controls, local topography, and meteorological conditions. Major sources of industrial emissions in Fresno County consist of agricultural production and processing operations, wine production, and marketing operations.

2.5 San Joaquin Valley Air Basin Monitoring

SJVAPCD and the CARB maintain numerous air quality monitoring sites throughout each County in the Air Basin to measure ozone, PM2.5, and PM10. It is important to note that the federal ozone 1-hour standard was revoked by the EPA and is no longer applicable for federal standards. The closest monitoring station to the MOB Project is located at Clovis' Villa Avenue Monitoring Station. The stations monitor particulates, ozone, and nitrogen dioxide. Monitoring data for the most recent three years on record is summarized in Table 2.

Table 3 identifies Fresno County's attainment status. As indicated, the SJVAB is nonattainment for Ozone (1 hour and 8 hour) and PM. In accordance with the FCAA, EPA uses the design value at the time of standard promulgation to assign nonattainment areas to one of several classes that reflect the severity of the nonattainment problem; classifications range from marginal nonattainment to extreme nonattainment. The FCAA contains provisions for changing the classifications using factors such as clean air progress rates and requests from states to move areas to a higher classification.

On April 16, 2004 EPA issued a final rule classifying the SJVAB as extreme nonattainment for Ozone, effective May 17, 2004 (69 FR 20550). The (federal) 1-hour ozone standard was revoked on June 6, 2005. However, many of the requirements in the 1-hour attainment plan (SIP) continue to apply to the SJVAB. The current ozone plan is the (federal) 8-hour ozone plan adopted in 2007. The SJVAB was reclassified from a "serious" nonattainment area for the 8-hour ozone standard to "extreme" effective June 4, 2010.

Table 2
Maximum Pollutant Levels at Clovis' N Villa Avenue Monitoring Station

Pollutant	Time Averaging	2016 Maximums	2017 Maximums	2018 Maximums	Standards National	Standards State
Ozone (O_3)	1 hour	0.113 ppm	0.138 ppm	0.121 ppm	-	0.09 ppm
Ozone (O_3)	8 hour	0.095 ppm	0.100 ppm	0.094 ppm	0.070 ppm	0.070 ppm
Nitrogen Dioxide (NO_2)	1 hour	49.8 ppb	58.8 ppb	64.5 ppb	100 ppb	0.18 ppm
Nitrogen Dioxide (NO_2)	Annual Average	*	10.0 ppb	9.0 ppb	0.053 ppm	0.030 ppm
Particulates (PM_{10})	24 hour	76.2 µg/m^3	103.2 µg/m^3	114.6 µg/m^3	150 µg/m^3	50 µg/m^3
Particulates (PM_{10})	Federal Annual Arithmetic Mean	32.7 µg/m^3	*	39.6 µg/m^3	-	20 µg/m^3
Particulates ($PM_{2.5}$)	24 hour	50.4 µg/m^3	69.5 µg/m^3	82.3 µg/m^3	35 µg/m^3	-
Particulates ($PM_{2.5}$)	Federal Annual Arithmetic Mean	11.6 µg/m^3	13.6 µg/m^3	15.6 µg/m^3	12 µg/m^3	12 µg/m^3

Source: California Air Resources Board (ADAM) Air Pollution Summaries

* Means there was insufficient data available to determine the value.

Table 3
Fresno County Attainment Status

Pollutant	Designation/Classification	
	Federal Standards	State Standards
Ozone - 1 Hour	Revoked in 2005	Nonattainment/Severe
Ozone - 8 Hour	Nonattainment/Extreme [a]	No State Standard
PM10	Attainment	Nonattainment
PM2.5	Nonattainment	Nonattainment
Carbon Monoxide	Unclassified/Attainment	Attainment
Nitrogen Dioxide	Unclassified/Attainment	Attainment
Sulfur Dioxide	Unclassified/Attainment	Attainment
Lead (Particulate)	Unclassified/Attainment	Attainment
Hydrogen Sulfide	No Federal Standard	Unclassified
Sulfates	No Federal Standard	Attainment
Visibility Reducing Particles	No Federal Standard	Unclassified

Source: ARB Website, 2019

a. Though the Valley was initially classified as serious nonattainment for the 1997 8-hour ozone standard, EPA approved Valley reclassification to extreme nonattainment in the Federal Register on May 5, 2010 (effective June 4, 2010).

Notes:

National Designation Categories

Non-Attainment Area: Any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.

Unclassified/Attainment Area: Any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant or meets the national primary or secondary ambient air quality standard for the pollutant.

State Designation Categories

Unclassified: A pollutant is designated unclassified if the data are incomplete and do not support a designation of attainment or non-attainment.

Attainment: A pollutant is designated attainment if the State standard for that pollutant was not violated at any site in the area during a three-year period.

Non-attainment: A pollutant is designated non-attainment if there was at least one violation of a State standard for that pollutant in the area.

Non-Attainment/Transitional: A subcategory of the non-attainment designation. An area is designated non-attainment/transitional to signify that the area is close to attaining the standard for the pollutant.

2.6 Air Quality Standards

The FCAA, first adopted in 1963, and periodically amended since then, established National Ambient Air Quality Standards (NAAQS). A set of 1977 amendments determined a deadline for the attainment of these standards. That deadline has since passed. Other CAA amendments, passed in 1990, share responsibility with the State in reducing emissions from mobile sources.

In 1988, the State of California passed the CCAA (State 1988 Statutes, Chapter 568), which set forth a program for achieving more stringent California Ambient Air Quality Standards. The CARB implements State ambient air quality standards, as required in the CCAA, and cooperates with the federal government in implementing pertinent sections of the FCAA Amendments (FCAAA). Further, CARB regulates vehicular emissions throughout the State. The SJVAPCD regulates stationary sources, as well as some mobile sources. Attainment of the more stringent State PM10 Air Quality Standards is not currently required.

The EPA uses six "criteria pollutants" as indicators of air quality and has established for each of them a maximum concentration above which adverse effects on human health may occur. These threshold concentrations are called the NAAQS.

The SJVAPCD operates regional air quality monitoring networks that provide information on average concentrations of pollutants for which State or federal agencies have established ambient air quality standards. Descriptions of nine pollutants of importance in Fresno County follow.

2.6.1 *Ozone (1-hour and 8-hour)*

The most severe air quality problem in the Air Basin is the high level of ozone. Ozone occurs in two layers of the atmosphere. The layer surrounding the earth's surface is the troposphere. Here, ground level, or "bad" ozone, is an air pollutant that damages human health, vegetation, and many common materials. It is a key ingredient of urban smog. The troposphere extends to a level about 10 miles up, where it meets the second layer, the stratosphere. The stratospheric, or "good" ozone layer, extends upward from about 10 to 30 miles and protects life on earth from the sun's harmful ultraviolet rays.

"Bad" ozone is what is known as a photochemical pollutant. It needs reactive organic gases (ROG), NOx, and sunlight. ROG and NOx are emitted from various sources throughout Tulare County. In order to reduce ozone concentrations, it is necessary to control the emissions of these ozone precursors.

Significant ozone formation generally requires an adequate amount of precursors in the atmosphere and several hours in a stable atmosphere with strong sunlight. High ozone concentrations can form over large regions when emissions from motor vehicles and stationary sources are carried hundreds of miles from their origins.

Ozone is a regional air pollutant. It is generated over a large area and is transported and spread by wind. Ozone, the primary constituent of smog, is the most complex, difficult to control, and pervasive of the criteria pollutants. Unlike other pollutants, ozone is not emitted directly into the air by specific sources. Ozone is created by sunlight acting on other air pollutants (called precursors), specifically NOx and ROG. Sources of precursor gases to the photochemical reaction that form ozone number in the thousands. Common sources include consumer products, gasoline vapors, chemical solvents, and combustion products of various fuels. Originating from gas stations, motor vehicles, large industrial facilities, and small businesses such as bakeries and dry cleaners, the ozone-forming chemical reactions often take place in another location, catalyzed by sunlight and heat. High ozone concentrations can form over large regions when emissions from motor vehicles and stationary sources are carried hundreds of miles from their origins. Approximately 50 million people lived in counties with air quality levels above the EPA's health-based national air quality standard in 1994. The highest levels of ozone were recorded in Los Angeles, closely followed by the San Joaquin Valley. High levels also persist in other heavily populated areas, including the Texas Gulf Coast and much of the Northeast.

While the ozone in the upper atmosphere absorbs harmful ultraviolet light, ground-level ozone is damaging to the tissues of plants, animals, and humans, as well as to a wide variety of inanimate materials such as plastics, metals, fabrics, rubber, and paints. Societal costs from ozone damage include increased medical costs, the loss of human and animal life, accelerated replacement of industrial equipment, and reduced crop yields.

✓ ***Health Effects***

While ozone in the upper atmosphere protects the earth from harmful ultraviolet radiation, high concentrations of ground-level ozone can adversely affect the human respiratory system. Many respiratory ailments, as well as cardiovascular disease, are aggravated by exposure to high ozone levels. Ozone also damages natural ecosystems, such as: forests and foothill communities; agricultural crops; and some man-made materials, such as rubber, paint, and plastic. High levels of ozone may negatively affect immune systems, making people more susceptible to respiratory illnesses, including bronchitis and pneumonia. Ozone accelerates aging and exacerbates pre-existing asthma and bronchitis and, in cases with high concentrations, can lead to the development of asthma in active children. Active people, both children and adults, appear to be more at risk from ozone exposure than those with a low level of activity. Additionally, the elderly and those with respiratory disease are also considered sensitive populations for ozone.

People who work or play outdoors are at a greater risk for harmful health effects from ozone. Children and adolescents are also at greater risk because they are more likely than adults to spend time engaged in vigorous activities. Research indicates that children under 12 years of age spend nearly twice as much time outdoors daily than adults. Teenagers spend at least twice as much time as adults in active sports and outdoor activities. In addition, children

inhale more air per pound of body weight than adults, and they breathe more rapidly than adults. Children are less likely than adults to notice their own symptoms and avoid harmful exposures.

Ozone is a powerful oxidant—it can be compared to household bleach, which can kill living cells (such as germs or human skin cells) upon contact. Ozone can damage the respiratory tract, causing inflammation and irritation, and it can induce symptoms such as coughing, chest tightness, shortness of breath, and worsening of asthmatic symptoms. Ozone in sufficient doses increases the permeability of lung cells, rendering them more susceptible to toxins and microorganisms. Exposure to levels of ozone above the current ambient air quality standard leads to lung inflammation and lung tissue damage and a reduction in the amount of air inhaled into the lungs.

The CARB found ozone standards in Fresno County nonattainment of Federal and State standards.

2.6.2 *Suspended PM (PM10 and PM2.5)*

Particulate matter pollution consists of very small liquid and solid particles that remain suspended in the air for long periods. Some particles are large or concentrated enough to be seen as soot or smoke. Others are so small they can be detected only with an electron microscope. Particulate matter is a mixture of materials that can include smoke, soot, dust, salt, acids, and metals. Particulate matter is emitted from stationary and mobile sources, including diesel trucks and other motor vehicles; power plants; industrial processes; wood-burning stoves and fireplaces; wildfires; dust from roads, construction, landfills, and agriculture; and fugitive windblown dust. PM10 refers to particles less than or equal to 10 microns in aerodynamic diameter. PM2.5 refers to particles less than or equal to 2.5 microns in aerodynamic diameter and are a subset of PM10. Particulates of concern are those that are 10 microns or less in diameter. These are small enough to be inhaled, pass through the respiratory system and lodge in the lungs, possibly leading to adverse health effects.

In the western United States, there are sources of PM10 in both urban and rural areas. Because particles originate from a variety of sources, their chemical and physical compositions vary widely. The composition of PM10 and PM2.5 can also vary greatly with time, location, the sources of the material and meteorological conditions. Dust, sand, salt spray, metallic and mineral particles, pollen, smoke, mist, and acid fumes are the main components of PM10 and PM2.5. In addition to those listed previously, secondary particles can also be formed as precipitates from chemical and photochemical reactions of gaseous sulfur dioxide (SO2) and NOx in the atmosphere to create sulfates (SO4) and nitrates (NO3). Secondary particles are of greatest concern during the winter months where low inversion layers tend to trap the precursors of secondary particulates.

The District's 2008 PM2.5 Plan built upon the aggressive emission reduction strategy adopted in

the 2007 Ozone Plan and strives to bring the valley into attainment status for the 1997 NAAQS for PM2.5. The District's 2012 PM2.5 Plan provides multiple control strategies to reduce emissions of PM2.5 and other pollutants that form PM2.5. The plan's comprehensive control strategy includes regulatory actions, incentive programs, technology advancement, policy and legislative positions, public outreach, participation and communication, and additional strategies.

✓ ***Health Effects***

PM10 and PM2.5 particles are small enough—about one-seventh the thickness of a human hair, or smaller—to be inhaled and lodged in the deepest parts of the lung where they evade the respiratory system's natural defenses. Health problems begin as the body reacts to these foreign particles. Acute and chronic health effects associated with high particulate levels include the aggravation of chronic respiratory diseases, heart and lung disease, and coughing, bronchitis, and respiratory illnesses in children. Recent mortality studies have shown a statistically significant direct association between mortality and daily concentrations of particulate matter in the air. Non-health-related effects include reduced visibility and soiling of buildings. PM10 can increase the number and severity of asthma attacks, cause or aggravate bronchitis and other lung diseases, and reduce the body's ability to fight infections. PM10 and PM2.5 can aggravate respiratory disease and cause lung damage, cancer, and premature death.

Although particulate matter can cause health problems for everyone, certain people are especially vulnerable to adverse health effects of PM10. These "sensitive populations" include children, the elderly, exercising adults, and those suffering from chronic lung disease such as asthma or bronchitis. Of greatest concern are recent studies that link PM10 exposure to the premature death of people who already have heart and lung disease, especially the elderly. Acidic PM10 can also damage manmade materials and is a major cause of reduced visibility in many parts of the United States.

The CARB found PM10 standards in Fresno County in attainment of Federal standards and nonattainment for State standards. The CARB found PM2.5 standards in Fresno County nonattainment of Federal and State standards.

2.6.3 *Carbon Monoxide (CO)*

Carbon monoxide (CO) is emitted by mobile and stationary sources as a result of incomplete combustion of hydrocarbons or other carbon-based fuels. CO is an odorless, colorless, poisonous gas that is highly reactive. CO is a byproduct of motor vehicle exhaust, contributes more than two thirds of all CO emissions nationwide. In cities, automobile exhaust can cause as much as 95 percent of all CO emissions. These emissions can result in high concentrations of CO, particularly in local areas with heavy traffic congestion. Other sources of CO emissions include industrial processes and fuel combustion in sources such as boilers and incinerators. Despite an overall

downward trend in concentrations and emissions of CO, some metropolitan areas still experience high levels of CO.

✓ ***Health Effects***

CO enters the bloodstream and binds more readily to hemoglobin than oxygen, reducing the oxygen-carrying capacity of blood and thus reducing oxygen delivery to organs and tissues. The health threat from CO is most serious for those who suffer from cardiovascular disease. Healthy individuals are also affected but only at higher levels of exposure. At high concentrations, CO can cause heart difficulties in people with chronic diseases and can impair mental abilities. Exposure to elevated CO levels is associated with visual impairment, reduced work capacity, reduced manual dexterity, poor learning ability, difficulty performing complex tasks, and in prolonged, enclosed exposure, death.

The adverse health effects associated with exposure to ambient and indoor concentrations of CO are related to the concentration of carboxyhemoglobin (COHb) in the blood. Health effects observed may include an early onset of cardiovascular disease; behavioral impairment; decreased exercise performance of young, healthy men; reduced birth weight; sudden infant death syndrome (SIDS); and increased daily mortality rate.

Most of the studies evaluating adverse health effects of CO on the central nervous system examine high-level poisoning. Such poisoning results in symptoms ranging from common flu and cold symptoms (shortness of breath on mild exertion, mild headaches, and nausea) to unconsciousness and death.

The CARB found CO standards in Fresno County as unclassified/attainment of Federal standards and attainment for State standards.

2.6.4 *Nitrogen Dioxide (NO2)*

Nitrogen oxides (NOx) is a family of highly reactive gases that are primary precursors to the formation of ground-level ozone and react in the atmosphere to form acid rain. NOx is emitted from combustion processes in which fuel is burned at high temperatures, principally from motor vehicle exhaust and stationary sources such as electric utilities and industrial boilers. A brownish gas, NOx is a strong oxidizing agent that reacts in the air to form corrosive nitric acid, as well as toxic organic nitrates. EPA regulates only nitrogen dioxide (NO2) as a surrogate for this family of compounds because it is the most prevalent form of NOx in the atmosphere that is generated by anthropogenic (human) activities.[1]

✓ ***Health Effects***

NOx is an ozone precursor that combines with Reactive Organic Gases (ROG) to form ozone.

1 United States Environmental Protection Agency (EPA), Nitrogen Oxides (NOx). Why and How They Are Controlled, 456/F-99-006R, November 2019

See the ozone section above for a discussion of the health effects of ozone.

Direct inhalation of NOx can also cause a wide range of health effects. NOx can irritate the lungs, cause lung damage, and lower resistance to respiratory infections such as influenza. Short-term exposures (e.g., less than 3 hours) to low levels of nitrogen dioxide (NO2) may lead to changes in airway responsiveness and lung function in individuals with preexisting respiratory illnesses. These exposures may also increase respiratory illnesses in children. Long-term exposures to NO2 may lead to increased susceptibility to respiratory infection and may cause irreversible alterations in lung structure. Other health effects associated with NOx are an increase in the incidence of chronic bronchitis and lung irritation. Chronic exposure to NO2 may lead to eye and mucus membrane aggravation, along with pulmonary dysfunction. NOx can cause fading of textile dyes and additives, deterioration of cotton and nylon, and corrosion of metals due to production of particulate nitrates. Airborne NOx can also impair visibility. NOx is a major component of acid deposition in California. NOx may affect both terrestrial and aquatic ecosystems. NOx in the air is a potentially significant contributor to a number of environmental effects such as acid rain and eutrophication in coastal waters. Eutrophication occurs when a body of water suffers an increase in nutrients that reduce the amount of oxygen in the water, producing an environment that is destructive to fish and other animal life.

NO2 is toxic to various animals as well as to humans. Its toxicity relates to its ability to combine with water to form nitric acid in the eye, lung, mucus membranes, and skin. Studies of the health impacts of NO2 include experimental studies on animals, controlled laboratory studies on humans, and observational studies.

In animals, long-term exposure to NOx increases susceptibility to respiratory infections, lowering their resistance to such diseases as pneumonia and influenza. Laboratory studies show susceptible humans, such as asthmatics, exposed to high concentrations of NO2, can suffer lung irritation and, potentially, lung damage. Epidemiological studies have also shown associations between NO2 concentrations and daily mortality from respiratory and cardiovascular causes as well as hospital admissions for respiratory conditions.

NOx contributes to a wide range of environmental effects both directly and when combined with other precursors in acid rain and ozone. Increased nitrogen inputs to terrestrial and wetland systems can lead to changes in plant species composition and diversity. Similarly, direct nitrogen inputs to aquatic ecosystems such as those found in estuarine and coastal waters can lead to eutrophication as discussed above. Nitrogen, alone or in acid rain, also can acidify soils and surface waters. Acidification of soils causes the loss of essential plant nutrients and increased levels of soluble aluminum, which is toxic to plants. Acidification of surface waters creates conditions of low pH and levels of aluminum that are toxic to fish and other aquatic organisms.

The CARB found NO2 standards in Fresno County as unclassified/attainment of Federal standards and attainment for State standards.

2.6.5 *Sulfur Dioxide (SO2)*

The major source of sulfur dioxide (SO2) is the combustion of high-sulfur fuels for electricity generation, petroleum refining and shipping. High concentrations of SO2 can result in temporary breathing impairment for asthmatic children and adults who are active outdoors. Short-term exposures of asthmatic individuals to elevated SO2 levels during moderate activity may result in breathing difficulties that can be accompanied by symptoms such as wheezing, chest tightness, or shortness of breath. Other effects that have been associated with longer-term exposures to high concentrations of SO2, in conjunction with high levels of PM, include aggravation of existing cardiovascular disease, respiratory illness, and alterations in the lungs' defenses. SO2 also is a major precursor to PM2.5, which is a significant health concern and a main contributor to poor visibility. In humid atmospheres, sulfur oxides can react with vapor to produce sulfuric acid, a component of acid rain.

The CARB found SO2 standards in the Fresno County as unclassified/attainment for Federal standards and attainment for State standards.

2.6.6 *Lead (Pb)*

Lead, a naturally occurring metal, can be a constituent of air, water, and the biosphere. Lead is neither created nor destroyed in the environment, so it essentially persists forever. Lead was used until recently to increase the octane rating in automobile fuel. Since the 1980s, lead has been phased out in gasoline, reduced in drinking water, reduced in industrial air pollution, and banned or limited in consumer products. Gasoline-powered automobile engines were a major source of airborne lead through the use of leaded fuels; however, the use of leaded fuel has been mostly phased out. Since this has occurred the ambient concentrations of lead have dropped dramatically.

Exposure to lead occurs mainly through inhalation of air and ingestion of lead in food, water, soil, or dust. It accumulates in the blood, bones, and soft tissues and can adversely affect the kidneys, liver, nervous system, and other organs. Excessive exposure to lead may cause neurological impairments such as seizures, mental retardation, and behavioral disorders. Even at low doses, lead exposure is associated with damage to the nervous systems of fetuses and young children. Effects on the nervous systems of children are one of the primary health risk concerns from lead. In high concentrations, children can even suffer irreversible brain damage and death. Children 6 years old and under are most at risk, because their bodies are growing quickly.

The CARB found Lead standards in Fresno County as unclassified/attainment of Federal standards and attainment for State standards.

2.6.7 *Toxic Air Contaminants (TAC)*

In addition to the criteria pollutants discussed above, Toxic Air Contaminants (TAC) are another group of pollutants of concern. TAC are injurious in small quantities and are regulated despite

the absence of criteria documents. The identification, regulation and monitoring of TAC is relatively recent compared to that for criteria pollutants. Unlike criteria pollutants, TAC are regulated on the basis of risk rather than specification of safe levels of contamination. The ten TAC are acetaldehyde, benzene, 1,3-butadiene, carbon tetrachloride, hexavalent chromium, para-dichlorobenzene, formaldehyde, methylene chloride, perchloroethylene, and diesel particulate matter (diesel PM). Caltrans' guidance for transportation studies references the Federal Highway Administration (FHWA) memorandum titled "Interim Guidance on Air Toxic Analysis in NEPA Documents" which discusses emissions quantification of six "priority" compounds of 21 Mobile Source Air Toxics (MSAT) identified by the United States Environmental Protection Agency (USEPA). The six "priority" compounds are diesel exhaust (particulate matter and organic gases), benzene, 1,3-butadiene, acetaldehyde, formaldehyde, and acrolein.

Some studies indicate that diesel PM poses the greatest health risk among the TAC listed above. A 10-year research program (California Air Resources Board 1998) demonstrated that diesel PM from diesel-fueled engines is a human carcinogen and that chronic (long-term) inhalation exposure to diesel PM poses a chronic health risk. In addition to increasing the risk of lung cancer, exposure to diesel exhaust can have other health effects. Diesel exhaust can irritate the eyes, nose, throat, and lungs, and it can cause coughs, headaches, lightheadedness, and nausea. Diesel exhaust is a major source of fine particulate pollution as well, and studies have linked elevated particle levels in the air to increased hospital admissions, emergency room visits, asthma attacks, and premature deaths among those suffering from respiratory problems.

Diesel PM differs from other TAC in that it is not a single substance but a complex mixture of hundreds of substances. Although diesel PM is emitted by diesel-fueled, internal combustion engines, the composition of the emissions varies, depending on engine type, operating conditions, fuel composition, lubricating oil, and whether an emission control system is present. Unlike the other TAC, however, no ambient monitoring data are available for diesel PM because no routine measurement method currently exists. The CARB has made preliminary concentration estimates based on a diesel PM exposure method. This method uses the CARB emissions inventory's PM10 database, ambient PM10 monitoring data, and the results from several studies to estimate concentrations of diesel PM. Table 4 depicts the CARB Handbook's recommended buffer distances associated with various types of common sources.

Existing air quality concerns within Fresno County and the entire SJVAB are related to increases of regional criteria air pollutants (e.g., ozone and particulate matter), exposure to toxic air contaminants, odors, and increases in greenhouse gas emissions contributing to climate change. The primary source of ozone (smog) pollution is motor vehicles. Particulate matter is caused by dust, primarily dust generated from construction and grading activities, and smoke which is emitted from fireplaces, wood-burning stoves, and agricultural burning.

TABLE 4

Recommendations on Siting New Sensitive Land Uses Such As Residences, Schools, Daycare Centers, Playgrounds, or Medical Facilities*

SOURCE CATEGORY	ADVISORY RECOMMENDATIONS
Freeways and High-Traffic Roads [1]	- Avoid siting new sensitive land uses within 500 feet of a freeway, urban roads with 100,000 vehicles/day, or rural roads with 50,000 vehicles/day.
Distribution Centers	- Avoid siting new sensitive land uses within 1,000 feet of a distribution center (that accommodates more than 100 trucks per day, more than 40 trucks with operating transport refrigeration units (TRUs) per day, or where TRU unit operations exceed 300 hours per week). - Take into account the configuration of existing distribution centers and avoid locating residences and other new sensitive land uses near entry and exit points.
Rail Yards	- Avoid siting new sensitive land uses within 1,000 feet of a major service and maintenance rail yard. - Within one mile of a rail yard, consider possible siting limitations and mitigation approaches.
Ports	- Avoid siting of new sensitive land uses immediately downwind of ports in the most heavily impacted zones. Consult local air districts or the ARB on the status of pending analyses of health risks.
Refineries	- Avoid siting new sensitive land uses immediately downwind of petroleum refineries. Consult with local air districts and other local agencies to determine an appropriate separation.
Chrome Platers	- Avoid siting new sensitive land uses within 1,000 feet of a chrome plater.
Dry Cleaners Using Perchloroethylene	- Avoid siting new sensitive land uses within 300 feet of any dry cleaning operation. For operations with two or more machines, provide 500 feet. For operations with 3 or more machines, consult with the local air district. - Do not site new sensitive land uses in the same building with perchloroethylene dry cleaning operations.
Gasoline Dispensing Facilities	- Avoid siting new sensitive land uses within 300 feet of a large gas station (defined as a facility with a throughput of 3.6 million gallons per year or greater). A 50 foot separation is recommended for typical gas dispensing facilities.

1: The recommendation to avoid siting new sensitive land uses within 500 feet of a freeway was identified in CARB's Air Quality and Land Use Handbook published in 2005. CARB recently published a technical advisory to the Air Quality and Land Use Handbook indicating that new research has demonstrated promising strategies to reduce pollution exposure along transportation corridors.

*Notes:
• These recommendations are advisory. Land use agencies have to balance other considerations, including housing and transportation needs, economic development priorities, and other quality of life issues.
• Recommendations are based primarily on data showing that the air pollution exposures addressed here (i.e., localized) can be reduced as much as 80% with the recommended separation.
• The relative risk for these categories varies greatly (see Table 1-2). To determine the actual risk near a particular facility, a site-specific analysis would be required. Risk from diesel PM will decrease over time as cleaner technology phases in.
• These recommendations are designed to fill a gap where information about existing facilities may not be readily available and are not designed to substitute for more specific information if it exists. The recommended distances take into account other factors in addition to available health risk data (see individual category descriptions).
• Site-specific project design improvements may help reduce air pollution exposures and should also be considered when siting new sensitive land uses.
• This table does not imply that mixed residential and commercial development in general is incompatible. Rather it focuses on known problems like dry cleaners using perchloroethylene that can be addressed with reasonable preventative actions.
• A summary of the basis for the distance recommendations can be found in the ARB Handbook: Air Quality and Land Use Handbook: A Community Health Perspective.

Source: SJVAPCD 2019

2.6.8 *Odors*

Typically, odors are regarded as an annoyance rather than a health hazard. However, manifestations of a person's reaction to foul odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache).

With respect to odors, the human nose is the sole sensing device. The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals have the ability to smell minute quantities of specific substances; others may not have the same sensitivity but may have sensitivities to odors of other substances. In addition, people may have different reactions to the same odor; in fact, an odor that is offensive to one person (e.g., from a fast-food restaurant) may be perfectly acceptable to another. It is also important to note that an unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. This is because of the phenomenon known as odor fatigue, in which a person can become desensitized to almost any odor and recognition only occurs with an alteration in the intensity.

Quality and intensity are two properties present in any odor. The quality of an odor indicates the nature of the smell experience. For instance, if a person describes an odor as flowery or sweet, then the person is describing the quality of the odor. Intensity refers to the strength of the odor. For example, a person may use the word "strong" to describe the intensity of an odor. Odor intensity depends on the odorant concentration in the air.

When an odorous sample is progressively diluted, the odorant concentration decreases. As this occurs, the odor intensity weakens and eventually becomes so low that the detection or recognition of the odor is quite difficult. At some point during dilution, the concentration of the odorant reaches a detection threshold. An odorant concentration below the detection threshold means that the concentration in the air is not detectable by the average human.

The intensity of an odor source's operations and its proximity to sensitive receptors influences the potential significance of odor emissions. The SJVAPCD has identified some common types of facilities that have been known to produce odors in the SJVAB. The types of facilities that are known to produce odors are shown in Table 5 along with a reasonable distance from the source within which, the degree of odors could possibly be significant. The MOB Project does not propose any uses that would be potential odor sources; however, the information presented in Table 5 will be used as a screening level analysis to determine if the MOB Project would be impacted by existing odor sources in the study area. Such information is presented for informational purposes, but it is noted that the environment's effect on the MOB Project, including exposure to potential odors, would not be an impact for CEQA purposes.

TABLE 5
Screening Levels for Potential Odor Sources

Type of Facility	Distance
Wastewater Treatment Facilities	2 miles
Sanitary Landfill	1 mile
Transfer Station	1 mile
Compositing Facility	1 mile
Petroleum Refinery	2 miles
Asphalt Batch Plant	1 mile
Chemical Manufacturing	1 mile
Fiberglass Manufacturing	1 mile
Painting/Coating Operations (e.g. auto body shops)	1 mile
Food Processing Facility	1 mile
Feed Lot/Dairy	1 mile
Rendering Plant	1 mile

Source: SJVAPCD 2019

2.6.9 *Naturally Occurring Asbestos (NOA)*

Asbestos is a term used for several types of naturally-occurring fibrous minerals found in many parts of California. The most common type of asbestos is chrysotile, but other types are also found in California. Asbestos is commonly found in ultramafic rock and near fault zones. The amount of asbestos that is typically present in these rocks ranges from less than 1% up to approximately 25% and sometimes more. It is released from ultramafic rock when it is broken or crushed. This can happen when cars drive over unpaved roads or driveways, which are surfaced with these rocks, when land is graded for building purposes, or at quarrying operations. Asbestos is also released naturally through weathering and erosion. Once released from the rock, asbestos can become airborne and may stay in the air for long periods of time. Asbestos is hazardous and can cause lung disease and cancer dependent upon the level of exposure. The longer a person is exposed to asbestos and the greater the intensity of the exposure, the greater the chances for a health problem.

The proposed MOB Project's construction phase may cause asbestos to become airborne due to the construction activities that will occur on site. The MOB Project would be required to submit a Dust Control Plan under the SJVAPCD's Rule 8021.

2.6.10 *Greenhouse Gas Emissions*

Gases that trap heat in the atmosphere are often called greenhouse gases. Some greenhouse gases such as carbon dioxide occur naturally and are emitted to the atmosphere through natural processes and human activities. Other greenhouse gases (e.g., fluorinated gases) are created and emitted solely through human activities. The principal greenhouse gases that enter the

atmosphere because of human activities are:

- ✓ **Carbon Dioxide (CO2):** Carbon dioxide enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement, asphalt paving, truck trips). Carbon dioxide is also removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.
- ✓ **Methane (CH4):** Methane is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills.
- ✓ **Nitrous Oxide (N2O):** Nitrous oxide is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.
- ✓ **Fluorinated Gases:** Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are synthetic, powerful greenhouse gases that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for ozone-depleting substances (i.e., CFCs, HCFCs, and halons). These gases are typically emitted in smaller quantities, but because they are potent greenhouse gases, they are sometimes referred to as High Global Warming Potential gases ("High GWP gases").

3.0 Air-Quality Impacts

3.1 Methodology

The impact assessment for air quality focuses on potential effects the MOB Project might have on air quality within the Fresno County region that differ from the impacts already analyzed and disclosed in the General Plan EIR. The SJVAPCD has established thresholds of significance for determining environmental significance. These thresholds separate a project's short-term emissions from its long-term emissions. The short-term emissions are mainly related to the construction phase of a project, which are recognized to be short in duration. The long-term emissions are primarily related to activities that occur as a result of MOB Project operations. Impacts are evaluated both on the basis of CEQA Appendix G criteria and SJVAPCD significance criteria. Short term and long term emissions are both evaluated in relation to impacts identified in the General Plan EIR to assess whether there are project-specific significant effects that are peculiar to the MOB Project or its site.

The SJVAPCD has established thresholds for certain pollutants shown in Table 6.

Table 6
SJVAPCD Air Quality Thresholds of Significance

Project Type	Ozone Precursor Emissions (tons/year)					
	CO	NO_X	ROG	SO_X	PM_{10}	$PM_{2.5}$
Construction Emissions	100	10	10	27	15	15
Operational Emissions (Permitted Equipment and Activities)	100	10	10	27	15	15
Operational Emissions (Non-Permitted Equipment and Activities)	100	10	10	27	15	15

Source: SJVAPCD 2019

3.1.1 *CalEEMod*

CalEEMod is a statewide land use emissions computer model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify potential criteria pollutant and greenhouse gas (GHG) emissions associated with both construction and operations from a variety of land use projects. The model quantifies direct emissions from construction and operations (including vehicle use), as well as indirect emissions, such as GHG emissions from energy use, solid waste disposal, vegetation planting and/or removal, and water use.

The model is an accurate and comprehensive tool for quantifying air quality impacts from land use projects throughout California. The model can be used for a variety of situations where an

air quality analysis is necessary or desirable such as CEQA and NEPA documents, pre-project planning, compliance with local air quality rules and regulations, etc.

3.1.2 *California Line Source Dispersion Model (CALINE)*

CALINE is a dispersion model for predicting air pollutant levels near highways and arterial streets. It is the standard modeling program used by Caltrans to assess carbon monoxide impacts near transportation facilities. The model is based on the Gaussian diffusion equation and employs a mixing zone concept to characterize pollutant dispersion from automobiles over the roadway.

3.2 Short-Term Impacts

Short-term impacts are mainly related to the construction phase of a project and are recognized to be short in duration. Construction air quality impacts are generally attributable to dust and exhaust pollutants generated by equipment and vehicles. Fugitive dust is emitted both during construction activity and as a result of wind erosion over exposed earth surfaces. Clearing and earth moving activities do comprise major sources of construction dust emissions, but traffic and general disturbances of soil surfaces also generate significant dust emissions. Further, dust generation is dependent on soil type and soil moisture. Exhaust pollutants are the non-useable gaseous waste products produced during the combustion process. Engine exhaust contains CO, HC, and NOx pollutants which are harmful to the environment.

Adverse effects of construction activities cause increased dust-fall and locally elevated levels of total suspended particulate. Dust-fall can be a nuisance to neighboring properties or previously completed developments surrounding or within the MOB Project area and may require frequent washing during the construction period.

PM10 emissions can result from construction activities of the MOB Project. The SJVAPCD has determined that compliance with Regulation VIII and other control measures will constitute sufficient mitigation to reduce PM10 impacts to a level considered less-than significant for most development projects. Even with implementation of District Regulation VIII and District Rule 9510, large development projects may not be able to reduce project specific construction impacts below District thresholds of significance.

Ozone precursor emissions are also an impact of construction activities and can be quantified through calculations. Numerous variables factored into estimating total construction emission include: level of activity, length of construction period, number of pieces and types of equipment in use, site characteristics, weather conditions, number of construction personnel, and amount of materials to be transported onsite or offsite. Additional exhaust emissions would be associated with the transport of workers and materials. Because the specific mix of construction equipment is not presently known for this Project, construction emissions were estimated using CalEEMod Model defaults for construction equipment.

Table 7 shows the CalEEMod-estimated construction emissions that would be generated from construction of the MOB Project which is anticipated to take approximately 16 months. Results of the analysis show that emissions generated from construction of the MOB Project will not exceed the SJVAPCD emission thresholds.

Table 7
Project Construction Emissions (tons/year)

Summary Report	CO	NO_X	ROG	SO_X	PM_{10}	$PM_{2.5}$	CO2e
Project Site Construction Emissions Per Year	2.76	3.30	1.35	0.01	0.38	0.25	481.86
SJVAPCD Level of Significance	100	10	10	27	15	15	None
Does the Project Exceed Standard?	No	No	No	No	No	No	No

Source: CalEEMod Emissions Model

3.3 Long-Term Emissions

Long-Term emissions from the MOB Project would be generated primarily by mobile source (vehicle) emissions from the MOB Project site and area sources such as lawn maintenance equipment.

3.3.1 *Localized Operational Emissions – Ozone/Particulate Matter*

The Fresno County area is nonattainment for Federal and State air quality standards for ozone, attainment of Federal standards for PM10 and nonattainment for State standards, and nonattainment for Federal and State standards for PM2.5. Nitrogen oxides and reactive organic gases are regulated as ozone precursors. Significance criteria have been established for criteria pollutant emissions as documented in Section 3.1. Operational emissions have been estimated for the MOB Project using the CalEEMod Model and detailed results are included in Appendix A of this report.

Results of the CalEEMod analysis are shown in Table 8. Results indicate that the annual operational emissions from the MOB Project will be less than the SJVAPCD emission thresholds for criteria pollutants considering adherence to all applicable SJVAPCD Rules. Compliance with Rule 9510 will reduce MOB Project Operational NOx Emissions by 33.3% and PM10 emissions by 50% according to the SJVAPCD's Guidance for Assessing and Mitigating Air Quality Impacts adopted in March 2015.

Table 8
Project Operational Emissions (tons/year)

Summary Report	CO	NO_X	ROG	SO_X	PM_{10}	$PM_{2.5}$	CO2e
Project Operational Emissions Per Year	9.96	9.62	1.85	0.05	1.46	0.82	6252.10
SJVAPCD Level of Significance	100	10	10	27	15	15	None
Does the Project Exceed Standard?	No	No	No	No	No	No	No

Source: CalEEMod Emissions Model

3.3.2 *Localized Operational Emissions*

✓ **Carbon Monoxide**

The SJVAPCD is currently in unclassified/attainment for Federal standards and attainment for State standards for CO. An analysis of localized CO concentrations is warranted to ensure that standards are maintained. Also, an analysis is required to ensure that localized concentrations don't reach potentially unhealthful levels that could affect sensitive receptors (residents, school children, hospital patients, the elderly, etc.).

Typically, high CO concentrations are associated with roadways or intersections operating at an unacceptable Level of Service (LOS). CO "Hot Spot" modeling is required if a traffic study reveals that a project will reduce the LOS on one or more streets to E or F or if the project will worsen an existing LOS F.

To analyze the Cumulative Year 2042 Plus Project "worst case" CO concentrations at study roadway segments, the analysis methodology considered the highest annual maximum CO concentration reported in 2013, using 1.0 PPM as an estimate of the background concentration for the 8-hour standard and 2.2 PPM for the 1-hour standard (source: CARB annual publications). Other modeling assumptions include a wind speed of .5 m/s, flat topography, 1,000-meter mixing height, and a 5 degree wind deviation.

Traffic forecasts for the Cumulative Year 2042 Plus Project conditions were used in the CALINE analysis to determine CO concentrations under worst case conditions. Intersections that are anticipated to operate at LOS E or F in the Cumulative Year 2042 Plus Project scenario were analyzed to determine CO concentrations.

Results of the CALINE analysis are shown in Table 9. Detailed CALINE analysis worksheets are included in Appendix B of this report. Results of the Analysis show that the intersections of Herndon Avenue at SR 41 SB Off Ramp, Herndon Avenue at SR 41 NB Off Ramp, Herndon Avenue at Fresno Street, and Herndon Avenue at First Street are not expected to generate CO concentrations that would exceed the Federal or State 1-hour and 8-hour standards.

Table 9
Cumulative Year 2042 Plus Project
Local Roadway Air Quality Segment Analysis
(1 Hour and 8 Hour CO Concentration – PPM)

Air Quality Standard	Cumulative Year 2042 Plus Project							
	Herndon Avenue / SR 41 SB Off Ramp		Herndon Avenue / SR 41 NB Off Ramp		Herndon Avenue / Fresno Street		Herndon Avenue / First Street	
	1 hr	8 hr	1 hr	8 hr	1 hr	8 hr	1 hr	8 hr
	8.9	3.1	9.1	3.0	8.8	3.2	8.3	3.0
Federal	35.0	9.0	35.0	9.0	35.0	9.0	35.0	9.0
Exceedance? (Y/N)	N	N	N	N	N	N	N	N
State	20.0	9.0	20.0	9.0	20.0	9.0	20.0	9.0
Exceedance? (Y/N)	N	N	N	N	N	N	N	N

✓ **Toxic Air Contaminants (TAC)**

The SJVAPCD's Guidance Document, Guidance for Assessing and Mitigating Air Quality Impacts – 2015, identifies the need for projects to analyze the potential for adverse air quality impacts to sensitive receptors. Sensitive receptors refer to those segments of the population most susceptible to poor air quality (i.e., children, the elderly, and those with pre-existing serious health problems affected by air quality). Land uses that have the greatest potential to attract these types of sensitive receptors include schools, parks, playgrounds, daycare centers, nursing homes, hospitals, and residential communities. From a health risk perspective, the proposed MOB Project is a Type B project in that it may potentially place sensitive receptors (medical office staff) in the vicinity of existing sources.

The SJVAPCD's current thresholds of significance for TAC emissions from the operations of both permitted and non-permitted sources are presented below:

- Carcinogens: Maximally Exposed Individual risk equals or exceeds 10 in one million
- Chronic: Hazard Index equals or exceeds 1 for the Maximally Exposed Individual
- Acute: Hazard Index equals or exceeds 1 for the Maximally Exposed Individual

Carcinogenic (cancer) risk is expressed as cancer cases per one million. Noncarcinogenic (acute and chronic) hazard indices (HI) are expressed as a ratio of expected exposure levels to acceptable exposure levels.

These metrics are generally applied to the maximally exposed individual (MEI). There are separate MEIs for residential exposure (i.e., residential areas) and for worker exposure (i.e., off-site workplaces). Residential exposure is for a worst-case exposure duration of 24 hours a day, 350 days a year for 70 years. For off-site workplaces, the exposure is 8 hours a day, 245 days a year for 40 years.

Although the effects of the environment, including existing air quality conditions, on the MOB Project are not impacts for CEQA purposes, the following analysis is presented for informational purposes and to demonstrate compliance with SJCAPCD guidance. The first step in evaluating the potential for impacts to sensitive receptors for TACs from the MOB

Project is to perform a screening level analysis. For Type B projects, one type of screening tool is found in the CARB Handbook: Air Quality and Land Use Handbook: A Community Perspective. This handbook includes a table (depicted in Table 4) with recommended buffer distances associated with various types of common sources. The screening level analysis for the MOB Project shows that TACs are not a concern based upon the recommendations provided in Table 4. An evaluation of nearby land uses considering CARB's Pollution Mapping Tool shows that the MOB Project will not place sensitive receptors in the vicinity of existing toxic sources. Table 4 indicates that new sensitive land uses should not be sited within 500 feet of a freeway/urban roads with 100,000 vehicles/day, or rural roads with 50,000 vehicles/day. The MOB Project is located more than 2,000 feet from the SR 41 freeway. Therefore, TAC's from sources in the study area will not significantly impact the MOB Project. In addition, the MOB Project will not generate TAC's that would have a significant impact on the environment or adjacent sensitive receptors.

✓ **Odors**

Typically, odors are regarded as an annoyance rather than a health hazard. However, manifestations of a person's reaction to foul odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache).

Quality and intensity are two properties present in any odor. The quality of an odor indicates the nature of the smell experience. For instance, if a person describes an odor as flowery or sweet, then the person is describing the quality of the odor. Intensity refers to the strength of the odor. For example, a person may use the word "strong" to describe the intensity of an odor. Odor intensity depends on the odorant concentration in the air.

When an odorous sample is progressively diluted, the odorant concentration decreases. As this occurs, the odor intensity weakens and eventually becomes so low that the detection or recognition of the odor is quite difficult. At some point during dilution, the concentration of the odorant reaches a detection threshold. An odorant concentration below the detection threshold means that the concentration in the air is not detectable by the average human.

While offensive odors rarely cause any physical harm, they can be very unpleasant, leading to considerable distress among the public and often generating citizen complaints to local governments and the SJVAPCD. Any project with the potential to frequently expose members of the public to objectionable odors should be deemed to have a significant impact. Because the project is a medical office development, it is not expected to generate significant odors.

The SJVAPCD requires that an analysis of potential odor impacts be conducted for the following two situations:

- Generators – projects that would potentially generate odorous emissions proposed to be located near existing sensitive receptors or other land uses where people may congregate, and

- Receivers – residential or other sensitive receptor projects or other projects built for the intent of attracting people locating near existing odor sources.

The proposed MOB Project will not generate odorous emissions given the nature or characteristics of medical office developments. The intensity of an odor source's operations and its proximity to sensitive receptors influences the potential significance of odor emissions. The SJVAPCD has identified some common types of facilities that have been known to produce odors in the SJV Air Basin. The types of facilities that are known to produce odors are shown in Table 5 above along with a reasonable distance from the source within which, the degree of odors could possibly be significant. None of the facilities shown in Table 5 are located within two (2) miles of the MOB Project.

✓ **Naturally Occurring Asbestos (NOA)**

Asbestos is a term used for several types of naturally occurring fibrous minerals found in many parts of California. The most common type of asbestos is chrysotile, but other types are also found in California. Construction of the MOB Project may cause asbestos to become airborne due to the construction activities that will occur on site. The MOB Project would be required to submit a Dust Control Plan under the SJVAPCD's Rule 8021. Compliance with Rule 8021 would limit fugitive dust emissions from construction, demolition, excavation, extraction, and other earthmoving activities associated with the MOB Project.

✓ **Greenhouse Gas Emissions**

CARB, in consultation with MPOs, has provided each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035. For the Fresno COG region, CARB set targets at five (5) percent per capita decrease in 2020 and a ten (10) percent per capita decrease in 2035 from a base year of 2005. Fresno COG's 2018 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) projects that the Fresno County region would achieve the prescribed emissions targets.

In 2009, the SJVAPCD adopted the following guidance documents applicable to projects within the San Joaquin Valley:

- ✓ Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA (SJVAPCD 2009), and
- ✓ District Policy: Addressing GHG Emission Impacts for Stationary Source Projects Under CEQA When Serving as the Lead Agency (SJVAPCD 2009).

This guidance and policy are the reference documents referenced in the SJVAPCD's Guidance for Assessing and Mitigating Air Quality Impacts adopted in March 2015 (SJVAPCD 2015). Consistent with the District Guidance and District Policy above, SJVAPCD (2015) acknowledges the current absence of numerical thresholds, and recommends a tiered approach to establish the significance of the GHG impacts on the environment:

i. If a project complies with an approved GHG emission reduction plan or GHG mitigation

program which avoids or substantially reduces GHG emissions within the geographic area in which the project is located, then the project would be determined to have a less than significant individual and cumulative impact for GHG emissions;

ii. If a project does not comply with an approved GHG emission reduction plan or mitigation program, then it would be required to implement Best Performance Standards (BPS); and

iii. If a project is not implementing BPS, then it should demonstrate that its GHG emissions would be reduced or mitigated by at least 29 percent compared to Business as Usual (BAU).

The City of Fresno GHG Plan, adopted December 2014, is a comprehensive municipal and community strategy to reduce GHG emissions within the City of Fresno and is consistent with the goals and strategies outlined in CARB regulations. As noted in the GHG Plan, the MOB Project's compliance with applicable City of Fresno General Plan policies and GHG Plan strategies would result in less than significant impacts for greenhouse gas emissions. The GHG Plan identifies numerous strategies needed to achieve reduction targets for 2020 and beyond. Those strategies are categorized as follows:

- ✓ Land Use and Transportation
- ✓ Transportation Facilities Strategies
- ✓ Transportation Demand Strategies
- ✓ Energy Conservation Strategies for New and Existing Buildings
- ✓ Waste Diversion and Recycling and Energy Recovery
- ✓ Strategies for Existing Development
- ✓ Municipal Strategies

The GHG Plan determined that projects within a SCS Plan area that are consistent with the land use and development densities as well as design standards for the project area would be considered to have a less than significant impact on climate change. The proposed MOB Project is consistent with the currently adopted General Plan for the City of Fresno and the adopted 2018 RTP/SCS and is therefore consistent with the population growth and VMT applied in those plan documents.

The MOB Project site falls under the Employment District (E) Office (O) designation which allows for administrative, financial, business, professional, medical, and public offices. In addition, the MOB Project site is located within the Woodward Park Community Plan area. The proposed MOB Project includes the development of approximately 145,000 square feet of medical office space which is consistent with the site designation as defined in the *Fresno Municipal Code Chapter 15: Citywide Development Code*, December 2015. Applicable design standards included within the development code have been incorporated into the MOB Project design. Finally, the MOB Project is consistent with the guidelines and policies outlined in the Woodward Park Community Plan.

As a result, the MOB Project is considered to have a less than significant impact on climate change. The MOB Project will not conflict with or obstruct implementation of the GHG Plan

and applicable SCS Plan area.

In December 2008, the South Coast Air Quality Management District (SCAQMD) Governing Board adopted the staff proposal for an interim GHG significance threshold for projects where the SCAQMD is lead agency. The SCAQMD guidance identifies a threshold of 10,000 MTCO2eq./year for GHG for construction emissions amortized over a 30-year project lifetime, plus annual operation emissions. This threshold is often used by agencies, such as the California Public Utilities Commission, to evaluate GHG impacts in areas that do not have specific thresholds (CPUC 2015)[2]. Though the MOB Project is under SJVAPCD jurisdiction, the SCAQMD GHG threshold provides some perspective on the GHG emissions generated by the MOB Project. Table 10 shows the yearly GHG emissions generated by the MOB Project as determined by the CalEEMod model, which is approximately 37% less than the threshold identified by the SCAQMD.

Table 10
Project Operational Greenhouse Gas Emissions

Summary Report	CO_2e
Project Operational Emissions Per Year	6,268.2 MT/yr

Source: CalEEMod Emissions Model

3.3.3 *Indirect Source Review*

The proposed MOB Project is subject to the SJVAPCD's ISR program, which is also known as Rule 9510. Rule 9510 and the Administrative ISR Fee Rule (Rule 3180) are the result of state requirements outlined in the California Health and Safety Code, Section 40604 and the State Implementation Plan (SIP). The purpose of the SJVAPCD's ISR program is to reduce emissions of NOx and PM10 from new projects. In general, new development contributes to the air-pollution problem in the Valley by increasing the number of vehicles and vehicle miles traveled.

Utilizing the ISR Fee Estimator calculator available on the SJVAPCD website, it was determined that the MOB Project's total cost for emission reductions is $8,025.68. The ISR Fee Estimator worksheets are included in Appendix C. It should be noted that Kaiser Permanente representatives have indicated that health care providers that will operate out of the new medical office building will transfer from the Fresno Medical Center and First Street Medical Offices. Consequently, patients being served by said health care providers will also relocate to the new medical office building.

2 California Public Utilities Commission (CPUC). 2015. Section 4.7, "Greenhouse Gases." Final Environmental Impact Report for the Santa Barbara County Reliability Project. May 2015. Accessed January 18, 2018. http://www.cpuc.ca.gov/environment/info/ene/sbcrp/SBCRP_FEIR.html.

4.0 Impact Determinations and Recommended Mitigation

In accordance with CEQA, when a proposed project is consistent with a General Plan for which an EIR has been certified, the effects of that project are evaluated to determine if they will result in project-specific significant adverse impacts on the environment. Accordingly, this analysis identifies any potential environmental effects that are peculiar to the MOB Project or its site that differ from those impacts already analyzed and disclosed in the City's General Plan EIR. The criteria used to determine the significance of an air quality or greenhouse gas impact are based on the following thresholds of significance, which come from Appendix G of the CEQA Guidelines and the General Plan EIR. Accordingly, air quality or greenhouse gas impacts resulting from the MOB Project are considered significant if the MOB Project would:

Air Quality

a) Conflict with or obstruct implementation of the applicable air quality plan?
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?
c) Expose sensitive receptors to substantial pollutant concentrations?
d) Result in other emissions such as those leading to odors adversely affecting a substantial number of people?

Greenhouse Gas Emissions

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

4.1 Air Quality

4.1.1 *Conflict with or obstruct implementation of the applicable air quality plan*

The primary way of determining consistency with the air quality plan's (AQP's) assumptions is determining consistency with the applicable General Plan to ensure that the MOB Project's population density and land use are consistent with the growth assumptions used in the AQPs for the air basin.

As required by California law, city and county General Plans contain a Land Use Element that details the types and quantities of land uses that the city or county estimates will be needed for future growth, and that designate locations for land uses to regulate growth. Fresno COG uses

the growth projections and land use information in adopted general plans to estimate future average daily trips and then VMT, which are then provided to SJVAPCD to estimate future emissions in the AQPs. Existing and future pollutant emissions computed in the AQP are based on land uses from area general plans. AQPs detail the control measures and emission reductions required for reaching attainment of the air standards.

The applicable General Plan for the MOB Project is the City of Fresno's General Plan, which was adopted December 18, 2014. The MOB Project is consistent with the currently adopted General Plan for the City of Fresno and is therefore consistent with the population growth and VMT applied in the plan. Therefore, the MOB Project is consistent with the growth assumptions used in the applicable AQPs. As a result, the MOB Project will not conflict with or obstruct implementation of any air quality plans. This is consistent with the General Plan EIR, which found a less than significant impact with respect to implementation of the applicable air quality plan. Therefore, no mitigation is needed.

4.1.2 *Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard*

Fresno County is nonattainment for Ozone (1 hour and 8 hour) and PM10 (State standards) and PM2.5. The SJVAPCD has prepared the 2016 and 2013 Ozone Plan, 2007 PM10 Maintenance Plan, and 2012 PM2.5 Plan to achieve Federal and State standards for improved air quality in the SJVAB regarding ozone and PM. Inconsistency with any of the plans would be considered a cumulatively adverse air quality impact. As discussed in Section 4.1.1, the MOB Project is consistent with the currently adopted General Plan for the City of Fresno and is therefore consistent with the population growth and VMT applied in the plan. Therefore, the MOB Project is consistent with the growth assumptions used in the 2016 and 2013 Ozone Plan, 2007 PM10 Maintenance Plan, and 2012 PM2.5 Plan.

Results of the CALINE analysis (Section 3.3.2) show that the intersections of Herndon Avenue at SR 41 SB Off Ramp, Herndon Avenue at SR 41 NB Off Ramp, Herndon Avenue at Fresno Street, and Herndon Avenue at First Street are not expected to generate CO concentrations that would exceed the Federal or State 1-hour and 8-hour standards. The MOB Project will not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard. Therefore, the MOB Project would have reduced impacts as compared to the General Plan EIR, which found a significant and unavoidable impact with respect to criteria pollution emissions. Moreover, the MOB Project will not result in Project-specific or site-specific significant adverse impacts from the net increase of any criteria pollutant within the Project study area. Accordingly, no mitigation measures are needed.

4.1.3 *Expose sensitive receptors to substantial pollutant concentrations*

Sensitive receptors refer to those segments of the population most susceptible to poor air quality (i.e., children, the elderly, and those with pre-existing serious health problems affected by air quality). Land uses that have the greatest potential to attract these types of sensitive receptors include schools, parks, playgrounds, daycare centers, nursing homes, hospitals, and residential communities. From a health risk perspective, the proposed MOB Project is a Type B project in that it may potentially place sensitive receptors (medical office staff) in the vicinity of existing sources.

The first step in evaluating the potential for impacts to sensitive receptors for TAC's from the MOB Project is to perform a screening level analysis. For Type B projects, one type of screening tool is found in the CARB Handbook: Air Quality and Land Use Handbook: A Community Perspective. This handbook includes recommended buffer distances (depicted in Table 4) associated with various types of common sources. The screening level analysis for the MOB Project shows that TAC's are not a concern based upon the recommendations provided in Table 4. An evaluation of nearby land uses considering CARB's Pollution Mapping Tool shows that the MOB Project will not place sensitive receptors in the vicinity of existing toxic sources. Table 4 indicates that new sensitive land uses should not be sited within 500 feet of a freeway/urban roads with 100,000 vehicles/day, or rural roads with 50,000 vehicles/day. The MOB Project is located more than 2,000 feet from the SR 41 freeway. Therefore, TAC's from sources in the study area will not significantly impact the MOB Project. In addition, the MOB Project will not generate TAC's that would have a significant impact on the environment or adjacent sensitive receptors. Therefore, no mitigation is needed.

Short-Term Impacts

The annual emissions from the construction phase of the MOB Project will be less than the applicable SJVAPCD emission thresholds for criteria pollutants as shown in Table 8. Therefore, construction emissions associated with the MOB Project are considered less than significant.

Long-Term Impacts

Long-Term emissions from the MOB Project are generated primarily by mobile source (vehicle) emissions from the MOB Project site and area sources such as lawn maintenance equipment. Emissions from long-term operations generally represent a project's most substantial air quality impact. Table 8 summarizes the MOB Project's operational impacts by pollutant. Results indicate that the annual operational emissions from the MOB Project will be less than the SJVAPCD emission thresholds for criteria pollutants considering adherence to all applicable SJVAPCD Rules. Therefore, operational emissions associated with the MOB Project are considered less than significant.

The General Plan EIR disclosed the potential for project-specific and cumulative significant and

unavoidable impacts resulting from TAC emissions. As discussed above, the MOB Project does not result in any significant Project- or site-specific impacts, which means the MOB Project would have reduced impacts as compared to the General Plan EIR. Because there would be no increase in severity to the previously-identified significant impact, and MOB Project operations will not result in Project-specific or site-specific significant adverse impacts from substantial pollutant concentrations within the Project study area, no mitigation measures are needed.

4.1.4 *Result in other emissions such as those leading to odors adversely affecting a substantial number of people*

The SJVAPCD requires that an analysis of potential odor impacts be conducted for the following two situations:

- ✓ Generators – projects that would potentially generate odorous emissions proposed to be located near existing sensitive receptors or other land uses where people may congregate, and

- ✓ Receivers – residential or other sensitive receptor projects or other projects built for the intent of attracting people located near existing odor sources.

The proposed MOB Project will not generate odorous emissions given the nature or characteristics of medical office developments. The intensity of an odor source's operations and its proximity to sensitive receptors influences the potential significance of odor emissions. The SJVAPCD has identified some common types of facilities that have been known to produce odors in the SJV Air Basin. The types of facilities that are known to produce odors are shown in Table 5 above along with a reasonable distance from the source within which, the degree of odors could possibly be significant. None of the facilities shown in Table 5 are located within two (2) miles of the MOB Project. Therefore, no mitigation is needed.

As summarized above, this Report shows that air quality impacts resulting from the MOB Project would be within the impacts analyzed in the General Plan EIR. Moreover, the Report demonstrates that with adherence to relevant air emission reduction policies included in General Plan Policies UF-1-c through HC-3-d and Chapter 10 of the Fresno Municipal Code, there would be no short-term or long-term Project- or site-specific air quality impacts with respect to construction or operation of the MOB Project.

4.2 Greenhouse Gas Emissions

4.2.1 *Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment*

The SJVAPCD acknowledges the current absence of numerical thresholds and recommends a tiered approach to establish the significance of the GHG impacts on the environment:

i. If a project complies with an approved GHG emission reduction plan or GHG mitigation program which avoids or substantially reduces GHG emissions within the geographic area in which the project is located, then the project would be determined to have a less than significant individual and cumulative impact for GHG emissions;
ii. If a project does not comply with an approved GHG emission reduction plan or mitigation program, then it would be required to implement Best Performance Standards (BPS); and
iii. If a project is not implementing BPS, then it should demonstrate that its GHG emissions would be reduced or mitigated by at least 29 percent compared to Business as Usual (BAU).

The General Plan EIR concluded that cumulative impacts related to the growth under the City of Fresno General Plan are significant and unavoidable. The City of Fresno GHG Plan, adopted December 2014, is a comprehensive municipal and community strategy to reduce GHG emissions within the City of Fresno and is consistent with the goals and strategies outlined in CARB regulations. As noted in the GHG Plan, the MOB Project's compliance with applicable City of Fresno General Plan policies and GHG Plan strategies would result in less than significant impacts for greenhouse gas emissions.

The GHG Plan determined that projects within a SCS Plan area that are consistent with the land use and development densities as well as design standards for the project area would be considered to have a less than significant impact on climate change. The proposed MOB Project is consistent with the currently adopted General Plan for the City of Fresno and the adopted 2018 RTP/SCS and is therefore consistent with the population growth and VMT applied in those plan documents.

The MOB Project site falls under the Employment District (E) Office (O) designation which allows for administrative, financial, business, professional, medical, and public offices. In addition, the MOB Project site is located within the Woodward Park Community Plan area. The proposed MOB Project includes the development of approximately 145,000 square feet of medical office space which is consistent with the site designation as defined in the *Fresno Municipal Code Chapter 15: Citywide Development Code*, December 2015. Applicable design standards included within the development code have been incorporated into the MOB Project design. Finally, the MOB Project is consistent with the guidelines and policies outlined in the Woodward Park Community Plan.

The SCAQMD guidance identifies a threshold of 10,000 MTCO2eq./year for GHG for construction emissions amortized over a 30-year project lifetime, plus annual operation emissions. Though the MOB Project is under SJVAPCD jurisdiction, the SCAQMD GHG threshold provides some perspective on the GHG emissions generated by the MOB Project. Table 10 shows the yearly GHG emissions generated by the MOB Project as determined by the CalEEMod model, which is approximately 37% less than the threshold identified by the SCAQMD.

The resulting permanent greenhouse gas increases related to MOB Project operations would be

within the greenhouse gas increases analyzed in the General Plan EIR, so there would be no increase in severity to the previously-identified significant and unavoidable greenhouse gas impacts, and implementation of the MOB Project will not result in Project-specific or site-specific significant adverse impacts from greenhouse gas emissions within the Project study area. Therefore, no mitigation measures are needed.

4.2.2 *Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases*

The City of Fresno GHG Plan, adopted December 2014, is a comprehensive municipal and community strategy to reduce GHG emissions within the City of Fresno and is consistent with the goals and strategies outlined in CARB regulations. As noted in the GHG Plan, the MOB Project's compliance with applicable City of Fresno General Plan policies and GHG Plan strategies would result in less than significant impacts for greenhouse gas emissions. The GHG Plan identifies numerous strategies needed to achieve reduction targets for 2020 and beyond. Those strategies are categorized as follows:

- ✓ Land Use and Transportation
- ✓ Transportation Facilities Strategies
- ✓ Transportation Demand Strategies
- ✓ Energy Conservation Strategies for New and Existing Buildings
- ✓ Waste Diversion and Recycling and Energy Recovery
- ✓ Strategies for Existing Development
- ✓ Municipal Strategies

The GHG Plan determined that projects within a SCS Plan area that are consistent with the land use and development densities as well as design standards for the project area would be considered to have a less than significant impact on climate change. The proposed MOB Project is consistent with the currently adopted General Plan for the City of Fresno and the adopted 2018 RTP/SCS and is therefore consistent with the population growth and VMT applied in those plan documents.

The MOB Project site falls under the Employment District (E) Office (O) designation which allows for administrative, financial, business, professional, medical, and public offices. In addition, the MOB Project site is located within the Woodward Park Community Plan area. The proposed MOB Project includes the development of approximately 145,000 square feet of medical office space which is consistent with the site designation as defined in the *Fresno Municipal Code Chapter 15: Citywide Development Code*, December 2015. Applicable design standards included within the development code have been incorporated into the MOB Project design. Finally, the MOB Project is consistent with the guidelines and policies outlined in the Woodward Park Community Plan.

As a result, the MOB Project is considered to have a less than significant impact on climate

change. The MOB Project will not conflict with or obstruct implementation of the GHG Plan and applicable SCS Plan area.

As summarized above, this Report shows that greenhouse gas impacts resulting from the MOB Project would be within the impacts analyzed in the General Plan EIR. Moreover, the Report demonstrates that with adherence to relevant greenhouse gas emission reduction policies included in General Plan Policies ED-1-c through HC-5-f and Chapter 10 of the Fresno Municipal Code, there would be no site-specific greenhouse gas impacts with respect to construction or operation of the MOB Project.

APPENDIX A

CalEEMod Emissions Worksheets

KP Fresno Medical Office Building

Fresno County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Medical Office Building	145.00	1000sqft	7.10	145,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	45
Climate Zone	3			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Project Description

Vehicle Trips - ITE Trip Generation Manual, 10th Edition

Table Name	Column Name	Default Value	New Value
tblLandUse	LotAcreage	3.33	7.10
tblProjectCharacteristics	OperationalYear	2018	2022
tblVehicleTrips	ST_TR	8.96	8.57
tblVehicleTrips	SU_TR	1.55	1.42
tblVehicleTrips	WD_TR	36.13	34.80

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.0987	0.9873	0.6453	1.2000e-003	0.1632	0.0494	0.2126	0.0853	0.0458	0.1311	0.0000	105.7244	105.7244	0.0287	0.0000	106.4427
2021	1.2546	2.3113	2.1125	4.2400e-003	0.0583	0.1113	0.1696	0.0159	0.1046	0.1205	0.0000	373.5257	373.5257	0.0756	0.0000	375.4151
Total	**1.3533**	**3.2986**	**2.7578**	**5.4400e-003**	**0.2215**	**0.1607**	**0.3822**	**0.1012**	**0.1504**	**0.2516**	**0.0000**	**479.2500**	**479.2500**	**0.1043**	**0.0000**	**481.8577**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.0987	0.9873	0.6453	1.2000e-003	0.1632	0.0494	0.2126	0.0853	0.0458	0.1311	0.0000	105.7242	105.7242	0.0287	0.0000	106.4426
2021	1.2546	2.3113	2.1125	4.2400e-003	0.0583	0.1113	0.1696	0.0159	0.1046	0.1205	0.0000	373.5253	373.5253	0.0756	0.0000	375.4147
Total	**1.3533**	**3.2986**	**2.7577**	**5.4400e-003**	**0.2215**	**0.1607**	**0.3822**	**0.1012**	**0.1504**	**0.2516**	**0.0000**	**479.2496**	**479.2496**	**0.1043**	**0.0000**	**481.8573**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.6672	1.0000e-005	1.3300e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.5900e-003	2.5900e-003	1.0000e-005	0.0000	2.7600e-003
Energy	0.0103	0.0933	0.0783	5.6000e-004		7.0900e-003	7.0900e-003		7.0900e-003	7.0900e-003	0.0000	494.6571	494.6571	0.0197	5.5400e-003	496.8008
Mobile	1.1686	14.3377	9.8835	0.0525	2.8597	0.0429	2.9026	0.7709	0.0406	0.8114	0.0000	4,895.3549	4,895.3549	0.6134	0.0000	4,910.6896
Waste						0.0000	0.0000		0.0000	0.0000	317.8839	0.0000	317.8839	18.7864	0.0000	787.5438
Water						0.0000	0.0000		0.0000	0.0000	5.7723	32.1693	37.9417	0.5943	0.0143	57.0613
Total	**1.8461**	**14.4309**	**9.9631**	**0.0531**	**2.8597**	**0.0500**	**2.9097**	**0.7709**	**0.0477**	**0.8185**	**323.6562**	**5,422.1839**	**5,745.8401**	**20.0139**	**0.0198**	**6,252.0982**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.6672	1.0000e-005	1.3300e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.5900e-003	2.5900e-003	1.0000e-005	0.0000	2.7600e-003
Energy	0.0103	0.0933	0.0783	5.6000e-004		7.0900e-003	7.0900e-003		7.0900e-003	7.0900e-003	0.0000	494.6571	494.6571	0.0197	5.5400e-003	496.8008
Mobile	1.1686	14.3377	9.8835	0.0525	2.8597	0.0429	2.9026	0.7709	0.0406	0.8114	0.0000	4,895.3549	4,895.3549	0.6134	0.0000	4,910.6896
Waste						0.0000	0.0000		0.0000	0.0000	317.8839	0.0000	317.8839	18.7864	0.0000	787.5438
Water						0.0000	0.0000		0.0000	0.0000	5.7723	32.1693	37.9417	0.5943	0.0143	57.0613
Total	**1.8461**	**14.4309**	**9.9631**	**0.0531**	**2.8597**	**0.0500**	**2.9097**	**0.7709**	**0.0477**	**0.8185**	**323.6562**	**5,422.1839**	**5,745.8401**	**20.0139**	**0.0198**	**6,252.0982**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Architectural Coating	Architectural Coating	11/25/2021	12/22/2021	5	20	
2	Building Construction	Building Construction	12/10/2020	10/27/2021	5	230	
3	Demolition	Demolition	10/1/2020	10/28/2020	5	20	
4	Grading	Grading	11/12/2020	12/9/2020	5	20	
5	Paving	Paving	10/28/2021	11/24/2021	5	20	
6	Site Preparation	Site Preparation	10/29/2020	11/11/2020	5	10	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 10

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 217,500; Non-Residential Outdoor: 72,500; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Demolition	Excavators	3	8.00	158	0.38
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Excavators	1	8.00	158	0.38
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Paving	Pavers	2	8.00	130	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Paving	Paving Equipment	2	8.00	132	0.36
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	1	9.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	46.00	24.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.0081					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.1900e-003	0.0153	0.0182	3.0000e-005		9.4000e-004	9.4000e-004		9.4000e-004	9.4000e-004	0.0000	2.5533	2.5533	1.8000e-004	0.0000	2.5576
Total	**1.0103**	**0.0153**	**0.0182**	**3.0000e-005**		**9.4000e-004**	**9.4000e-004**		**9.4000e-004**	**9.4000e-004**	**0.0000**	**2.5533**	**2.5533**	**1.8000e-004**	**0.0000**	**2.5576**

3.2 Architectural Coating - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.6000e-004	2.2000e-004	2.2700e-003	1.0000e-005	7.2000e-004	0.0000	7.2000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6014	0.6014	1.0000e-005	0.0000	0.6018
Total	**3.6000e-004**	**2.2000e-004**	**2.2700e-003**	**1.0000e-005**	**7.2000e-004**	**0.0000**	**7.2000e-004**	**1.9000e-004**	**0.0000**	**2.0000e-004**	**0.0000**	**0.6014**	**0.6014**	**1.0000e-005**	**0.0000**	**0.6018**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.0081					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.1900e-003	0.0153	0.0182	3.0000e-005		9.4000e-004	9.4000e-004		9.4000e-004	9.4000e-004	0.0000	2.5533	2.5533	1.8000e-004	0.0000	2.5576
Total	**1.0103**	**0.0153**	**0.0182**	**3.0000e-005**		**9.4000e-004**	**9.4000e-004**		**9.4000e-004**	**9.4000e-004**	**0.0000**	**2.5533**	**2.5533**	**1.8000e-004**	**0.0000**	**2.5576**

3.2 Architectural Coating - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.6000e-004	2.2000e-004	2.2700e-003	1.0000e-005	7.2000e-004	0.0000	7.2000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6014	0.6014	1.0000e-005	0.0000	0.6018
Total	**3.6000e-004**	**2.2000e-004**	**2.2700e-003**	**1.0000e-005**	**7.2000e-004**	**0.0000**	**7.2000e-004**	**1.9000e-004**	**0.0000**	**2.0000e-004**	**0.0000**	**0.6014**	**0.6014**	**1.0000e-005**	**0.0000**	**0.6018**

3.3 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0170	0.1535	0.1348	2.2000e-004		8.9400e-003	8.9400e-003		8.4000e-003	8.4000e-003	0.0000	18.5288	18.5288	4.5200e-003	0.0000	18.6418
Total	**0.0170**	**0.1535**	**0.1348**	**2.2000e-004**		**8.9400e-003**	**8.9400e-003**		**8.4000e-003**	**8.4000e-003**	**0.0000**	**18.5288**	**18.5288**	**4.5200e-003**	**0.0000**	**18.6418**

3.3 Building Construction - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	7.2000e-004	0.0238	3.8000e-003	5.0000e-005	1.2700e-003	1.3000e-004	1.4000e-003	3.7000e-004	1.2000e-004	4.9000e-004	0.0000	5.1780	5.1780	6.4000e-004	0.0000	5.1940
Worker	1.5900e-003	1.0100e-003	0.0102	3.0000e-005	2.9400e-003	2.0000e-005	2.9600e-003	7.8000e-004	2.0000e-005	8.0000e-004	0.0000	2.5463	2.5463	7.0000e-005	0.0000	2.5480
Total	**2.3100e-003**	**0.0248**	**0.0140**	**8.0000e-005**	**4.2100e-003**	**1.5000e-004**	**4.3600e-003**	**1.1500e-003**	**1.4000e-004**	**1.2900e-003**	**0.0000**	**7.7243**	**7.7243**	**7.1000e-004**	**0.0000**	**7.7420**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0170	0.1535	0.1348	2.2000e-004		8.9400e-003	8.9400e-003		8.4000e-003	8.4000e-003	0.0000	18.5288	18.5288	4.5200e-003	0.0000	18.6418
Total	**0.0170**	**0.1535**	**0.1348**	**2.2000e-004**		**8.9400e-003**	**8.9400e-003**		**8.4000e-003**	**8.4000e-003**	**0.0000**	**18.5288**	**18.5288**	**4.5200e-003**	**0.0000**	**18.6418**

3.3 Building Construction - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	7.2000e-004	0.0238	3.8000e-003	5.0000e-005	1.2700e-003	1.3000e-004	1.4000e-003	3.7000e-004	1.2000e-004	4.9000e-004	0.0000	5.1780	5.1780	6.4000e-004	0.0000	5.1940
Worker	1.5900e-003	1.0100e-003	0.0102	3.0000e-005	2.9400e-003	2.0000e-005	2.9600e-003	7.8000e-004	2.0000e-005	8.0000e-004	0.0000	2.5463	2.5463	7.0000e-005	0.0000	2.5480
Total	**2.3100e-003**	**0.0248**	**0.0140**	**8.0000e-005**	**4.2100e-003**	**1.5000e-004**	**4.3600e-003**	**1.1500e-003**	**1.4000e-004**	**1.2900e-003**	**0.0000**	**7.7243**	**7.7243**	**7.1000e-004**	**0.0000**	**7.7420**

3.3 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2034	1.8652	1.7736	2.8800e-003		0.1026	0.1026		0.0964	0.0964	0.0000	247.8519	247.8519	0.0598	0.0000	249.3468
Total	**0.2034**	**1.8652**	**1.7736**	**2.8800e-003**		**0.1026**	**0.1026**		**0.0964**	**0.0964**	**0.0000**	**247.8519**	**247.8519**	**0.0598**	**0.0000**	**249.3468**

3.3 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	7.7600e-003	0.2891	0.0440	7.2000e-004	0.0170	7.8000e-004	0.0178	4.9200e-003	7.4000e-004	5.6600e-003	0.0000	68.6032	68.6032	8.2800e-003	0.0000	68.8101
Worker	0.0196	0.0120	0.1241	3.6000e-004	0.0394	2.4000e-004	0.0396	0.0105	2.3000e-004	0.0107	0.0000	32.8901	32.8901	8.1000e-004	0.0000	32.9104
Total	**0.0274**	**0.3011**	**0.1682**	**1.0800e-003**	**0.0564**	**1.0200e-003**	**0.0574**	**0.0154**	**9.7000e-004**	**0.0163**	**0.0000**	**101.4933**	**101.4933**	**9.0900e-003**	**0.0000**	**101.7205**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2034	1.8652	1.7735	2.8800e-003		0.1026	0.1026		0.0964	0.0964	0.0000	247.8516	247.8516	0.0598	0.0000	249.3465
Total	**0.2034**	**1.8652**	**1.7735**	**2.8800e-003**		**0.1026**	**0.1026**		**0.0964**	**0.0964**	**0.0000**	**247.8516**	**247.8516**	**0.0598**	**0.0000**	**249.3465**

3.3 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	7.7600e-003	0.2891	0.0440	7.2000e-004	0.0170	7.8000e-004	0.0178	4.9200e-003	7.4000e-004	5.6600e-003	0.0000	68.6032	68.6032	8.2800e-003	0.0000	68.8101
Worker	0.0196	0.0120	0.1241	3.6000e-004	0.0394	2.4000e-004	0.0396	0.0105	2.3000e-004	0.0107	0.0000	32.8901	32.8901	8.1000e-004	0.0000	32.9104
Total	**0.0274**	**0.3011**	**0.1682**	**1.0800e-003**	**0.0564**	**1.0200e-003**	**0.0574**	**0.0154**	**9.7000e-004**	**0.0163**	**0.0000**	**101.4933**	**101.4933**	**9.0900e-003**	**0.0000**	**101.7205**

3.4 Demolition - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0331	0.3320	0.2175	3.9000e-004		0.0166	0.0166		0.0154	0.0154	0.0000	33.9986	33.9986	9.6000e-003	0.0000	34.2386
Total	**0.0331**	**0.3320**	**0.2175**	**3.9000e-004**		**0.0166**	**0.0166**		**0.0154**	**0.0154**	**0.0000**	**33.9986**	**33.9986**	**9.6000e-003**	**0.0000**	**34.2386**

3.4 Demolition - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.5000e-004	4.1000e-004	4.1700e-003	1.0000e-005	1.2000e-003	1.0000e-005	1.2100e-003	3.2000e-004	1.0000e-005	3.3000e-004	0.0000	1.0379	1.0379	3.0000e-005	0.0000	1.0386
Total	**6.5000e-004**	**4.1000e-004**	**4.1700e-003**	**1.0000e-005**	**1.2000e-003**	**1.0000e-005**	**1.2100e-003**	**3.2000e-004**	**1.0000e-005**	**3.3000e-004**	**0.0000**	**1.0379**	**1.0379**	**3.0000e-005**	**0.0000**	**1.0386**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0331	0.3320	0.2175	3.9000e-004		0.0166	0.0166		0.0154	0.0154	0.0000	33.9986	33.9986	9.6000e-003	0.0000	34.2385
Total	**0.0331**	**0.3320**	**0.2175**	**3.9000e-004**		**0.0166**	**0.0166**		**0.0154**	**0.0154**	**0.0000**	**33.9986**	**33.9986**	**9.6000e-003**	**0.0000**	**34.2385**

3.4 Demolition - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.5000e-004	4.1000e-004	4.1700e-003	1.0000e-005	1.2000e-003	1.0000e-005	1.2100e-003	3.2000e-004	1.0000e-005	3.3000e-004	0.0000	1.0379	1.0379	3.0000e-005	0.0000	1.0386
Total	**6.5000e-004**	**4.1000e-004**	**4.1700e-003**	**1.0000e-005**	**1.2000e-003**	**1.0000e-005**	**1.2100e-003**	**3.2000e-004**	**1.0000e-005**	**3.3000e-004**	**0.0000**	**1.0379**	**1.0379**	**3.0000e-005**	**0.0000**	**1.0386**

3.5 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0655	0.0000	0.0655	0.0337	0.0000	0.0337	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0243	0.2639	0.1605	3.0000e-004		0.0127	0.0127		0.0117	0.0117	0.0000	26.0588	26.0588	8.4300e-003	0.0000	26.2694
Total	**0.0243**	**0.2639**	**0.1605**	**3.0000e-004**	**0.0655**	**0.0127**	**0.0783**	**0.0337**	**0.0117**	**0.0454**	**0.0000**	**26.0588**	**26.0588**	**8.4300e-003**	**0.0000**	**26.2694**

3.5 Grading - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.5000e-004	4.1000e-004	4.1700e-003	1.0000e-005	1.2000e-003	1.0000e-005	1.2100e-003	3.2000e-004	1.0000e-005	3.3000e-004	0.0000	1.0379	1.0379	3.0000e-005	0.0000	1.0386
Total	**6.5000e-004**	**4.1000e-004**	**4.1700e-003**	**1.0000e-005**	**1.2000e-003**	**1.0000e-005**	**1.2100e-003**	**3.2000e-004**	**1.0000e-005**	**3.3000e-004**	**0.0000**	**1.0379**	**1.0379**	**3.0000e-005**	**0.0000**	**1.0386**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0655	0.0000	0.0655	0.0337	0.0000	0.0337	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0243	0.2639	0.1605	3.0000e-004		0.0127	0.0127		0.0117	0.0117	0.0000	26.0587	26.0587	8.4300e-003	0.0000	26.2694
Total	**0.0243**	**0.2639**	**0.1605**	**3.0000e-004**	**0.0655**	**0.0127**	**0.0783**	**0.0337**	**0.0117**	**0.0454**	**0.0000**	**26.0587**	**26.0587**	**8.4300e-003**	**0.0000**	**26.2694**

3.5 Grading - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.5000e-004	4.1000e-004	4.1700e-003	1.0000e-005	1.2000e-003	1.0000e-005	1.2100e-003	3.2000e-004	1.0000e-005	3.3000e-004	0.0000	1.0379	1.0379	3.0000e-005	0.0000	1.0386
Total	**6.5000e-004**	**4.1000e-004**	**4.1700e-003**	**1.0000e-005**	**1.2000e-003**	**1.0000e-005**	**1.2100e-003**	**3.2000e-004**	**1.0000e-005**	**3.3000e-004**	**0.0000**	**1.0379**	**1.0379**	**3.0000e-005**	**0.0000**	**1.0386**

3.6 Paving - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0126	0.1292	0.1465	2.3000e-004		6.7800e-003	6.7800e-003		6.2400e-003	6.2400e-003	0.0000	20.0235	20.0235	6.4800e-003	0.0000	20.1854
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0126**	**0.1292**	**0.1465**	**2.3000e-004**		**6.7800e-003**	**6.7800e-003**		**6.2400e-003**	**6.2400e-003**	**0.0000**	**20.0235**	**20.0235**	**6.4800e-003**	**0.0000**	**20.1854**

3.6 Paving - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.0000e-004	3.7000e-004	3.7800e-003	1.0000e-005	1.2000e-003	1.0000e-005	1.2100e-003	3.2000e-004	1.0000e-005	3.3000e-004	0.0000	1.0023	1.0023	2.0000e-005	0.0000	1.0030
Total	**6.0000e-004**	**3.7000e-004**	**3.7800e-003**	**1.0000e-005**	**1.2000e-003**	**1.0000e-005**	**1.2100e-003**	**3.2000e-004**	**1.0000e-005**	**3.3000e-004**	**0.0000**	**1.0023**	**1.0023**	**2.0000e-005**	**0.0000**	**1.0030**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0126	0.1292	0.1465	2.3000e-004		6.7800e-003	6.7800e-003		6.2400e-003	6.2400e-003	0.0000	20.0235	20.0235	6.4800e-003	0.0000	20.1854
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0126**	**0.1292**	**0.1465**	**2.3000e-004**		**6.7800e-003**	**6.7800e-003**		**6.2400e-003**	**6.2400e-003**	**0.0000**	**20.0235**	**20.0235**	**6.4800e-003**	**0.0000**	**20.1854**

3.6 Paving - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.0000e-004	3.7000e-004	3.7800e-003	1.0000e-005	1.2000e-003	1.0000e-005	1.2100e-003	3.2000e-004	1.0000e-005	3.3000e-004	0.0000	1.0023	1.0023	2.0000e-005	0.0000	1.0030
Total	**6.0000e-004**	**3.7000e-004**	**3.7800e-003**	**1.0000e-005**	**1.2000e-003**	**1.0000e-005**	**1.2100e-003**	**3.2000e-004**	**1.0000e-005**	**3.3000e-004**	**0.0000**	**1.0023**	**1.0023**	**2.0000e-005**	**0.0000**	**1.0030**

3.7 Site Preparation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0903	0.0000	0.0903	0.0497	0.0000	0.0497	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0204	0.2121	0.1076	1.9000e-004		0.0110	0.0110		0.0101	0.0101	0.0000	16.7153	16.7153	5.4100e-003	0.0000	16.8505
Total	**0.0204**	**0.2121**	**0.1076**	**1.9000e-004**	**0.0903**	**0.0110**	**0.1013**	**0.0497**	**0.0101**	**0.0598**	**0.0000**	**16.7153**	**16.7153**	**5.4100e-003**	**0.0000**	**16.8505**

3.7 Site Preparation - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.9000e-004	2.5000e-004	2.5000e-003	1.0000e-005	7.2000e-004	0.0000	7.2000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6227	0.6227	2.0000e-005	0.0000	0.6232
Total	**3.9000e-004**	**2.5000e-004**	**2.5000e-003**	**1.0000e-005**	**7.2000e-004**	**0.0000**	**7.2000e-004**	**1.9000e-004**	**0.0000**	**2.0000e-004**	**0.0000**	**0.6227**	**0.6227**	**2.0000e-005**	**0.0000**	**0.6232**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0903	0.0000	0.0903	0.0497	0.0000	0.0497	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0204	0.2121	0.1076	1.9000e-004		0.0110	0.0110		0.0101	0.0101	0.0000	16.7153	16.7153	5.4100e-003	0.0000	16.8505
Total	**0.0204**	**0.2121**	**0.1076**	**1.9000e-004**	**0.0903**	**0.0110**	**0.1013**	**0.0497**	**0.0101**	**0.0598**	**0.0000**	**16.7153**	**16.7153**	**5.4100e-003**	**0.0000**	**16.8505**

3.7 Site Preparation - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.9000e-004	2.5000e-004	2.5000e-003	1.0000e-005	7.2000e-004	0.0000	7.2000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6227	0.6227	2.0000e-005	0.0000	0.6232
Total	**3.9000e-004**	**2.5000e-004**	**2.5000e-003**	**1.0000e-005**	**7.2000e-004**	**0.0000**	**7.2000e-004**	**1.9000e-004**	**0.0000**	**2.0000e-004**	**0.0000**	**0.6227**	**0.6227**	**2.0000e-005**	**0.0000**	**0.6232**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	1.1686	14.3377	9.8835	0.0525	2.8597	0.0429	2.9026	0.7709	0.0406	0.8114	0.0000	4,895.3549	4,895.3549	0.6134	0.0000	4,910.6896
Unmitigated	1.1686	14.3377	9.8835	0.0525	2.8597	0.0429	2.9026	0.7709	0.0406	0.8114	0.0000	4,895.3549	4,895.3549	0.6134	0.0000	4,910.6896

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Medical Office Building	5,046.00	1,242.65	205.90	7,459,513	7,459,513
Total	5,046.00	1,242.65	205.90	7,459,513	7,459,513

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Medical Office Building	9.50	7.30	7.30	29.60	51.40	19.00	60	30	10

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.492212	0.031147	0.169820	0.116157	0.015815	0.004502	0.033398	0.126328	0.002363	0.001519	0.005062	0.001083	0.000594

4.4 Fleet Mix

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	393.1378	393.1378	0.0178	3.6800e-003	394.6782
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	393.1378	393.1378	0.0178	3.6800e-003	394.6782
NaturalGas Mitigated	0.0103	0.0933	0.0783	5.6000e-004		7.0900e-003	7.0900e-003		7.0900e-003	7.0900e-003	0.0000	101.5193	101.5193	1.9500e-003	1.8600e-003	102.1226
NaturalGas Unmitigated	0.0103	0.0933	0.0783	5.6000e-004		7.0900e-003	7.0900e-003		7.0900e-003	7.0900e-003	0.0000	101.5193	101.5193	1.9500e-003	1.8600e-003	102.1226

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Medical Office Building	1.9024e+006	0.0103	0.0933	0.0783	5.6000e-004		7.0900e-003	7.0900e-003		7.0900e-003	7.0900e-003	0.0000	101.5193	101.5193	1.9500e-003	1.8600e-003	102.1226
Total		**0.0103**	**0.0933**	**0.0783**	**5.6000e-004**		**7.0900e-003**	**7.0900e-003**		**7.0900e-003**	**7.0900e-003**	**0.0000**	**101.5193**	**101.5193**	**1.9500e-003**	**1.8600e-003**	**102.1226**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Medical Office Building	1.9024e+006	0.0103	0.0933	0.0783	5.6000e-004		7.0900e-003	7.0900e-003		7.0900e-003	7.0900e-003	0.0000	101.5193	101.5193	1.9500e-003	1.8600e-003	102.1226
Total		**0.0103**	**0.0933**	**0.0783**	**5.6000e-004**		**7.0900e-003**	**7.0900e-003**		**7.0900e-003**	**7.0900e-003**	**0.0000**	**101.5193**	**101.5193**	**1.9500e-003**	**1.8600e-003**	**102.1226**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Medical Office Building	1.3514e+006	393.1378	0.0178	3.6800e-003	394.6782
Total		**393.1378**	**0.0178**	**3.6800e-003**	**394.6782**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Medical Office Building	1.3514e+006	393.1378	0.0178	3.6800e-003	394.6782
Total		**393.1378**	**0.0178**	**3.6800e-003**	**394.6782**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.6672	1.0000e-005	1.3300e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.5900e-003	2.5900e-003	1.0000e-005	0.0000	2.7600e-003
Unmitigated	0.6672	1.0000e-005	1.3300e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.5900e-003	2.5900e-003	1.0000e-005	0.0000	2.7600e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.1008					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.5663					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.2000e-004	1.0000e-005	1.3300e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.5900e-003	2.5900e-003	1.0000e-005	0.0000	2.7600e-003
Total	**0.6672**	**1.0000e-005**	**1.3300e-003**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.5900e-003**	**2.5900e-003**	**1.0000e-005**	**0.0000**	**2.7600e-003**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Consumer Products	0.5663					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.2000e-004	1.0000e-005	1.3300e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.5900e-003	2.5900e-003	1.0000e-005	0.0000	2.7600e-003
Architectural Coating	0.1008					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.6672**	**1.0000e-005**	**1.3300e-003**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.5900e-003**	**2.5900e-003**	**1.0000e-005**	**0.0000**	**2.7600e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	37.9417	0.5943	0.0143	57.0613
Unmitigated	37.9417	0.5943	0.0143	57.0613

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Medical Office Building	18.1947 / 3.46565	37.9417	0.5943	0.0143	57.0613
Total		**37.9417**	**0.5943**	**0.0143**	**57.0613**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Medical Office Building	18.1947 / 3.46565	37.9417	0.5943	0.0143	57.0613
Total		**37.9417**	**0.5943**	**0.0143**	**57.0613**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	317.8839	18.7864	0.0000	787.5438
Unmitigated	317.8839	18.7864	0.0000	787.5438

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Medical Office Building	1566	317.8839	18.7864	0.0000	787.5438
Total		**317.8839**	**18.7864**	**0.0000**	**787.5438**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Medical Office Building	1566	317.8839	18.7864	0.0000	787.5438
Total		**317.8839**	**18.7864**	**0.0000**	**787.5438**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

APPENDIX B

CALINE Worksheets

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: KP Int 1 1HR
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U= .5 M/S Z0= 100. CM ALT= 90. (M)
BRG= WORST CASE VD= .0 CM/S
CLAS= 7 (G) VS= .0 CM/S
MIXH= 1000. M AMB= 2.2 PPM
SIGTH= 5. DEGREES TEMP= 4.4 DEGREE (C)

II. LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M) X1	Y1	X2	Y2	* TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. SB In	*	-2	750	-2	150	* AG	727	24.1	.0	10.4
B. SB In	*	-2	150	-2	0	* AG	727	24.1	.0	10.4
C. SB Out	*	-2	0	-2	-150	* AG	1280	24.1	.0	10.4
D. SB Out	*	-2	-150	-2	-750	* AG	1280	24.1	.0	10.4
E. NB In	*	2	-750	2	-150	* AG	0	24.1	.0	10.4
F. NB In	*	2	-150	2	0	* AG	0	24.1	.0	10.4
G. NB Out	*	2	0	2	150	* AG	1279	24.1	.0	10.4
H. NB Out	*	2	150	2	750	* AG	1279	24.1	.0	10.4
I. WB In	*	750	2	150	2	* AG	3671	24.1	.0	10.4
J. WB In	*	150	2	0	2	* AG	3671	24.1	.0	10.4
K. WB Out	*	0	2	-150	2	* AG	2573	24.1	.0	10.4
L. WB Out	*	-150	2	-750	2	* AG	2573	24.1	.0	10.4
M. EB In	*	-750	-2	-150	-2	* AG	4215	24.1	.0	10.4
N. EB In	*	-150	-2	0	-2	* AG	4215	24.1	.0	10.4
O. EB Out	*	0	-2	150	-2	* AG	3480	24.1	.0	10.4
P. EB Out	*	150	-2	750	-2	* AG	3480	24.1	.0	10.4
Q. WB L	*	150	1	0	0	* AG	0	24.1	.0	10.4
R. EB L	*	0	0	-150	-1	* AG	0	24.1	.0	10.4
S. NB L	*	1	-150	0	0	* AG	0	24.1	.0	10.4
T. SB L	*	0	0	-1	150	* AG	545	24.1	.0	10.4

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 2

JOB: KP Int 1 1HR
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

III. RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z
1. Recpt 1	*	50	50	1.8
2. Recpt 2	*	52	52	1.8
3. Recpt 3	*	53	53	1.8

4. Recpt 4	-50	-50	1.8
5. Recpt 5	-52	-52	1.8
6. Recpt 6	-53	-53	1.8
7. Recpt 7	-50	50	1.8
8. Recpt 8	-52	52	1.8
9. Recpt 9	-53	53	1.8
10. Recpt 10	50	-50	1.8
11. Recpt 11	52	-52	1.8
12. Recpt 12	53	-53	1.8

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D	E	F	G	H
1. Recpt 1	261.	8.7	.0	.4	.0	.0	.0	.0	.7	.0
2. Recpt 2	260.	8.6	.0	.4	.0	.0	.0	.0	.7	.0
3. Recpt 3	260.	8.5	.0	.4	.0	.0	.0	.0	.6	.0
4. Recpt 4	81.	8.2	.0	.0	.7	.0	.0	.0	.0	.0
5. Recpt 5	80.	8.1	.0	.0	.7	.0	.0	.0	.0	.0
6. Recpt 6	80.	8.0	.0	.0	.6	.0	.0	.0	.0	.0
7. Recpt 7	99.	8.9	.0	.4	.0	.0	.0	.0	.6	.0
8. Recpt 8	100.	8.8	.0	.4	.0	.0	.0	.0	.6	.0
9. Recpt 9	100.	8.7	.0	.4	.0	.0	.0	.0	.6	.0
10. Recpt 10	279.	8.0	.0	.0	.6	.0	.0	.0	.0	.0
11. Recpt 11	280.	7.9	.0	.0	.6	.0	.0	.0	.0	.0
12. Recpt 12	280.	7.8	.0	.0	.6	.0	.0	.0	.0	.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 3

JOB: KP Int 1 1HR
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M	N	O	P	Q	R	S	T
1. Recpt 1	.0	.0	.0	2.0	3.0	.0	.0	.0	.0	.0	.0	.3
2. Recpt 2	.0	.0	.1	1.9	2.9	.0	.0	.0	.0	.0	.0	.3
3. Recpt 3	.0	.0	.0	1.9	2.9	.0	.0	.0	.0	.0	.0	.3
4. Recpt 4	2.6	.0	.0	.0	.0	.0	.0	2.6	.0	.0	.0	.0
5. Recpt 5	2.6	.0	.0	.0	.0	.0	.2	2.4	.0	.0	.0	.0
6. Recpt 6	2.5	.0	.0	.0	.0	.0	.1	2.4	.0	.0	.0	.0
7. Recpt 7	2.7	.0	.0	.0	.0	.0	.0	2.5	.0	.0	.0	.3
8. Recpt 8	2.6	.2	.0	.0	.0	.0	.0	2.4	.0	.0	.0	.3
9. Recpt 9	2.6	.1	.0	.0	.0	.0	.0	2.4	.0	.0	.0	.3
10. Recpt 10	.0	.0	.0	1.9	3.1	.1	.0	.0	.0	.0	.0	.0
11. Recpt 11	.0	.0	.0	1.9	3.0	.2	.0	.0	.0	.0	.0	.0
12. Recpt 12	.0	.0	.0	1.8	2.9	.1	.0	.0	.0	.0	.0	.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: KP Int 1 8HR
RUN: (MULTI-RUN)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

VD= .0 CM/S Z0= 100. CM ALT= 90. (M)
VS= .0 CM/S

II. METEOROLOGICAL CONDITIONS

RUN	U (M/S)	BRG (DEG)	CLASS	AMB (PPM)	MIXH (M)	SIGTH (DEG)	TEMP (C)
1. Hour 1	.5	0.	7 (G)	1.0	1000.	5.00	4.4
2. Hour 2	.5	0.	7 (G)	1.0	1000.	5.00	4.4
3. Hour 3	.5	0.	7 (G)	1.0	1000.	5.00	4.4
4. Hour 4	.5	0.	7 (G)	1.0	1000.	5.00	4.4
5. Hour 5	.5	0.	7 (G)	1.0	1000.	5.00	4.4
6. Hour 6	.5	0.	7 (G)	1.0	1000.	5.00	4.4
7. Hour 7	.5	0.	7 (G)	1.0	1000.	5.00	4.4
8. Hour 8	.5	0.	7 (G)	1.0	1000.	5.00	4.4

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 2

JOB: KP Int 1 8HR
RUN: (MULTI-RUN)
POLLUTANT: Carbon Monoxide

III. LINK GEOMETRY

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	TYPE	H (M)	W (M)
A. SB In	-2	750	-2	150	AG	.0	10.4
B. SB In	-2	150	-2	0	AG	.0	10.4
C. SB Out	-2	0	-2	-150	AG	.0	10.4
D. SB Out	-2	-150	-2	-750	AG	.0	10.4
E. NB In	2	-750	2	-150	AG	.0	10.4
F. NB In	2	-150	2	0	AG	.0	10.4
G. NB Out	2	0	2	150	AG	.0	10.4
H. NB Out	2	150	2	750	AG	.0	10.4
I. WB In	750	2	150	2	AG	.0	10.4
J. WB In	150	2	0	2	AG	.0	10.4
K. WB Out	0	2	-150	2	AG	.0	10.4
L. WB Out	-150	2	-750	2	AG	.0	10.4
M. EB In	-750	-2	-150	-2	AG	.0	10.4
N. EB In	-150	-2	0	-2	AG	.0	10.4
O. EB Out	0	-2	150	-2	AG	.0	10.4
P. EB Out	150	-2	750	-2	AG	.0	10.4
Q. WB L	150	1	0	0	AG	.0	10.4
R. EB L	0	0	-150	-1	AG	.0	10.4
S. NB L	1	-150	0	0	AG	.0	10.4
T. SB L	0	0	-1	150	AG	.0	10.4

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CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 3

JOB: KP Int 1 8HR
RUN: (MULTI-RUN)
POLLUTANT: Carbon Monoxide

IV. EMISSIONS AND VEHICLE VOLUMES

RUN		LINK A	B	C	D	E	F	G	H	I	J
1	VPH	727	727	1280	1280	0	0	1279	1279	3671	3671
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
2	VPH	618	618	1088	1088	0	0	1087	1087	3120	3120
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
3	VPH	525	525	925	925	0	0	924	924	2652	2652
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
4	VPH	446	446	786	786	0	0	785	785	2254	2254
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
5	VPH	379	379	668	668	0	0	668	668	1916	1916
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
6	VPH	323	323	568	568	0	0	567	567	1629	1629
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
7	VPH	274	274	483	483	0	0	482	482	1385	1385
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
8	VPH	233	233	410	410	0	0	410	410	1177	1177
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 4

JOB: KP Int 1 8HR
RUN: (MULTI-RUN)
POLLUTANT: Carbon Monoxide

IV. EMISSIONS AND VEHICLE VOLUMES (CONT.)

RUN		LINK K	L	M	N	O	P	Q	R	S	T
1	VPH	2573	2573	4215	4215	3480	3480	0	0	0	545
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
2	VPH	2187	2187	3583	3583	2958	2958	0	0	0	463
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.

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3	VPH	1859	1859	3045	3045	2514	2514	0	0	0	394
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
4	VPH	1580	1580	2589	2589	2137	2137	0	0	0	335
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
5	VPH	1343	1343	2200	2200	1817	1817	0	0	0	284
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
6	VPH	1142	1142	1870	1870	1544	1544	0	0	0	242
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
7	VPH	970	970	1590	1590	1312	1312	0	0	0	206
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
8	VPH	825	825	1351	1351	1116	1116	0	0	0	175
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 5

JOB: KP Int 1 8HR
RUN: (MULTI-RUN)
POLLUTANT: Carbon Monoxide

V. RECEPTOR LOCATIONS AND MULTI-RUN AVERAGE CONCENTRATIONS

RECEPTOR	COORDINATES (M) X	Y	Z	AVG (PPM)
1. Recpt 1	50	50	1.8	1.1
2. Recpt 2	52	52	1.8	1.1
3. Recpt 3	53	53	1.8	1.1
4. Recpt 4	-50	-50	1.8	3.1
5. Recpt 5	-52	-52	1.8	3.0
6. Recpt 6	-53	-53	1.8	3.0
7. Recpt 7	-50	50	1.8	1.1
8. Recpt 8	-52	52	1.8	1.1
9. Recpt 9	-53	53	1.8	1.1
10. Recpt 10	50	-50	1.8	3.1
11. Recpt 11	52	-52	1.8	3.1
12. Recpt 12	53	-53	1.8	3.1

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CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: KP Int 2 1HR
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U=	.5 M/S	Z0=	100. CM	ALT=	90. (M)
BRG=	WORST CASE	VD=	.0 CM/S		
CLAS=	7 (G)	VS=	.0 CM/S		
MIXH=	1000. M	AMB=	2.2 PPM		
SIGTH=	5. DEGREES	TEMP=	4.4 DEGREE (C)		

II. LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M) X1	Y1	X2	Y2	* TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. SB In	*	-2	750	-2	150	* AG	0	24.1	.0	10.4
B. SB In	*	-2	150	-2	0	* AG	0	24.1	.0	10.4
C. SB Out	*	-2	0	-2	-150	* AG	238	24.1	.0	10.4
D. SB Out	*	-2	-150	-2	-750	* AG	238	24.1	.0	10.4
E. NB In	*	2	-750	2	-150	* AG	2325	24.1	.0	10.4
F. NB In	*	2	-150	2	0	* AG	2325	24.1	.0	10.4
G. NB Out	*	2	0	2	150	* AG	510	24.1	.0	10.4
H. NB Out	*	2	150	2	750	* AG	510	24.1	.0	10.4
I. WB In	*	750	2	150	2	* AG	3631	24.1	.0	10.4
J. WB In	*	150	2	0	2	* AG	3631	24.1	.0	10.4
K. WB Out	*	0	2	-150	2	* AG	4173	24.1	.0	10.4
L. WB Out	*	-150	2	-750	2	* AG	4173	24.1	.0	10.4
M. EB In	*	-750	-2	-150	-2	* AG	2200	24.1	.0	10.4
N. EB In	*	-150	-2	0	-2	* AG	2200	24.1	.0	10.4
O. EB Out	*	0	-2	150	-2	* AG	3235	24.1	.0	10.4
P. EB Out	*	150	-2	750	-2	* AG	3235	24.1	.0	10.4
Q. WB L	*	150	1	0	0	* AG	0	24.1	.0	10.4
R. EB L	*	0	0	-150	-1	* AG	0	24.1	.0	10.4
S. NB L	*	1	-150	0	0	* AG	1052	24.1	.0	10.4
T. SB L	*	0	0	-1	150	* AG	0	24.1	.0	10.4

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 2

JOB: KP Int 2 1HR
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

III. RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z
1. Recpt 1	*	50	50	1.8
2. Recpt 2	*	52	52	1.8
3. Recpt 3	*	53	53	1.8
4. Recpt 4	*	-50	-50	1.8
5. Recpt 5	*	-52	-52	1.8

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6. Recpt 6	-53	-53	1.8
7. Recpt 7	-50	50	1.8
8. Recpt 8	-52	52	1.8
9. Recpt 9	-53	53	1.8
10. Recpt 10	50	-50	1.8
11. Recpt 11	52	-52	1.8
12. Recpt 12	53	-53	1.8

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D	E	F	G	H
1. Recpt 1	199.	7.9	.0	.0	.2	.0	.0	1.5	.0	.0
2. Recpt 2	199.	7.8	.0	.0	.2	.0	.0	1.5	.0	.0
3. Recpt 3	200.	7.7	.0	.0	.2	.0	.0	1.5	.0	.0
4. Recpt 4	81.	9.1	.0	.0	.2	.0	.0	1.0	.0	.0
5. Recpt 5	80.	8.9	.0	.0	.2	.0	.0	1.0	.0	.0
6. Recpt 6	80.	8.8	.0	.0	.1	.0	.0	1.0	.0	.0
7. Recpt 7	99.	7.6	.0	.0	.0	.0	.0	.0	.3	.0
8. Recpt 8	100.	7.5	.0	.0	.0	.0	.0	.0	.3	.0
9. Recpt 9	100.	7.4	.0	.0	.0	.0	.0	.0	.3	.0
10. Recpt 10	279.	8.9	.0	.0	.1	.0	.0	1.1	.0	.0
11. Recpt 11	280.	8.8	.0	.0	.1	.0	.0	1.0	.0	.0
12. Recpt 12	280.	8.6	.0	.0	.1	.0	.0	1.0	.0	.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 3

JOB: KP Int 2 1HR
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M	N	O	P	Q	R	S	T
1. Recpt 1	.0	1.7	.0	.0	.0	.0	1.4	.0	.0	.0	.8	.0
2. Recpt 2	.0	1.6	.0	.0	.0	.0	1.4	.0	.0	.0	.8	.0
3. Recpt 3	.0	1.6	.0	.0	.0	.0	1.4	.0	.0	.0	.8	.0
4. Recpt 4	2.6	.0	.0	.0	.0	.0	.0	2.4	.0	.0	.6	.0
5. Recpt 5	2.5	.0	.0	.0	.0	.0	.1	2.3	.0	.0	.5	.0
6. Recpt 6	2.5	.0	.0	.0	.0	.0	.1	2.3	.0	.0	.5	.0
7. Recpt 7	2.7	.0	.0	.0	.0	.0	.0	2.3	.0	.0	.0	.0
8. Recpt 8	2.6	.2	.0	.0	.0	.0	.0	2.3	.0	.0	.0	.0
9. Recpt 9	2.5	.1	.0	.0	.0	.0	.0	2.2	.0	.0	.0	.0
10. Recpt 10	.0	.0	.0	3.0	1.8	.0	.0	.0	.0	.0	.6	.0
11. Recpt 11	.0	.0	.0	2.9	1.7	.1	.0	.0	.0	.0	.5	.0
12. Recpt 12	.0	.0	.0	2.9	1.7	.0	.0	.0	.0	.0	.5	.0

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CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: KP Int 2 8HR
RUN: (MULTI-RUN)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

VD= .0 CM/S Z0= 100. CM ALT= 90. (M)
VS= .0 CM/S

II. METEOROLOGICAL CONDITIONS

RUN	U (M/S)	BRG (DEG)	CLASS	AMB (PPM)	MIXH (M)	SIGTH (DEG)	TEMP (C)
1. Hour 1	.5	0.	7 (G)	1.0	1000.	5.00	4.4
2. Hour 2	.5	0.	7 (G)	1.0	1000.	5.00	4.4
3. Hour 3	.5	0.	7 (G)	1.0	1000.	5.00	4.4
4. Hour 4	.5	0.	7 (G)	1.0	1000.	5.00	4.4
5. Hour 5	.5	0.	7 (G)	1.0	1000.	5.00	4.4
6. Hour 6	.5	0.	7 (G)	1.0	1000.	5.00	4.4
7. Hour 7	.5	0.	7 (G)	1.0	1000.	5.00	4.4
8. Hour 8	.5	0.	7 (G)	1.0	1000.	5.00	4.4

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 2

JOB: KP Int 2 8HR
RUN: (MULTI-RUN)
POLLUTANT: Carbon Monoxide

III. LINK GEOMETRY

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	TYPE	H (M)	W (M)
A. SB In	-2	750	-2	150	AG	.0	10.4
B. SB In	-2	150	-2	0	AG	.0	10.4
C. SB Out	-2	0	-2	-150	AG	.0	10.4
D. SB Out	-2	-150	-2	-750	AG	.0	10.4
E. NB In	2	-750	2	-150	AG	.0	10.4
F. NB In	2	-150	2	0	AG	.0	10.4
G. NB Out	2	0	2	150	AG	.0	10.4
H. NB Out	2	150	2	750	AG	.0	10.4
I. WB In	750	2	150	2	AG	.0	10.4
J. WB In	150	2	0	2	AG	.0	10.4
K. WB Out	0	2	-150	2	AG	.0	10.4
L. WB Out	-150	2	-750	2	AG	.0	10.4
M. EB In	-750	-2	-150	-2	AG	.0	10.4
N. EB In	-150	-2	0	-2	AG	.0	10.4
O. EB Out	0	-2	150	-2	AG	.0	10.4
P. EB Out	150	-2	750	-2	AG	.0	10.4
Q. WB L	150	1	0	0	AG	.0	10.4
R. EB L	0	0	-150	-1	AG	.0	10.4
S. NB L	1	-150	0	0	AG	.0	10.4
T. SB L	0	0	-1	150	AG	.0	10.4

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CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 3

JOB: KP Int 2 8HR
RUN: (MULTI-RUN)
POLLUTANT: Carbon Monoxide

IV. EMISSIONS AND VEHICLE VOLUMES

RUN		LINK A	B	C	D	E	F	G	H	I	J
1	VPH	0	0	238	238	2325	2325	510	510	3631	3631
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
2	VPH	0	0	202	202	1976	1976	434	434	3086	3086
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
3	VPH	0	0	172	172	1680	1680	368	368	2623	2623
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
4	VPH	0	0	146	146	1428	1428	313	313	2230	2230
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
5	VPH	0	0	124	124	1214	1214	266	266	1895	1895
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
6	VPH	0	0	106	106	1032	1032	226	226	1611	1611
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
7	VPH	0	0	90	90	877	877	192	192	1369	1369
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
8	VPH	0	0	76	76	745	745	163	163	1164	1164
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 4

JOB: KP Int 2 8HR
RUN: (MULTI-RUN)
POLLUTANT: Carbon Monoxide

IV. EMISSIONS AND VEHICLE VOLUMES (CONT.)

RUN		LINK K	L	M	N	O	P	Q	R	S	T
1	VPH	4173	4173	2200	2200	3235	3235	0	0	1052	0
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
2	VPH	3547	3547	1870	1870	2750	2750	0	0	894	0
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.

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3	VPH	3015	3015	1590	1590	2337	2337	0	0	760	0
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
4	VPH	2563	2563	1351	1351	1987	1987	0	0	646	0
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
5	VPH	2178	2178	1148	1148	1689	1689	0	0	549	0
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
6	VPH	1852	1852	976	976	1435	1435	0	0	467	0
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
7	VPH	1574	1574	830	830	1220	1220	0	0	397	0
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
8	VPH	1338	1338	705	705	1037	1037	0	0	337	0
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 5

JOB: KP Int 2 8HR
RUN: (MULTI-RUN)
POLLUTANT: Carbon Monoxide

V. RECEPTOR LOCATIONS AND MULTI-RUN AVERAGE CONCENTRATIONS

RECEPTOR	COORDINATES (M) X	Y	Z	AVG (PPM)
1. Recpt 1	50	50	1.8	1.0
2. Recpt 2	52	52	1.8	1.0
3. Recpt 3	53	53	1.8	1.0
4. Recpt 4	-50	-50	1.8	2.8
5. Recpt 5	-52	-52	1.8	2.8
6. Recpt 6	-53	-53	1.8	2.8
7. Recpt 7	-50	50	1.8	1.0
8. Recpt 8	-52	52	1.8	1.0
9. Recpt 9	-53	53	1.8	1.0
10. Recpt 10	50	-50	1.8	3.0
11. Recpt 11	52	-52	1.8	2.9
12. Recpt 12	53	-53	1.8	2.9

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CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: KP Int 3 1HR
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U= .5 M/S Z0= 100. CM ALT= 90. (M)
BRG= WORST CASE VD= .0 CM/S
CLAS= 7 (G) VS= .0 CM/S
MIXH= 1000. M AMB= 2.2 PPM
SIGTH= 5. DEGREES TEMP= 4.4 DEGREE (C)

II. LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M) X1	Y1	X2	Y2	* TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. SB In	*	-2	750	-2	150	* AG	1868	24.1	.0	10.4
B. SB In	*	-2	150	-2	0	* AG	1868	24.1	.0	10.4
C. SB Out	*	-2	0	-2	-150	* AG	1402	24.1	.0	10.4
D. SB Out	*	-2	-150	-2	-750	* AG	1402	24.1	.0	10.4
E. NB In	*	2	-750	2	-150	* AG	1336	24.1	.0	10.4
F. NB In	*	2	-150	2	0	* AG	1336	24.1	.0	10.4
G. NB Out	*	2	0	2	150	* AG	1575	24.1	.0	10.4
H. NB Out	*	2	150	2	750	* AG	1575	24.1	.0	10.4
I. WB In	*	750	2	150	2	* AG	2654	24.1	.0	10.4
J. WB In	*	150	2	0	2	* AG	2654	24.1	.0	10.4
K. WB Out	*	0	2	-150	2	* AG	3129	24.1	.0	10.4
L. WB Out	*	-150	2	-750	2	* AG	3129	24.1	.0	10.4
M. EB In	*	-750	-2	-150	-2	* AG	3234	24.1	.0	10.4
N. EB In	*	-150	-2	0	-2	* AG	3234	24.1	.0	10.4
O. EB Out	*	0	-2	150	-2	* AG	2986	24.1	.0	10.4
P. EB Out	*	150	-2	750	-2	* AG	2986	24.1	.0	10.4
Q. WB L	*	150	1	0	0	* AG	393	24.1	.0	10.4
R. EB L	*	0	0	-150	-1	* AG	643	24.1	.0	10.4
S. NB L	*	1	-150	0	0	* AG	252	24.1	.0	10.4
T. SB L	*	0	0	-1	150	* AG	326	24.1	.0	10.4

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 2

JOB: KP Int 3 1HR
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

III. RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z
1. Recpt 1	*	50	50	1.8
2. Recpt 2	*	52	52	1.8
3. Recpt 3	*	53	53	1.8
4. Recpt 4	*	-50	-50	1.8
5. Recpt 5	*	-52	-52	1.8

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6. Recpt 6	-53	-53	1.8
7. Recpt 7	-50	50	1.8
8. Recpt 8	-52	52	1.8
9. Recpt 9	-53	53	1.8
10. Recpt 10	50	-50	1.8
11. Recpt 11	52	-52	1.8
12. Recpt 12	53	-53	1.8

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D	E	F	G	H
1. Recpt 1	260.	8.8	.0	.9	.0	.0	.0	.0	.8	.0
2. Recpt 2	260.	8.7	.0	.9	.0	.0	.0	.0	.8	.0
3. Recpt 3	260.	8.6	.0	.8	.0	.0	.0	.0	.8	.0
4. Recpt 4	9.	8.5	1.7	.0	.0	.0	.0	.0	.0	1.5
5. Recpt 5	10.	8.4	1.6	.1	.0	.0	.0	.0	.0	1.4
6. Recpt 6	10.	8.3	1.6	.0	.0	.0	.0	.0	.0	1.4
7. Recpt 7	100.	8.4	.0	.9	.0	.0	.0	.0	.8	.0
8. Recpt 8	100.	8.2	.0	.9	.0	.0	.0	.0	.8	.0
9. Recpt 9	100.	8.1	.0	.9	.0	.0	.0	.0	.7	.0
10. Recpt 10	280.	8.5	.0	.0	.7	.0	.0	.7	.0	.0
11. Recpt 11	280.	8.4	.0	.0	.7	.0	.0	.7	.0	.0
12. Recpt 12	280.	8.3	.0	.0	.7	.0	.0	.7	.0	.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 3

JOB: KP Int 3 1HR
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M	N	O	P	Q	R	S	T
1. Recpt 1	.0	.0	.2	2.2	2.3	.0	.0	.0	.0	.0	.0	.2
2. Recpt 2	.0	.0	.1	2.2	2.3	.0	.0	.0	.0	.0	.0	.2
3. Recpt 3	.0	.0	.1	2.2	2.2	.0	.0	.0	.0	.0	.0	.2
4. Recpt 4	.0	.0	1.3	.0	.0	1.4	.0	.0	.0	.4	.0	.0
5. Recpt 5	.0	.0	1.3	.0	.0	1.4	.0	.0	.0	.4	.0	.0
6. Recpt 6	.0	.0	1.3	.0	.0	1.4	.0	.0	.0	.4	.0	.0
7. Recpt 7	1.9	.2	.0	.0	.0	.0	.0	2.1	.0	.0	.0	.2
8. Recpt 8	1.9	.1	.0	.0	.0	.0	.0	2.1	.0	.0	.0	.2
9. Recpt 9	1.9	.0	.0	.0	.0	.0	.0	2.1	.0	.0	.0	.2
10. Recpt 10	.0	.0	.0	2.2	2.3	.2	.0	.0	.0	.0	.2	.0
11. Recpt 11	.0	.0	.0	2.2	2.3	.1	.0	.0	.0	.0	.2	.0
12. Recpt 12	.0	.0	.0	2.2	2.3	.1	.0	.0	.0	.0	.2	.0

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CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: KP Int 3 8HR
RUN: (MULTI-RUN)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

VD= .0 CM/S Z0= 100. CM ALT= 90. (M)
VS= .0 CM/S

II. METEOROLOGICAL CONDITIONS

RUN	U (M/S)	BRG (DEG)	CLASS	AMB (PPM)	MIXH (M)	SIGTH (DEG)	TEMP (C)
1. Hour 1	.5	0.	7 (G)	1.0	1000.	5.00	4.4
2. Hour 2	.5	0.	7 (G)	1.0	1000.	5.00	4.4
3. Hour 3	.5	0.	7 (G)	1.0	1000.	5.00	4.4
4. Hour 4	.5	0.	7 (G)	1.0	1000.	5.00	4.4
5. Hour 5	.5	0.	7 (G)	1.0	1000.	5.00	4.4
6. Hour 6	.5	0.	7 (G)	1.0	1000.	5.00	4.4
7. Hour 7	.5	0.	7 (G)	1.0	1000.	5.00	4.4
8. Hour 8	.5	0.	7 (G)	1.0	1000.	5.00	4.4

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 2

JOB: KP Int 3 8HR
RUN: (MULTI-RUN)
POLLUTANT: Carbon Monoxide

III. LINK GEOMETRY

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	TYPE	H (M)	W (M)
A. SB In	-2	750	-2	150	AG	.0	10.4
B. SB In	-2	150	-2	0	AG	.0	10.4
C. SB Out	-2	0	-2	-150	AG	.0	10.4
D. SB Out	-2	-150	-2	-750	AG	.0	10.4
E. NB In	2	-750	2	-150	AG	.0	10.4
F. NB In	2	-150	2	0	AG	.0	10.4
G. NB Out	2	0	2	150	AG	.0	10.4
H. NB Out	2	150	2	750	AG	.0	10.4
I. WB In	750	2	150	2	AG	.0	10.4
J. WB In	150	2	0	2	AG	.0	10.4
K. WB Out	0	2	-150	2	AG	.0	10.4
L. WB Out	-150	2	-750	2	AG	.0	10.4
M. EB In	-750	-2	-150	-2	AG	.0	10.4
N. EB In	-150	-2	0	-2	AG	.0	10.4
O. EB Out	0	-2	150	-2	AG	.0	10.4
P. EB Out	150	-2	750	-2	AG	.0	10.4
Q. WB L	150	1	0	0	AG	.0	10.4
R. EB L	0	0	-150	-1	AG	.0	10.4
S. NB L	1	-150	0	0	AG	.0	10.4
T. SB L	0	0	-1	150	AG	.0	10.4

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CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 3

JOB: KP Int 3 8HR
RUN: (MULTI-RUN)
POLLUTANT: Carbon Monoxide

IV. EMISSIONS AND VEHICLE VOLUMES

RUN		LINK A	B	C	D	E	F	G	H	I	J
1	VPH	1868	1868	1402	1402	1336	1336	1575	1575	2654	2654
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
2	VPH	1588	1588	1192	1192	1136	1136	1339	1339	2256	2256
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
3	VPH	1350	1350	1013	1013	965	965	1138	1138	1918	1918
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
4	VPH	1147	1147	861	861	820	820	967	967	1630	1630
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
5	VPH	975	975	732	732	697	697	822	822	1385	1385
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
6	VPH	829	829	622	622	593	593	699	699	1178	1178
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
7	VPH	705	705	529	529	504	504	594	594	1001	1001
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
8	VPH	599	599	449	449	428	428	505	505	851	851
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 4

JOB: KP Int 3 8HR
RUN: (MULTI-RUN)
POLLUTANT: Carbon Monoxide

IV. EMISSIONS AND VEHICLE VOLUMES (CONT.)

RUN		LINK K	L	M	N	O	P	Q	R	S	T
1	VPH	3129	3129	3234	3234	2986	2986	393	643	252	326
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
2	VPH	2660	2660	2749	2749	2538	2538	334	547	214	277
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.

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3	VPH	2261	2261	2337	2337	2157	2157	284	465	182	236
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
4	VPH	1922	1922	1986	1986	1834	1834	241	395	155	200
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
5	VPH	1633	1633	1688	1688	1559	1559	205	336	132	170
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
6	VPH	1388	1388	1435	1435	1325	1325	174	285	112	145
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
7	VPH	1180	1180	1220	1220	1126	1126	148	243	95	123
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
8	VPH	1003	1003	1037	1037	957	957	126	206	81	105
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 5

JOB: KP Int 3 8HR
RUN: (MULTI-RUN)
POLLUTANT: Carbon Monoxide

V. RECEPTOR LOCATIONS AND MULTI-RUN AVERAGE CONCENTRATIONS

RECEPTOR	COORDINATES (M) X	Y	Z	AVG (PPM)
1. Recpt 1	50	50	1.8	1.1
2. Recpt 2	52	52	1.8	1.1
3. Recpt 3	53	53	1.8	1.1
4. Recpt 4	-50	-50	1.8	3.2
5. Recpt 5	-52	-52	1.8	3.2
6. Recpt 6	-53	-53	1.8	3.1
7. Recpt 7	-50	50	1.8	1.1
8. Recpt 8	-52	52	1.8	1.1
9. Recpt 9	-53	53	1.8	1.1
10. Recpt 10	50	-50	1.8	3.0
11. Recpt 11	52	-52	1.8	2.9
12. Recpt 12	53	-53	1.8	2.9

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CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: KP Int 4 1HR
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U= .5 M/S Z0= 100. CM ALT= 90. (M)
BRG= WORST CASE VD= .0 CM/S
CLAS= 7 (G) VS= .0 CM/S
MIXH= 1000. M AMB= 2.2 PPM
SIGTH= 5. DEGREES TEMP= 4.4 DEGREE (C)

II. LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. SB In	-2	750	-2	150	AG	1569	24.1	.0	10.4
B. SB In	-2	150	-2	0	AG	1569	24.1	.0	10.4
C. SB Out	-2	0	-2	-150	AG	1329	24.1	.0	10.4
D. SB Out	-2	-150	-2	-750	AG	1329	24.1	.0	10.4
E. NB In	2	-750	2	-150	AG	1215	24.1	.0	10.4
F. NB In	2	-150	2	0	AG	1215	24.1	.0	10.4
G. NB Out	2	0	2	150	AG	1434	24.1	.0	10.4
H. NB Out	2	150	2	750	AG	1434	24.1	.0	10.4
I. WB In	750	2	150	2	AG	2579	24.1	.0	10.4
J. WB In	150	2	0	2	AG	2579	24.1	.0	10.4
K. WB Out	0	2	-150	2	AG	2655	24.1	.0	10.4
L. WB Out	-150	2	-750	2	AG	2655	24.1	.0	10.4
M. EB In	-750	-2	-150	-2	AG	2985	24.1	.0	10.4
N. EB In	-150	-2	0	-2	AG	2985	24.1	.0	10.4
O. EB Out	0	-2	150	-2	AG	2930	24.1	.0	10.4
P. EB Out	150	-2	750	-2	AG	2930	24.1	.0	10.4
Q. WB L	150	1	0	0	AG	311	24.1	.0	10.4
R. EB L	0	0	-150	-1	AG	391	24.1	.0	10.4
S. NB L	1	-150	0	0	AG	330	24.1	.0	10.4
T. SB L	0	0	-1	150	AG	516	24.1	.0	10.4

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 2

JOB: KP Int 4 1HR
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

III. RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. Recpt 1	50	50	1.8
2. Recpt 2	52	52	1.8
3. Recpt 3	53	53	1.8
4. Recpt 4	-50	-50	1.8
5. Recpt 5	-52	-52	1.8

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6. Recpt 6	-53	-53	1.8
7. Recpt 7	-50	50	1.8
8. Recpt 8	-52	52	1.8
9. Recpt 9	-53	53	1.8
10. Recpt 10	50	-50	1.8
11. Recpt 11	52	-52	1.8
12. Recpt 12	53	-53	1.8

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D	E	F	G	H
1. Recpt 1	261.	8.3	.0	.8	.0	.0	.0	.0	.7	.0
2. Recpt 2	260.	8.2	.0	.8	.0	.0	.0	.0	.7	.0
3. Recpt 3	260.	8.1	.0	.7	.0	.0	.0	.0	.7	.0
4. Recpt 4	81.	7.9	.0	.0	.7	.0	.0	.6	.0	.0
5. Recpt 5	80.	7.8	.0	.0	.7	.0	.0	.6	.0	.0
6. Recpt 6	80.	7.7	.0	.0	.7	.0	.0	.6	.0	.0
7. Recpt 7	99.	8.2	.0	.8	.0	.0	.0	.0	.7	.0
8. Recpt 8	100.	8.1	.0	.8	.0	.0	.0	.0	.7	.0
9. Recpt 9	100.	8.0	.0	.8	.0	.0	.0	.0	.7	.0
10. Recpt 10	280.	8.0	.0	.0	.7	.0	.0	.6	.0	.0
11. Recpt 11	280.	7.9	.0	.0	.7	.0	.0	.6	.0	.0
12. Recpt 12	280.	7.8	.0	.0	.7	.0	.0	.6	.0	.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 3

JOB: KP Int 4 1HR
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M	N	O	P	Q	R	S	T
1. Recpt 1	.0	.0	.0	2.0	2.1	.0	.0	.0	.0	.0	.0	.3
2. Recpt 2	.0	.0	.1	1.9	2.1	.0	.0	.0	.0	.0	.0	.3
3. Recpt 3	.0	.0	.0	1.9	2.1	.0	.0	.0	.0	.0	.0	.3
4. Recpt 4	1.9	.0	.0	.0	.0	.0	.0	2.2	.0	.0	.2	.0
5. Recpt 5	1.9	.0	.0	.0	.0	.0	.1	2.1	.0	.0	.2	.0
6. Recpt 6	1.8	.0	.0	.0	.0	.0	.0	2.0	.0	.0	.2	.0
7. Recpt 7	2.0	.0	.0	.0	.0	.0	.0	2.1	.0	.0	.0	.3
8. Recpt 8	1.9	.1	.0	.0	.0	.0	.0	2.0	.0	.0	.0	.3
9. Recpt 9	1.9	.0	.0	.0	.0	.0	.0	2.0	.0	.0	.0	.3
10. Recpt 10	.0	.0	.0	1.9	2.1	.2	.0	.0	.0	.0	.2	.0
11. Recpt 11	.0	.0	.0	1.9	2.1	.1	.0	.0	.0	.0	.2	.0
12. Recpt 12	.0	.0	.0	1.9	2.1	.1	.0	.0	.0	.0	.2	.0

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CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: KP Int 4 8HR
RUN: (MULTI-RUN)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

VD= .0 CM/S Z0= 100. CM ALT= 90. (M)
VS= .0 CM/S

II. METEOROLOGICAL CONDITIONS

RUN	U (M/S)	BRG (DEG)	CLASS	AMB (PPM)	MIXH (M)	SIGTH (DEG)	TEMP (C)
1. Hour 1	.5	0.	7 (G)	1.0	1000.	5.00	4.4
2. Hour 2	.5	0.	7 (G)	1.0	1000.	5.00	4.4
3. Hour 3	.5	0.	7 (G)	1.0	1000.	5.00	4.4
4. Hour 4	.5	0.	7 (G)	1.0	1000.	5.00	4.4
5. Hour 5	.5	0.	7 (G)	1.0	1000.	5.00	4.4
6. Hour 6	.5	0.	7 (G)	1.0	1000.	5.00	4.4
7. Hour 7	.5	0.	7 (G)	1.0	1000.	5.00	4.4
8. Hour 8	.5	0.	7 (G)	1.0	1000.	5.00	4.4

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 2

JOB: KP Int 4 8HR
RUN: (MULTI-RUN)
POLLUTANT: Carbon Monoxide

III. LINK GEOMETRY

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	TYPE	H (M)	W (M)
A. SB In	-2	750	-2	150	AG	.0	10.4
B. SB In	-2	150	-2	0	AG	.0	10.4
C. SB Out	-2	0	-2	-150	AG	.0	10.4
D. SB Out	-2	-150	-2	-750	AG	.0	10.4
E. NB In	2	-750	2	-150	AG	.0	10.4
F. NB In	2	-150	2	0	AG	.0	10.4
G. NB Out	2	0	2	150	AG	.0	10.4
H. NB Out	2	150	2	750	AG	.0	10.4
I. WB In	750	2	150	2	AG	.0	10.4
J. WB In	150	2	0	2	AG	.0	10.4
K. WB Out	0	2	-150	2	AG	.0	10.4
L. WB Out	-150	2	-750	2	AG	.0	10.4
M. EB In	-750	-2	-150	-2	AG	.0	10.4
N. EB In	-150	-2	0	-2	AG	.0	10.4
O. EB Out	0	-2	150	-2	AG	.0	10.4
P. EB Out	150	-2	750	-2	AG	.0	10.4
Q. WB L	150	1	0	0	AG	.0	10.4
R. EB L	0	0	-150	-1	AG	.0	10.4
S. NB L	1	-150	0	0	AG	.0	10.4
T. SB L	0	0	-1	150	AG	.0	10.4

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CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 3

JOB: KP Int 4 8HR
RUN: (MULTI-RUN)
POLLUTANT: Carbon Monoxide

IV. EMISSIONS AND VEHICLE VOLUMES

RUN		LINK A	B	C	D	E	F	G	H	I	J
1	VPH	1569	1569	1329	1329	1215	1215	1434	1434	2579	2579
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
2	VPH	1334	1334	1130	1130	1033	1033	1219	1219	2192	2192
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
3	VPH	1134	1134	960	960	878	878	1036	1036	1863	1863
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
4	VPH	964	964	816	816	746	746	881	881	1584	1584
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
5	VPH	819	819	694	694	634	634	749	749	1346	1346
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
6	VPH	696	696	590	590	539	539	636	636	1144	1144
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
7	VPH	592	592	501	501	458	458	541	541	973	973
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
8	VPH	503	503	426	426	390	390	460	460	827	827
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 4

JOB: KP Int 4 8HR
RUN: (MULTI-RUN)
POLLUTANT: Carbon Monoxide

IV. EMISSIONS AND VEHICLE VOLUMES (CONT.)

RUN		LINK K	L	M	N	O	P	Q	R	S	T
1	VPH	2655	2655	2985	2985	2930	2930	311	391	330	516
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
2	VPH	2257	2257	2537	2537	2491	2491	264	332	281	439
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.

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3	VPH	1918	1918	2157	2157	2117	2117	225	282	238	373
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
4	VPH	1631	1631	1833	1833	1799	1799	191	240	203	317
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
5	VPH	1386	1386	1558	1558	1529	1529	162	204	172	269
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
6	VPH	1178	1178	1324	1324	1300	1300	138	173	146	229
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
7	VPH	1001	1001	1126	1126	1105	1105	117	147	124	195
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.
8	VPH	851	851	957	957	939	939	100	125	106	165
	EF	24.	24.	24.	24.	24.	24.	24.	24.	24.	24.

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 5

JOB: KP Int 4 8HR
RUN: (MULTI-RUN)
POLLUTANT: Carbon Monoxide

V. RECEPTOR LOCATIONS AND MULTI-RUN AVERAGE CONCENTRATIONS

RECEPTOR	COORDINATES (M) X	Y	Z	AVG (PPM)
1. Recpt 1	50	50	1.8	1.1
2. Recpt 2	52	52	1.8	1.1
3. Recpt 3	53	53	1.8	1.1
4. Recpt 4	-50	-50	1.8	3.0
5. Recpt 5	-52	-52	1.8	2.9
6. Recpt 6	-53	-53	1.8	2.9
7. Recpt 7	-50	50	1.8	1.1
8. Recpt 8	-52	52	1.8	1.1
9. Recpt 9	-53	53	1.8	1.1
10. Recpt 10	50	-50	1.8	2.9
11. Recpt 11	52	-52	1.8	2.9
12. Recpt 12	53	-53	1.8	2.8

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APPENDIX C

ISR Worksheets

Emissions Estimator Worksheet

5/8/2020

Applicant/Business Name:	**Kaiser Permanente**
Project Name:	**Fresno Medical Office Development**
Project Location:	**Locust Avenue/First Street**
District Project ID No.:	

Project Construction Emissions

If applicant selected Construction Clean Fleet Mitigation Measure - Please select "Yes" from dropdown menu: No

			NOx					PM10					
Project Phase Name	ISR Phase	Construction Start Date	Unmitigated Baseline[1] (TPY)	Mitigated Baseline[2] (TPY)	Achieved On-site Reductions[3] (tons)	Required Off-site Reductions[4] (tons)	Emission Reductions Required by Rule[5]	Unmitigated Baseline[1] (TPY)	Mitigated Baseline[2] (TPY)	Achieved On-site Reductions[3] (tons)	Required Off-site Reductions[4] (tons)	Emission Reductions Required by Rule[5]
KP Fresno Medical Office	1	10/1/2020	3.2986	3.2986	0.0000	0.6597	0.6597	0.3822	0.3822	0.0000	0.1720	0.1720
	2				0.0000	0.0000	0.0000			0.0000	0.0000	0.0000
	3				0.0000	0.0000	0.0000			0.0000	0.0000	0.0000
	4				0.0000	0.0000	0.0000			0.0000	0.0000	0.0000
	5				0.0000	0.0000	0.0000			0.0000	0.0000	0.0000
	6				0.0000	0.0000	0.0000			0.0000	0.0000	0.0000
	7				0.0000	0.0000	0.0000			0.0000	0.0000	0.0000
	8				0.0000	0.0000	0.0000			0.0000	0.0000	0.0000
	9				0.0000	0.0000	0.0000			0.0000	0.0000	0.0000
	10				0.0000	0.0000	0.0000			0.0000	0.0000	0.0000
		Total	**3.2986**	**3.2986**	**0.0000**	**0.6597**	0.6597	**0.3822**	**0.3822**	**0.0000**	**0.1720**	0.1720

Total Achieved On-Site Reductions (tons)

ISR Phase	NOx	PM10
1	0.0000	0.0000
2	0.0000	0.0000
3	0.0000	0.0000
4	0.0000	0.0000
5	0.0000	0.0000
6	0.0000	0.0000
7	0.0000	0.0000
8	0.0000	0.0000
9	0.0000	0.0000
10	0.0000	0.0000
Total	**0.0000**	**0.0000**

Project Operations Emissions (Area + Mobile)

			NOx						PM10					
Project Phase Name	ISR Phase	Operation Start Date	Unmitigated Baseline[1] (TPY)	Mitigated Baseline[2] (TPY)	Achieved On-site Reductions[3] (tons)	Required Off-site Reductions[4] (tons)	Total Emission Reductions Required by Rule[6]	Average Annual Emission Reductions Required by Rule[7]	Unmitigated Baseline[1] (TPY)	Mitigated Baseline[2] (TPY)	Achieved On-site Reductions[3] (tons)	Required Off-site Reductions[4] (tons)	Total Emission Reductions Required by Rule[6]	Average Annual Emission Reductions Required by Rule[7]
KP Fresno Medical Office	1	1/1/2022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	2				0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
	3				0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
	4				0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
	5				0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
	6				0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
	7				0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
	8				0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
	9				0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
	10				0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
		Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Total Required Off-Site Reductions (tons)

ISR Phase	NOx	PM10
1	0.6597	0.1720
2	0.0000	0.0000
3	0.0000	0.0000
4	0.0000	0.0000
5	0.0000	0.0000
6	0.0000	0.0000
7	0.0000	0.0000
8	0.0000	0.0000
9	0.0000	0.0000
10	0.0000	0.0000
Total	**0.6597**	**0.1720**

Notes:

TPY: Tons Per Year

[1] **Unmitigated Baseline:** The project's baseline emissions generated with no on-site emission reduction measures.

[2] **Mitigated Baseline:** The project's baseline emissions generated after on-site emisison reduction measures have been applied.

[3] **Achieved On-site Reductions:** The project's emission reductions achieved after on-site emission reduction measures have been applied.

[4] **Required Off-site Reductions:** The project's remaining emission reductions required by Rule 9510 if on-site emission reduction measures did not achieive the required rule reductions.

[5] **Emission Reductions Required by Rule:** The project's emission reductions required (20% NOx and 45% PM10) for construction from the unmitigated baseline.

[6] **Total Emission Reductions Required by Rule:** The project's emission reductions required (33.3% NOx and 50% PM10) for operations from the unmitigated baseline over a 10-year period.

[7] **Average Annual Emission Reductions Required by Rule:** The project's total emission reduction for operations required by Rule 9510 divided by 10 years.

Fee Estimator Worksheet

5/8/2020

Applicant/Business Name:	**Kaiser Permanente**
Project Name:	**Fresno Medical Office Development**
Project Location:	**Locust Avenue/First Street**
District Project ID No.:	

NOTES:

(1) The start date for each ISR phase is shown in TABLE 1.
(2) If you have chosen a **ONE-TIME** payment for the project, then the total amount due for ALL PHASES is shown under TABLE 2.
(3) If you have chosen a **DEFERRED** payment schedule or would like to propose a **DEFERRED** payment schedule for the project, the total amount due for a specific year is shown in TABLE 3 according to the schedule in TABLE 1.
* If you have not provided a proposed payment date, the District sets a default invoice date of 60 days prior to start of the ISR phase.

If applicant selected Fee Deferral Schedule - Please select "Yes" from dropdown menu	Yes

TABLE 1 - PROJECT INFORMATION

Project Phase Name	ISR Phase	Start Date per Phase	Scheduled Payment Date*
0	1	10/1/20	1/1/2021
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
	10		
TOTAL (tons)			

TABLE 2 - No Fee Deferral Schedule (FDS)

Pollutant	Required Offsite Reductions (tons)
NOx	0.6597
PM10	0.1720
NOx	0.0000
PM10	0.0000
NOx	0.0000
PM10	0.0000
NOx	0.0000
PM10	0.0000
NOx	0.0000
PM10	0.0000
NOx	0.0000
PM10	0.0000
NOx	0.0000
PM10	0.0000
NOx	0.0000
PM10	0.0000
NOx	0.0000
PM10	0.0000
NOx	0.0000
PM10	0.0000
NOx	0.0000
PM10	0.0000
NOx	0.6597
PM10	0.1720

Offsite Fee by Pollutant ($)	NOx	$6,168
	PM10	$1,549
Administrative Fee ($)		$308.68
Offsite Fee ($)		$7,717.00
Total Project Offsite Fee ($)		$8,025.68

Rule 9510 Fee Schedule ($/ton)		
Year	Nox	PM10
2019 and Beyond	$9,350	$9,011

TABLE 2 - NO FDS

2017
0.6597
0.1720
0.0000
0.0000
0.0000
0.0000
0.0000
0.0000
0.0000
0.0000
0.0000
0.0000
0.0000
0.0000
0.0000
0.0000
0.0000
0.0000
0.0000
0.0000
0.0000
0.0000
0.0000
0.6597
0.1720

TABLE 3 - APPROVED FEE DEFERRAL SCHEDULE (FDS) BY PAYMENT YEAR

2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
					0.6597					
					0.1720					
0.0000	0.0000	0.0000	0.0000	0.0000	0.6597	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.1720	0.0000	0.0000	0.0000	0.0000	0.0000
$0	$0	$0	$0	$0	$6,168	$0	$0	$0	$0	$0
$0	$0	$0	$0	$0	$1,549	$0	$0	$0	$0	$0
$0.00	$0.00	$0.00	$0.00	$0.00	$308.68	$0.00	$0.00	$0.00	$0.00	$0.00
$0.00	$0.00	$0.00	$0.00	$0.00	$8,025.68	$0.00	$0.00	$0.00	$0.00	$0.00
					$8,025.68					

Appendix B
Biological Resources Assessment

853 LINCOLN WAY, SUITE 208
AUBURN, CALIFORNIA 95603
T 530.887.8500 F 530.887.1250

April 29, 2020 12664

Christopher Teng
Kaiser Foundation Health Plan, Inc.
1950 Franklin St., 12th Floor
Oakland, CA 94612-5190

Subject: ***Biological Resources Assessment for the Kaiser Medical Office Building Project in Fresno County, California***

Dear Mr. Teng:

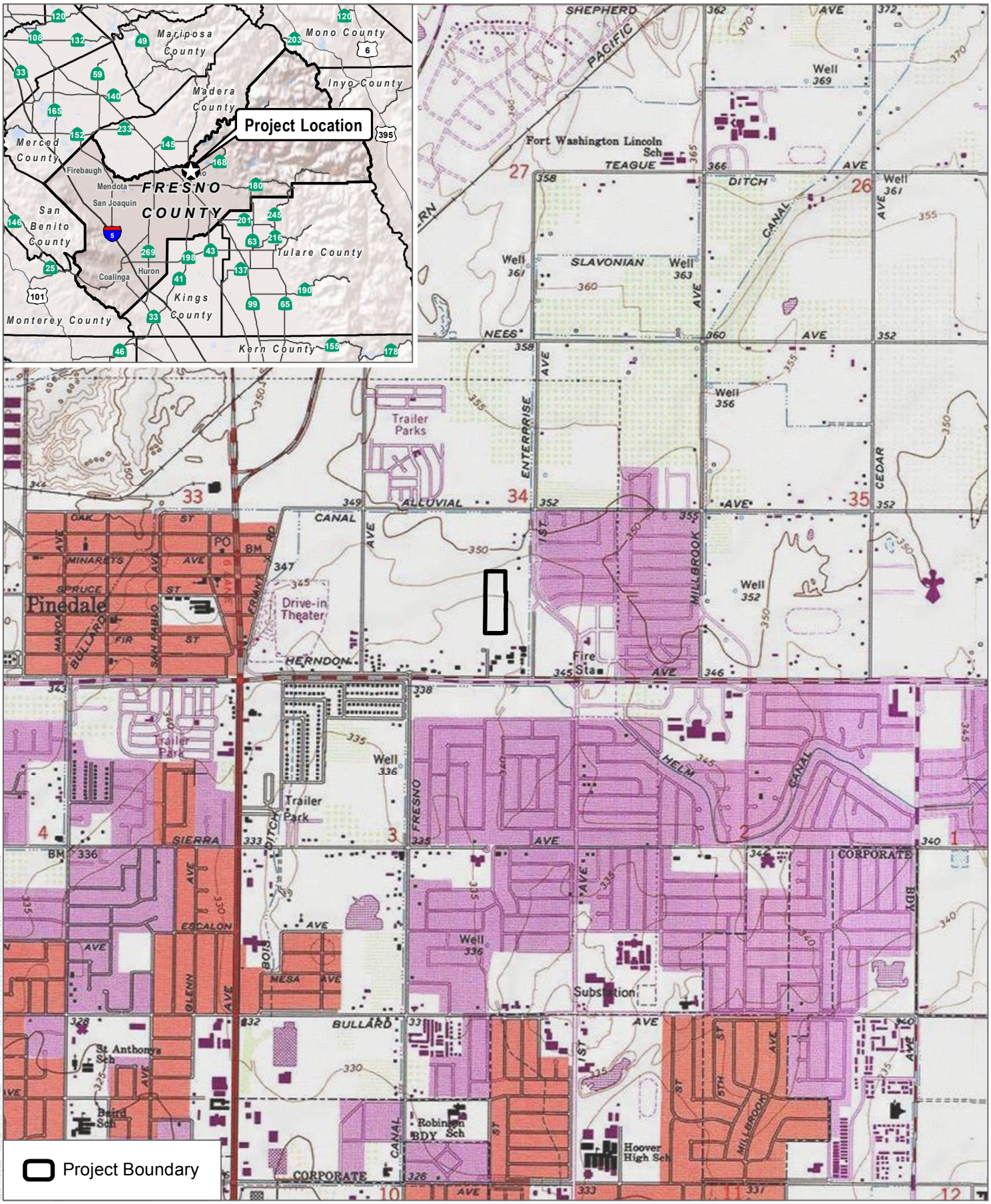
At the request of Kaiser Foundation Health Plan, Inc., Dudek conducted a biological resources assessment for the proposed Kaiser Medical Office Building Project (project) at Assessor's Parcel Numbers [APNs] 303-20-117 and 303-20-111) in Fresno, Fresno County, California. In April 2020, a Dudek biologist conducted a reconnaissance-level field survey to identify and describe existing biological conditions, including the presence of natural vegetation communities, aquatic resources (e.g., wetlands and other waters), sensitive habitats, and the potential for special-status plant and wildlife species to occur within the project site.

1 Project Site Location and Description

The project site is approximately seven acres of undeveloped land located northeast of the intersection of East Locust Avenue and Orchard Street in the City of Fresno (Figure 1, Project Location; Figure 2, Project Site). The project site is located in Section 34 of Township 12S and Range 20E of the Fresno North U.S. Geological Survey (USGS) 7.5-minute quadrangle. The approximate center of the project site corresponds to 36.840665 north latitude, and 119.77654 west longitude.

At the time of the field assessment, the project site consisted of undeveloped land with no buildings or other on-site structures. The project site contained mostly non-native grasses and forbs and appeared to be recently tilled. Landscaped trees and shrubs were located along the western and northern boundary, along with approximately 30 percent of the eastern boundary. East Locust Avenue bounds the site to the south and a portion of North Corporate Drive bounds the site to the east. A little league baseball park and detention basin are located to the west, a medical office complex is located to the north, to the northeast is a professional office complex that includes a number of dentists and optometrists, and undeveloped land similar to the project site is to the southeast.

The project site is located within San Joaquin Valley geographic subdivision of the California Floristic Province (Jepson Flora Project 2019). Topography is relatively flat with the exception of soil stockpiles within the southern half of the project site, with an average elevation of 345 feet above mean sea level. The region surrounding the project site receives approximately 11 inches of precipitation annually. Average minimum temperature is approximately 50 degrees Fahrenheit and average maximum temperature is approximately 77 degrees Fahrenheit (WRCC 2020).



SOURCE: USGS 7.5-Minute Series Fresno North Quadrangle

DUDEK

0 1,000 2,000 Feet

FIGURE 1

Project Location

Kaiser Fresno Project Biological Resources Assessment



SOURCE: Esri Clarity Basemap 2020, County of Fresno 2019

DUDEK

0 100 200 Feet

FIGURE 2

Project Site

Kaiser Fresno Project Biological Resources Assessment

2 Project Description

The proposed project at the time of report preparation involves the construction of a new approximately 147,000 square foot (sf) four-story medical office building), internal driveways, and a two-story staff parking structure located in the northern portion of the site. Surface parking will also be developed for Kaiser Permanente members in the southern portion of the site to accommodate up to 573 vehicles, which includes 25 accessible parking spaces and 37 electric vehicle charging stations. Vehicle access to the site would be from both East Locust Avenue and North Corporate Drive. It is assumed the entire approximately seven-acre project site would be developed with structures, paved surfaces, or landscaping.

3 Methods

3.1 Preliminary Project Site Evaluation

Special-status species present or potentially present in the project site were identified through a literature search using the following sources in April 2020: U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC), California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB) (CDFW 2020), and the California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants of California (see Attachment A, Database Queries). For this report, special-status plant and wildlife species are defined as those that are (1) listed, proposed for listing, or candidates for listing as Threatened or Endangered under the federal Endangered Species Act; (2) listed or candidates as Threatened or Endangered for listing under the California Endangered Species Act; (3) a state fully protected species; (4) a CDFW Species of Special Concern; or (5) a CNPS-listed species with a California Rare Plant Rank (CRPR) of 1 or 2.

Following a review of these resources, Dudek biologists determined the potential for special-status species to occur within the project site. Determinations were based on a review of habitat types, soils, and elevation preferences, as well as the known geographic range of each species. For example, if the project site is within the elevation range of a particular plant species, but a specific soil type for the species was not present, the species was determined to have "low potential to occur" on the project site. Species were considered "not expected to occur" when the project site was clearly outside the known geographic range of the species.

3.2 Field Reconnaissance

Dudek biologist Anna Godinho performed a field assessment of the project site on April 10, 2020 from 10:30 am to 12:30 pm. Weather during the field assessment was partly cloudy, with an ambient temperature of 60 degrees Fahrenheit. The field assessment included mapping vegetation communities and land cover types present in the project site, as well as assessing habitat for special-status species. The survey was conducted on foot to visually cover the entire project site. Field notes, an aerial photograph (Google Earth 2019) with an overlay of the property boundary, and the ESRI Collector app for iPhone 7 were used to map vegetation communities and record any sensitive biological resources while in the field. Representative project site photographs are included in Attachment B.

All plant species encountered during the field surveys were identified to the lowest taxonomic group possible and recorded directly into a field notebook. Nomenclature for all plant species observed on the project site follow The Jepson Manual, Vascular Plants of California, Second Edition (Jepson Flora Project 2019).

Wildlife species detected during the field surveys by sight, calls, tracks, scat, or other signs were recorded directly into a field notebook. The project site was scanned with and without binoculars to aid in the identification of wildlife. In addition to species actually detected during the surveys, expected wildlife use of the project site was determined by known habitat preferences of local species and knowledge of their relative distributions in the region.

3.3 Aquatic Resources Delineation

Ms. Godinho conducted an aquatic resources delineation on April 10 2020, with a follow up visit to evaluate soils on April 28, 2020. The purpose of the aquatic resources delineation was to determine whether any wetlands or other aquatic resources are present on the project site that would be subject to the jurisdiction of the United States Army Corps of Engineers (ACOE), CDFW, and/or the Regional Water Quality Control Board (RWQCB). The delineation was conducted according to the ACOE standards (ACOE 1987; ACOE 2008). The results of the delineation are incorporated into this letter report and the field datasheets are attached in Appendix C.

4 Results

Two terrestrial communities or land cover types and one aquatic cover type were mapped in the project site (Figure 3, Vegetation Communities and Land Cover Types). Table 1 provides a breakdown of the cover types present, and a detailed discussion of cover types in the project site is included below.

Table 1. Vegetation Communities and Land Cover Types within the Project Site

Macrogroup	Vegetation Community/ Land Cover Type	Acres
Terrestrial		
Herbaceous Semi-Natural Stands	Ruderal Grassland	6.449
Anthropogenic Land Cover	Developed	0.603
	Subtotal	*7.052*
Aquatic		
Seasonal Wetlands, Swales, and Seeps	Non-Jurisdictional Seasonally Ponded Feature	0.001
	Subtotal	*0.001*
	Total	**7.053**



SOURCE: Esri Clarity Basemap 2020, County of Fresno 2019

DUDEK

0 100 200 Feet

FIGURE 3

Vegetation Communities and Land Cover Types

Kaiser Fresno Project Biological Resources Assessment

4.1 Terrestrial Habitats

Ruderal Field. Most of the project site consisted of an undeveloped field dominated by annual, mostly non-native grasses and forbs indicative of disturbed areas. The field was characterized by loose, tilled soils, and soil stockpiles were present in the southern third of the project site. Aerial imagery shows evidence of regular ground-disturbing practices within the parcel, including tilling and moving of stockpiles. Vegetation was dominated by wild oats, annual bromes, Mediterranean grasses, upland mustards, and other ruderal forbs, including ripgut brome (*Bromus diandrus*), wild oat (*Avenua fatua*), wall barley (*Hordeum murinum*), cheeseweed (*Malva parviflora*), stork's bill (*Erodium* spp.), jointed charlock (*Raphanus raphistrum*), and common fiddleneck (*Amsinckia intermedia*). An area of light-colored sandy soil located in the southern half of the project site supported smooth cat's ear (*Hypochaeris glabra*), annual bur-sage (*Ambrosia acanthacarpa*), Valley popcornflower (*Plagiobothrys canescens*), and contorted sun cup (*Camissonia contorta)*, among non-native weedy dominants. Landscaped shrubs and trees were present along the northern and western boundaries of the project site, including ornamental cherry (*Prunus* sp.), Callery pear (*Pyrus calleryana*), wax-leaf privet (*Ligustrum japonicum*), tree-of-heaven (*Ailanthus altissima*), and Mexican fan palm (*Washingtonia filifera*) among others. Data point #2 (DP2) was taken within the ruderal field and no evidence of hydrophytic vegetation, hydric soils, or wetland hydrology were observed. A clay hardpan was present at a depth of six inches.

Developed. This land cover type is limited to developed areas that have been completely altered by human activities and contain little to no vegetation. A portion of a paved road, North Corporate Drive, is included in this cover type.

4.2 Non-Jurisdictional Seasonally Ponded Feature

Non-Jurisdictional Seasonally Ponded Feature. A small depression containing low-growing, hydrophytic vegetation was located within the northwestern corner of the project site. This feature supported toad rush (*Juncus bufonius*), knotweed (*Polygonum aviculare*), and Hyssop loosestrife (*Lythrum hyssopifolia*), which are wetland obligate or facultative wetland species. The depression may collect excess stormwater runoff from the adjacent parking lot, although a hydrologic connection (e.g. culvert, storm drain) was not observed. This feature did not contain surface water at the time of the field assessment and inundation was not visible on aerial imagery.

Data point #1 (DP1) was taken within the depression, where disturbed soils showed evidence of past discing in deep rows. Soils within the first eight inches had a Munsell color notation of 10YR 3/3, and soils below eight inches had redoximorphic concentrations of 5YR 4/6 within a matrix of 7.5YR 3/4. A clay hardpan was present at a depth of two inches. Indicators of hydric soils or wetland hydrology were absent. As such, this feature would not be subject to the jurisdiction of ACOE, CDFW, and/or RWQCB.

4.3 Plant and Wildlife Species Observed

Common grasses and forbs indicative of disturbed areas were observed in the project site during the field assessment, none of which were special-status plant species (Section 4.4). Eleven non special-status bird species were detected within the project site, including house sparrow (*Passer domesticus*), house finch (*Haemorhous mexicanus*), European starling (*Sturnus vulgaris*), western kingbird (*Tyrannus verticalis*), white-crowned sparrow (*Zonotrichia leucophrys*), American goldfinch (*Spinus tristis*), mourning dove (*Zenaida macroura*), California scrub

jay (*Aphelocoma californica*), northern mockingbird (*Mimus polyglottos*), and cliff swallow (*Petrochelidon pyrrhonota*). A Canada goose (*Branta canadensis*) was incubating an active nest within the project site. Approximately six California ground squirrel (*Otospermophilus beecheyi*) burrows making up one burrow complex were observed within the northern half of the project site.

4.4 Special-Status Plant and Wildlife Species

Special-Status Plant Species

Results of the CNDDB and CNPS searches revealed 13 special-status plant species as present or potentially present in the project site or vicinity. All of these species are considered absent from the project site due to past and ongoing disturbance, the absence of suitable habitat, and/or the project site being situated outside of the elevational range of the species. These species are identified in Table 2, but are not addressed further in this report.

Table 2. Special-Status Plant Species with Potential to Occur in the Project Site

Species	Common Name	Status (Federal/State)	Habitat	Determination
Calycadenia hooveri	Hoover's calycadenia	None/None/1B.3	Cismontane woodland, Valley and foothill grassland; rocky/annual herb/July–Sep/210–985	**Not expected to occur.** Suitable habitat for this species is absent from the project site. Any suitable habitat that may have been present has been eliminated by intensive human use.
Castilleja campestris var. *succulenta*	succulent owl's-clover	FT/SE/1B.2	Vernal pools (often acidic)/annual herb (hemiparasitic)/(Mar) Apr–May/160–2,460	**Not expected to occur.** Suitable vernal pool habitat is absent from the project site. Any suitable habitat that may have been present has been eliminated by intensive human use.
Caulanthus californicus	California jewelflower	FE/SE/1B.1	Chenopod scrub, Pinyon and juniper woodland, Valley and foothill grassland; sandy/annual herb/Feb–May/200–3,280	**Not expected to occur.** Suitable habitat for this species is absent from the project site. Any suitable habitat that may have been present has been eliminated by intensive human use. A historical occurrence of this species was mapped generally to the vicinity of Fresno, however this population is considered extirpated due to habitat in the vicinity being eliminated by urbanization and agriculture (CDFW 2020a).

Table 2. Special-Status Plant Species with Potential to Occur in the Project Site

Species	Common Name	Status (Federal/State)	Habitat	Determination
Downingia pusilla	dwarf downingia	None/None/2B.2	Valley and foothill grassland (mesic), Vernal pools/annual herb/Mar–May/0–1,455	**Not expected to occur.** Suitable vernal pool habitat is absent from the project site. Any suitable habitat that may have been present has been eliminated by intensive human use.
Eryngium spinosepalum	spiny-sepaled button-celery	None/None/1B.2	Valley and foothill grassland, Vernal pools/annual / perennial herb/Apr–June/260–3,195	**Not expected to occur.** Suitable vernal pool habitat is absent from the project site. Any suitable habitat that may have been present has been eliminated by intensive human use.
Imperata brevifolia	California satintail	None/None/2B.1	Chaparral, Coastal scrub, Mojavean desert scrub, Meadows and seeps (often alkali), Riparian scrub; mesic/perennial rhizomatous herb/Sep–May/0–3,985	**Not expected to occur.** Suitable habitat is absent from the project site. Any suitable habitat that may have been present has been eliminated by intensive human use. An 1893 collection of this species was mapped generally to the vicinity of Fresno (CDFW 2020a), however suitable habitat has since been eliminated by urbanization and agriculture.
Layia munzii	Munz's tidy-tips	None/None/1B.2	Chenopod scrub, Valley and foothill grassland (alkaline clay)/annual herb/Mar–Apr/490–2,295	**Not expected to occur.** Suitable habitat for this species is absent from the project site. Any suitable habitat that may have been present has been eliminated by intensive human use.
Leptosiphon serrulatus	Madera leptosiphon	None/None/1B.2	Cismontane woodland, Lower montane coniferous forest/annual herb/Apr–May/980–4,265	**Not expected to occur.** The project site is outside of the elevational range of this species.
Orcuttia inaequalis	San Joaquin Valley Orcutt grass	FT/SE/1B.1	Vernal pools/annual herb/Apr–Sep/30–2,475	**Not expected to occur.** Suitable habitat for this species is absent from the project site. Any suitable habitat that may have been present has been eliminated by intensive human

Table 2. Special-Status Plant Species with Potential to Occur in the Project Site

Species	Common Name	Status (Federal/State)	Habitat	Determination
				use. This species was documented less than one mile northwest of the project site in 1927, however this population is considered extirpated due to the conversion of the habitat to urban development (CDFW 2020a).
Orcuttia pilosa	hairy Orcutt grass	FE/SE/1B.1	Vernal pools/annual herb/May–Sep/150–655	**Not expected to occur.** Suitable vernal pool habitat is absent from the project site. Any suitable habitat that may have been present has been eliminated by intensive human use.
Pseudobahia bahiifolia	Hartweg's golden sunburst	FE/SE/1B.1	Cismontane woodland, Valley and foothill grassland; clay, often acidic/annual herb/Mar–Apr/45–490	**Not expected to occur.** Suitable habitat for this species is absent from the project site. Any suitable habitat that may have been present has been eliminated by intensive human use.
Sagittaria sanfordii	Sanford's arrowhead	None/None/1B.2	Marshes and swamps (assorted shallow freshwater)/perennial rhizomatous herb (emergent)/May–Oct(Nov)/0–2,130	**Not expected to occur.** Suitable aquatic habitat for this species absent from the project site.
Tropidocarpum capparideum	caper-fruited tropidocarpum	None/None/1B.1	Valley and foothill grassland (alkaline hills)/annual herb/Mar–Apr/0–1,490	**Not expected to occur.** Suitable habitat for this species is absent from the project site. Any suitable habitat that may have been present has been eliminated by intensive human use. A 1930 collection of this species was mapped generally to the vicinity of Fresno (CDFW 2020a), however suitable habitat has since been eliminated by urbanization and agriculture.
Tuctoria greenei	Greene's tuctoria	FE/SR/1B.1	Vernal pools/annual herb/May–July(Sep)/95–3,510	**Not expected to occur.** Suitable vernal pool habitat is absent from the project site. Any suitable habitat that may have

Table 2. Special-Status Plant Species with Potential to Occur in the Project Site

Species	Common Name	Status (Federal/State)	Habitat	Determination
				been present has been eliminated by intensive human use.

[1] **Status Legend:** CRPR 1B: Plants Rare, Threatened, or Endangered in California and Elsewhere; CRPR 2B: Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere; .1 Seriously threatened in California (over 80% of occurrences threatened/high degree and immediacy of threat); .2 Moderately threatened in California (20–80% occurrences threatened/moderate degree and immediacy of threat); .3 Not very threatened in California (less than 20% of occurrences threatened / low degree and immediacy of threat or no current threats known).

Special-Status Wildlife Species

Results of the CNDDB and USFWS IPaC database queries revealed 24 special-status wildlife species as present or potentially present in the project site or vicinity. Of these, 18 species are not expected to occur in the project site or vicinity due to a lack of potential habitat or the area being outside of the species' known range; these species are identified in Table 3, but not addressed further. The remaining six special-status wildlife species have a low to moderate potential to occur in the project site and are discussed further below. Table 3 summarizes the special-status wildlife evaluated for the project site.

Table 3. Special-Status Wildlife Species with Potential to Occur in the Project Site

Species	Common Name	Status (Federal/State)	Habitat	Determination
Fish				
Hypomesus transpacificus	Delta smelt	FT/SE	Sacramento–San Joaquin Delta; seasonally in Suisun Bay, Carquinez Strait, and San Pablo Bay	**Not expected to occur.** The project site is located outside of the species known geographic range.
Mylopharodon conocephalus	hardhead	None/SSC	Low- to mid-elevation streams in the Sacramento–San Joaquin drainage; also present in the Russian River	**Not expected to occur.** Suitable aquatic habitat for this species is absent from the project site.
Amphibians				
Ambystoma californiense	California tiger salamander (CTS)	FT/ST, WL	Annual grassland, valley–foothill hardwood, and valley–foothill riparian habitats; vernal pools, other ephemeral pools, and (uncommonly) along stream courses and man-made pools if predatory fishes are absent	**Not expected to occur.** Although the project site contains California ground squirrel burrows structurally suitable for CTS aestivation, this species would not be expected to breed on-site due to past and current land use practices and the project site's isolation from suitable natural lands. The nearest wetland features within which CTS could potentially breed are located in undeveloped pastureland approximately five miles to the northeast, separated from the project site by urban development of Fresno and Clovis. Two occurrences have been documented within one mile of the project site, however these sites are considered extirpated (CDFW 2020a).
Rana draytonii	California red-legged frog	FT/SSC	Lowland streams, wetlands, riparian woodlands, livestock ponds; dense, shrubby or emergent vegetation associated with deep, still or slow-moving water; uses adjacent uplands	**Not expected to occur.** The project site is located outside of the species known geographic range.
Spea hammondii	western spadefoot	None/SSC	Primarily grassland and vernal pools, but also in ephemeral wetlands that persist at least 3 weeks in chaparral, coastal	**Not expected to occur.** Although the project site contains rodent burrows structurally suitable for aestivation, this species would not be expected to breed on-site due to past and current land use practices and the project site's isolation from suitable natural lands. The nearest

Table 3. Special-Status Wildlife Species with Potential to Occur in the Project Site

Species	Common Name	Status (Federal/State)	Habitat	Determination
			scrub, valley–foothill woodlands, pastures, and other agriculture	wetland features within which this species could potentially breed are separated from the project site by the urban development of Fresno and Clovis.
Reptiles				
Actinemys marmorata	northwestern pond turtle	None/SSC	Slow-moving permanent or intermittent streams, ponds, small lakes, and reservoirs with emergent basking sites; adjacent uplands used for nesting and during winter	**Not expected to occur.** Suitable aquatic habitat is absent from the project site and adjacent lands.
Anniella pulchra	Northern California legless lizard	None/SSC	Coastal dunes, stabilized dunes, beaches, dry washes, valley–foothill, chaparral, and scrubs; pine, oak, and riparian woodlands; associated with sparse vegetation and sandy or loose, loamy soils	**Not expected to occur.** Any suitable habitat that may have been present has been eliminated by intensive human use.
Arizona elegans occidentalis	California glossy snake	None/SSC	Commonly occurs in desert regions throughout southern California. Prefers open sandy areas with scattered brush. Also found in rocky areas.	**Not expected to occur.** The project site is outside of the known geographic range of this species.
Gambelia sila	blunt-nosed leopard lizard	FE/FP, SE	Sparsely vegetated alkali and desert scrubs, including semi-arid grasslands, alkali flats, and washes	**Not expected to occur.** Any suitable habitat that may have been present has been eliminated by intensive human use.
Phrynosoma blainvillii	Blainville's (coast) horned lizard	None/SSC	Open areas of sandy soil in valleys, foothills, and semi-arid mountains including coastal scrub, chaparral, valley–foothill hardwood, conifer, riparian, pine–cypress, juniper, and annual grassland habitats	**Not expected to occur.** Any suitable habitat that may have been present has been eliminated by intensive human use.

Table 3. Special-Status Wildlife Species with Potential to Occur in the Project Site

Species	Common Name	Status (Federal/State)	Habitat	Determination
Thamnophis gigas	giant garter snake	FT/ST	Freshwater marsh habitat and low-gradient streams; also uses canals and irrigation ditches	**Not expected to occur.** Suitable aquatic habitat for this species is absent from the project site.
Birds				
Agelaius tricolor (nesting colony)	tricolored blackbird	BCC/SSC, ST	Nests near freshwater, emergent wetland with cattails or tules, but also in Himalayan blackberrry; forages in grasslands, woodland, and agriculture	**Moderate potential to occur.** This species may occasionally forage within the ruderal field of the project site but nesting habitat is absent. The CNDDB lists three occurrences of this species within the 9-quad search area; two of them are considered extirpated due to loss of habitat. The closest extant nesting occurrence was documented within small ponds east and north of CSU Fresno, approximately two miles southeast of the project site in 1975 (CDFW 2020a).
Athene cunicularia (burrow sites & some wintering sites)	burrowing owl	BCC/SSC	Nests and forages in grassland, open scrub, and agriculture, particularly with ground squirrel burrows	**Low potential to occur.** Burrowing owls are not known from the near vicinity, which is heavily influenced by urban development. The closest known occurrence of this species is approximately 4.5 miles southwest of the project site in a field at the Fresno International Airport, where burrowing owls were sighted between 1980 and 1990, but not since (CDFW 2020a). Although California ground squirrel burrows potentially suitable for burrowing owl occupation were observed within the project site, the regular intensive disturbance of the project site and lack of detections in the vicinity suggest a low probability for occurrence on the site.
Buteo swainsoni (nesting)	Swainson's hawk	BCC/ST	Nests in open woodland and savanna, riparian, and in isolated large trees; forages in nearby grasslands and agricultural areas such as wheat and alfalfa fields and pasture	**Low potential to occur.** This species could theoretically nest in the landscaped trees adjacent to the project site, and forage in the project site's ruderal field. However, this species is uncommon in the vicinity. The closest known nesting occurrence was mapped generally to the Fresno area in 1936 (CDFW 2020a).
Coccyzus americanus occidentalis (nesting)	western yellow-billed cuckoo	FT, BCC/SE	Nests in dense, wide riparian woodlands and forest with well-developed understories	**Not expected to occur.** This species has been extirpated from the vicinity of the project site.

Table 3. Special-Status Wildlife Species with Potential to Occur in the Project Site

Species	Common Name	Status (Federal/State)	Habitat	Determination
Vireo bellii pusillus (nesting)	least Bell's vireo	FE/SE	Nests and forages in low, dense riparian thickets along water or along dry parts of intermittent streams; forages in riparian and adjacent shrubland late in nesting season	**Not expected to occur.** Suitable riparian habitat for this species is absent from the project site and adjacent lands. The closest known occurrence of this species is located approximately three miles southeast of the project site from 1906; this population is considered extirpated (CDFW 2020a).
Mammals				
Antrozous pallidus	pallid bat	None/SSC	Grasslands, shrublands, woodlands, forests; most common in open, dry habitats with rocky outcrops for roosting, but also roosts in man-made structures and trees	**Moderate potential to occur.** The project site provides suitable foraging habitat for this species. Roosting habitat is absent from the project site.
Dipodomys nitratoides exilis	Fresno kangaroo rat	FE/SE	Alkali sink/open grassland habitats; sands and saline sandy soils in chenopod scrub	**Not expected to occur.** The Study area does not provide suitable habitat for this species, and no known populations of this species remain in Fresno County. The closest known occurrence, historical or modern, is located approximately five miles southwest of the project site from 1898; this population is considered extirpated (CDFW 2020a).
Euderma maculatum	spotted bat	None/SSC	Foothills, mountains, desert regions of southern California, including arid deserts, grasslands, and mixed-conifer forests; roosts in rock crevices and cliffs; feeds over water and along washes	**Moderate potential to occur.** The project site provides suitable foraging habitat for this species. Roosting habitat is absent from the project site.
Taxidea taxus	American badger	None/SSC	Dry, open, treeless areas; grasslands, coastal scrub, agriculture, and pastures, especially with friable soils	**Not expected to occur.** The highly disturbed habitats of the project site are marginal, at best, for this species, and the project site is situated in a matrix of land uses that are generally incompatible with badger ecology. The closest known occurrence was documented approximately six miles southeast of the project site in a residential area in Clovis in 1987 (CDFW 2020a); however, badgers do not typically occur in urban environments.

Table 3. Special-Status Wildlife Species with Potential to Occur in the Project Site

Species	Common Name	Status (Federal/State)	Habitat	Determination
Vulpes macrotis mutica	San Joaquin kit fox	FE/ST	Grasslands and scrublands, including those that have been modified; oak woodland, alkali sink scrubland, vernal pool, and alkali meadow	**Low potential to occur.** The highly disturbed habitats of the project site are marginal, at best, for this species, and the project site is situated in a mosaic of land uses that are generally incompatible with kit fox ecology. Moreover, there are no known natural occurrence of the SJKF in the project vicinity, historical or modern. The CNDDB lists only two occurrences of this species within the 9-quad search area. One was recorded approximately seven miles west of the project site in rural Fresno in 1993. The other was recorded in Friant in the early 1990's, a sighting that has since been characterized by the observer as representing a kit fox that had been domesticated and transported from another part of the state (CDFW 2020a).
Invertebrates				
Bombus crotchii	Crotch bumble bee	None/CE	Open grassland and scrub communities supporting suitable floral resources.	**Not expected to occur.** Although the project site is located within the historic geographic range of this species, the ruderal field provides only marginal foraging habitat due to past and current land use practices and the project site's isolation from suitable natural lands. The closest known occurrence was mapped generally to the Fresno area in 1899 (CDFW 2020a).
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	FT/None	Occurs only in the Central Valley of California, in association with blue elderberry (Sambucus nigra ssp. caerulea)	**Not expected to occur.** The project site is outside of the current known range of this species.
Crustaceans				
Branchinecta lynchi	vernal pool fairy shrimp	FT/None	Vernal pools, seasonally ponded areas within vernal swales, and ephemeral freshwater habitats	**Not expected to occur.** Suitable vernal pool habitat for this species is absent from the project site.

Tricolored blackbird (*Agelaius tricolor*). Tricolored blackbird is a state threatened species with a moderate potential to occur in the project site. This species nests colonially near freshwater wetlands with emergent vegetation, Himalayan blackberry thickets, and increasingly in grain fields, and forages in grasslands, woodland, and agriculture. may occasionally forage within the project site but nesting habitat is absent. The CNDDB lists three occurrences of this species within the 9-quad search area; two of them are considered extirpated due to loss of habitat. The closest extant nesting occurrence was documented within small ponds east and north of CSU Fresno, approximately two miles southeast of the project site in 1975 (CDFW 2020a). The project site provides potential foraging habitat for this species, although the regular disking and other human disturbance likely limits its habitat value.

Burrowing owl (*Athene cunicularia*). The burrowing owl is a state species of special concern with a low potential to occur in the project site. Burrowing owls are not known from the near vicinity, which is heavily influenced by urban development. The closest known occurrence of this species is approximately 4.5 miles southwest of the project site in a field at the Fresno International Airport, where burrowing owls were sighted between 1980 and 1990, but not since (CDFW 2020a). Although California ground squirrel burrows potentially suitable for burrowing owl occupation were observed within the project site, regular disturbance of the project site and lack of detections in the vicinity suggest a low probability for occurrence on the site. No evidence of occupation or sign of this species (i.e. whitewash, pellets, feathers) was observed during the field survey.

Swainson's hawk (*Buteo swainsoni*). The Swainson's hawk is a state threatened species with a low potential to occur in the project site. This species nests in open woodland and savanna, riparian, and in isolated large trees, and forages in nearby grasslands and agricultural areas such as wheat and alfalfa fields and pasture. Nesting habitat is absent from the project site. This species could theoretically nest in the adjacent landscaped trees and forage in the project site's ruderal lands. However, this species is uncommon in the project vicinity. The closest known nesting occurrence was mapped generally to the Fresno area in 1936 (CDFW 2020a).

Pallid bat (*Antrozous pallidus*). The pallid bat is a state species of special concern with a moderate potential to occur in the project site. This species occurs in grasslands, shrublands, woodlands, and forests. It is most common in open, dry habitats with rocky outcrops for roosting, but also roosts in man-made structures and trees. The closest known occurrence of this species was documented approximately 10 miles south of the project site in 1909 (CDFW 2020a). The project site provides potential foraging habitat for this species. Roosting habitat is absent from the project site. This species could theoretically roost in the adjacent landscaped trees and forage across the project site.

Spotted bat (*Euderma maculatum*). The spotted bat is a state species of special concern with a moderate potential to occur in the project site. This species occurs in the foothills, mountains, and desert regions of southern California, including arid deserts, grasslands, and mixed-conifer forests. It roosts in rock crevices and cliffs and feeds over open habitats including water and along washes. The closest known occurrence of this species was documented approximately 12 miles northeast of the project site in 1970 (CDFW 2020a). The project site provides potential foraging habitat for this species. Roosting habitat is absent from the project site.

San Joaquin kit fox (*Vulpes macrotis mutica*). San Joaquin kit fox is a federally endangered and state threatened species with a low potential to occur in the project site. The highly disturbed habitats of the project site are marginal, at best, for this species, and the project site is situated in a mosaic of developed land uses that are generally

incompatible with kit fox ecology. Moreover, there are no known natural occurrence of San Joaquin kit fox in the project vicinity, historical or modern. The CNDDB lists only two occurrences of this species within the 9-quad search area. One was recorded approximately seven miles west of the project site in rural Fresno in 1993. The other was recorded in Friant in the early 1990's, a sighting that is now characterized by CDFW as a kit fox that was domesticated and transported from another part of the state (CDFW 2020a). The project site is situated over 100 miles from the nearest kit fox core population in the Ciervo-Panoche region, further reducing the likelihood of kit fox occurrence on site.

5 Preliminary CEQA Checklist for Biological Resources

The City of Fresno adopted its current General Plan on December 18, 2014 and certified a Master Environmental Impact Report (EIR) for the General Plan (State Clearinghouse Number 2012111015) (the "General Plan EIR"). The proposed Kaiser Permanente Medical Office Building (MOB Project) would be located within the "Office" use designation under the General Plan, which permits professional and medical offices up to a maximum floor area ratio of 2.0. The MOB Project is a permitted use and proposes a floor area ratio of approximately 0.47 (assuming 145,000 square feet of development on the 7.1 acre site), so it is consistent with the General Plan's use and density regulations.

Public Resources Code Section 21083.3 and California Environmental Quality Act (CEQA) Guidelines Section 15183 provide that proposed projects that are consistent with a "community plan" (including the General Plan) for which an EIR was certified is exempt from CEQA, "except as might be necessary to examine whether there are project-specific significant effects which are peculiar to the Project or its site." CEQA Guidelines Section 15183(c) specifies that "if an impact is not peculiar to the parcel or to the proposed Project, has been addressed as a significant effect in the prior EIR, or can be substantially mitigated by the imposition of uniformly applied development policies or standards…, then an EIR need not be prepared for the project solely on the basis of that impact."

In other words, projects consistent with the General Plan are exempt from subsequent CEQA review unless they would result in project-specific impacts. If a project's impacts are within the universe of effects previously covered in the General Plan EIR, or if they can be reduced to a less than significant level through the imposition of uniformly applied development standards (such as General Plan policies, zoning requirements, General Plan EIR mitigation measures, or standards from other plans), no new CEQA document (e.g., a Mitigated Negative Declaration or and EIR) is required.

Pursuant to CEQA Guidelines Section 15183, the analysis included in this report can be used by the City of Fresno to determine if the MOB Project would result in project-specific effects peculiar to the MOB Project or its site that differ from those impacts already analyzed and disclosed in the General Plan EIR. As discussed within this report, the analysis provides substantial evidence in support of the conclusion that the MOB Project would not result in any significant impacts that: (1) are peculiar to the MOB Project or its site; (2) were not identified as significant in the General Plan EIR; or (3) were previously identified significant effects but that would have a substantial increase in severity as compared to the General Plan EIR.

Analysis of Impacts to Biological Resources in the General Plan EIR

The General Plan EIR identified several General Plan policies that would avoid, minimize and offset impacts to biological resources from buildout of the General Plan. The coarse vegetation mapping used for the General Plan EIR identified the project site as being Urban land cover. Based on the description of this land cover in the General Plan EIR (p. 5.4-9), this mapping is not applicable to the project site: "constructed upon or otherwise covered with a permanent, unnatural surface (e.g., concrete, asphalt, buildings, homes, etc.) or large amount of debris or other materials." The project site better matches the General Plan EIR Annual Grassland land cover type: "a mix of native and non-native, annual grasses, which often occur in association with ruderal herbs and occasional native annual forbs." The General Plan EIR noted the potential for occurrence of each of the wildlife species analyzed in this report: Swainson's hawk, tricolored blackbird, burrowing owl, San Joaquin kit fox, pallid bat, and spotted bat. The impact analysis of the General Plan EIR concluded that "Development within the Planning Area could result in the loss or degradation of natural habitats such as annual grassland, oak woodland, lacustrine, riverine, and pasture, which may support special-status plant and wildlife species. Project-related impacts to any of these habitat types may result in a substantial adverse effect, if it is determined that a special-status species will be impacted, either directly or through habitat modifications" (p. 5.4-31). The General Plan EIR also identified a significant cumulative impact to biological resources from the further urbanization of the San Joaquin Valley study area (p. 5.4-33).

The MOB Project is consistent with the General Plan and would be required to comply with Mitigation Measures BIO-1 through BIO-9, as well as applicable state and federal laws related to protection of species, wetlands, and waters. As shown by this study, the MOB Project specific impacts would be less than significant with adherence to these uniform standards, and therefore the MOB Project would not result in any new significant effects or increase the severity of previously identified environmental effects related to biological resources as compared with the General Plan EIR.

Preliminary Analysis of Impacts to Biological Resources Specific to the Proposed Project

Dudek provides the following preliminary analysis of impacts to demonstrate that the impacts associated with project development are consistent with the impacts analyzed in the General Plan EIR.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
IV. BIOLOGICAL RESOURCES – Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☐	☒
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☐	☒
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

a) Thirteen special-status plant species have been documented in the project vicinity (see Table 2). All of these species are not expected to occur in the project site due to past and ongoing disturbance, the absence of suitable habitat, and/or the project site's being situated outside of the elevational range of the species.

Twenty-four special-status wildlife species have been documented in the project vicinity (see Table 3). Of these, 18 of these species are not expected to occur within the project site due to past and ongoing disturbance of the

project site, the absence of suitable habitat, and/or the project site's being situated outside of the species' known geographic distribution. The remaining six species have a low to moderate likelihood of occurrence within the project site. Two of these special-status species, the tricolored blackbird and spotted bat may occasionally forage across the project site but would not nest or roost on site, and the project site provides only marginal foraging habitat at most for these species. These species are highly mobile while foraging and would not be disturbed by future project-related activities.

Evidence of burrowing owl and San Joaquin kit fox occupation of the project site was not observed during the field survey. However, if these species were to move onto the site at some point in the future, they could be vulnerable to construction-related mortality. Swainson's hawks are uncommon in the project vicinity. However, in the event that a pair is nesting adjacent to the project site, they may be disturbed by future project-related activities such that they would abandon their nest(s). Bat species including pallid bat have the potential to roost in the trees that surround a portion of the site.

Similarly, a variety of native birds have the potential to nest on or adjacent to the project site. Killdeer, mourning doves, and Canada geese (observed) all have the potential to nest in ground vegetation within the ruderal lands of the project site. The adjacent office buildings and landscaped trees and shrubs could be used by a number of common species, including northern mockingbirds, black phoebes, and western kingbirds. If birds were to nest on or adjacent to the project site, future project-related activities could result in the abandonment of active nests or direct mortality to birds.

b) There are no riparian areas or sensitive natural communities located within the project site. Therefore, the proposed project would have no impact to these resources.

c) There are no state- or federally-protected wetlands located within the project site. Therefore, the proposed project would have no impact to these resources.

d) Wildlife corridors are linear and/or regional habitats that provide connectivity to other natural vegetation communities within a landscape fractured by urbanization and other development. There is existing development surrounding the project site, which would not allow for easy travel, migration, or breeding within the site. The project site does not function as a wildlife corridor and does not support any wildlife nursery sites. Thus, there would be no impact to wildlife corridors or wildlife nursery sites.

e) The project does not include removal of any street trees, heritage trees, or trees on the City's Special Trees List. Therefore, the project would not conflict with local policies or ordinances protecting trees. No impact would occur.

f) The project site is not located with an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan area. Therefore, no impact would occur.

6 Recommended Mitigation Measures

Mitigation measures BIO-1 through BIO-9 in the General Plan EIR were identified to avoid, minimize, and mitigate impacts to special status species. These measures are necessarily general in nature, and point to projects to provide more specificity on particular surveys or avoidance measures that might be taken to protect biological resources on a project site. Dudek recommends the following clarifications to the General Plan EIR measures to ensure that potential impacts to special status species are avoided, minimized, and mitigated.

1. *Swainson's Hawk.* If feasible, future project-related activities are recommended to occur outside of the Swainson's hawk nesting season, typically defined as March 1 to September 15. If future project-related activities must occur during the nesting season, pre-activity surveys for nesting Swainson's hawks on and within 0.5 miles of the project site shall be conducted by a biologists experienced in habitat requirements, life history, and survey techniques for this species. Should any active nests be discovered, an appropriate disturbance-free buffer shall be established by a qualified biologist and observed until the young have fledged.

2. *Nesting Bird Species*. If construction is proposed during the breeding season (February 1 through August 30), a preconstruction nesting bird survey shall be conducted at the project site (plus a 250-foot buffer for raptors) by a qualified biologist 14 days prior to the beginning of construction activities. If no active nests are found during the preconstruction survey, no further mitigation is required. If any active nests are found within 250-feet of the project alignment, a temporary buffer shall be determined and flagged by the qualified biologist based on the location of the nest and planned construction activity in the vicinity of the nest. These nests shall be avoided until the chicks have fledged and the nests are no longer active, as determined by the qualified biologist.

3. *San Joaquin Kit-Fox.* This survey can be conducted in association with the survey for western burrowing owl described below. Conduct pre-construction surveys for San Joaquin kit fox according to USFWS's Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance (2011). The pre-construction surveys for the San Joaquin kit fox will focus on identifying suitable dens. Pre-construction surveys would be conducted by a biologist experienced with the identification of kit fox dens, as well as life history and habitat requirements of the species within 30 days, but no less than 14 days, before the start of construction or ground-disturbing activities. If no suitable dens are discovered, no further action is necessary. If a natal/pupping den is discovered within the project area or within 200-feet of the project boundary, the USFWS shall be immediately notified and under no circumstances should the den be disturbed or destroyed without prior authorization. If the pre-construction survey reveals an active natal pupping or new information, the project applicant shall contact the USFWS immediately to obtain the necessary take authorization/permit.

4. *Western Burrowing Owl.* A qualified biologist shall conduct take avoidance surveys for burrowing owl within 14 days prior to ground-disturbing activities at the project site, consistent with Appendix D of the Staff Report on Burrowing Owl Mitigation (CDFW 2012). The survey shall cover the limits of ground disturbance and potentially suitable nesting habitat within 300 feet, to the extent feasible. If ground-disturbing activities are delayed by more than 7 days, then an additional survey shall be conducted within 24 hours prior to ground disturbance. If no potential burrowing owl nests are detected during the take avoidance surveys, no additional actions are needed, and ground-disturbing activities may proceed. If non-nesting burrowing owls are observed in or adjacent to the construction footprint during the survey, construction shall be postponed until the qualified biologist can fully implement a California Department of Fish and Wildlife-approved burrow exclusion plan (to be prepared by

the qualified biologist). The exclusion plan shall be conducted in accordance with the Staff Report on Burrowing Owl Mitigation (CDFW 2012). Once owls have been successfully excluded and unoccupied burrows evacuated, construction in the area may proceed. If nesting burrowing owls are observed during the survey, construction activities within 300 feet of occupied burrows shall be delayed until young owls have fledged and are independent of the burrow, as determined by a qualified biologist. The qualified biologist may reduce the 300-foot buffer based on the type, timing, extent, and intensity of the construction activity and other factors such as site topography and vegetation cover between the construction activity and the burrow. Once all young have fledged and are no longer dependent upon the nest burrow, the same burrow exclusion procedure described above shall be implemented prior to resuming construction activities in the area.

5. *Roosting Bat Species*. A qualified biologist familiar with native and special-status bats of California and their ecology, identification, and habitat requirements, conduct a survey for bat roosts within 14 days prior to project-related activities. The survey should include a visual inspection of potential roosting features (bats need not be present) and presence of guano within 50 feet of the project site. Potential roosting features found during the survey should be flagged or marked. If bats (individuals or colonies) are detected, CDFW would be notified immediately. If a bat roosting or maternity colony cannot be completely avoided, a qualified biologist would prepare a bat mitigation and monitoring plan for CDFW review and approval.

If you have any questions or concerns regarding the content of this letter report, please contact me at 916.865.6131 or agodinho@dudek.com.

Sincerely,

Anna Godinho
Biologist

Att.: *Figure 1 – Project Location*
Figure 2 – Project Site
Figure 3 – Vegetation Communities and Land Cover Types
Attachment A, Database Queries
Attachment B, Representative Photographs of the Study Area
Attachment C, Aquatic Resource Data Sheet

7 References Cited

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Attachment A

Database Queries

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (Fresno North (3611977) OR Fresno South (3611967) OR Herndon (3611978) OR Gregg (3611988) OR Lanes Bridge (3611987) OR Friant (3611986) OR Clovis (3611976) OR Kearney Park (3611968) OR Malaga (3611966))

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Agelaius tricolor tricolored blackbird	ABPBXB0020	None	Threatened	G2G3	S1S2	SSC
Ambystoma californiense California tiger salamander	AAAAA01180	Threatened	Threatened	G2G3	S2S3	WL
Anniella pulchra northern California legless lizard	ARACC01020	None	None	G3	S3	SSC
Antrozous pallidus pallid bat	AMACC10010	None	None	G5	S3	SSC
Ardea alba great egret	ABNGA04040	None	None	G5	S4	
Arizona elegans occidentalis California glossy snake	ARADB01017	None	None	G5T2	S2	SSC
Athene cunicularia burrowing owl	ABNSB10010	None	None	G4	S3	SSC
Bombus crotchii Crotch bumble bee	IIHYM24480	None	Candidate Endangered	G3G4	S1S2	
Branchinecta lynchi vernal pool fairy shrimp	ICBRA03030	Threatened	None	G3	S3	
Branchinecta mesovallensis midvalley fairy shrimp	ICBRA03150	None	None	G2	S2S3	
Buteo swainsoni Swainson's hawk	ABNKC19070	None	Threatened	G5	S3	
Calycadenia hooveri Hoover's calycadenia	PDAST1P040	None	None	G2	S2	1B.3
Castilleja campestris var. succulenta succulent owl's-clover	PDSCR0D3Z1	Threatened	Endangered	G4?T2T3	S2S3	1B.2
Caulanthus californicus California jewelflower	PDBRA31010	Endangered	Endangered	G1	S1	1B.1
Coccyzus americanus occidentalis western yellow-billed cuckoo	ABNRB02022	Threatened	Endangered	G5T2T3	S1	
Desmocerus californicus dimorphus valley elderberry longhorn beetle	IICOL48011	Threatened	None	G3T2	S2	
Dipodomys nitratoides exilis Fresno kangaroo rat	AMAFD03151	Endangered	Endangered	G3TH	SH	
Downingia pusilla dwarf downingia	PDCAM060C0	None	None	GU	S2	2B.2
Efferia antiochi Antioch efferian robberfly	IIDIP07010	None	None	G1G2	S1S2	

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Egretta thula snowy egret	ABNGA06030	None	None	G5	S4	
Emys marmorata western pond turtle	ARAAD02030	None	None	G3G4	S3	SSC
Eremophila alpestris actia California horned lark	ABPAT02011	None	None	G5T4Q	S4	WL
Eryngium spinosepalum spiny-sepaled button-celery	PDAPI0Z0Y0	None	None	G2	S2	1B.2
Euderma maculatum spotted bat	AMACC07010	None	None	G4	S3	SSC
Eumops perotis californicus western mastiff bat	AMACD02011	None	None	G5T4	S3S4	SSC
Great Valley Mixed Riparian Forest Great Valley Mixed Riparian Forest	CTT61420CA	None	None	G2	S2.2	
Imperata brevifolia California satintail	PMPOA3D020	None	None	G4	S3	2B.1
Lasiurus cinereus hoary bat	AMACC05030	None	None	G5	S4	
Layia munzii Munz's tidy-tips	PDAST5N0B0	None	None	G2	S2	1B.2
Leptosiphon serrulatus Madera leptosiphon	PDPLM09130	None	None	G3	S3	1B.2
Linderiella occidentalis California linderiella	ICBRA06010	None	None	G2G3	S2S3	
Lytta moesta moestan blister beetle	IICOL4C020	None	None	G2	S2	
Lytta molesta molestan blister beetle	IICOL4C030	None	None	G2	S2	
Metapogon hurdi Hurd's metapogon robberfly	IIDIP08010	None	None	G1G2	S1S2	
Mylopharodon conocephalus hardhead	AFCJB25010	None	None	G3	S3	SSC
Northern Claypan Vernal Pool Northern Claypan Vernal Pool	CTT44120CA	None	None	G1	S1.1	
Northern Hardpan Vernal Pool Northern Hardpan Vernal Pool	CTT44110CA	None	None	G3	S3.1	
Nycticorax nycticorax black-crowned night heron	ABNGA11010	None	None	G5	S4	
Orcuttia inaequalis San Joaquin Valley Orcutt grass	PMPOA4G060	Threatened	Endangered	G1	S1	1B.1
Orcuttia pilosa hairy Orcutt grass	PMPOA4G040	Endangered	Endangered	G1	S1	1B.1

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Perognathus inornatus San Joaquin Pocket Mouse	AMAFD01060	None	None	G2G3	S2S3	
Phalacrocorax auritus double-crested cormorant	ABNFD01020	None	None	G5	S4	WL
Phrynosoma blainvillii coast horned lizard	ARACF12100	None	None	G3G4	S3S4	SSC
Pseudobahia bahiifolia Hartweg's golden sunburst	PDAST7P010	Endangered	Endangered	G1	S1	1B.1
Sagittaria sanfordii Sanford's arrowhead	PMALI040Q0	None	None	G3	S3	1B.2
Spea hammondii western spadefoot	AAABF02020	None	None	G3	S3	SSC
Sycamore Alluvial Woodland Sycamore Alluvial Woodland	CTT62100CA	None	None	G1	S1.1	
Taxidea taxus American badger	AMAJF04010	None	None	G5	S3	SSC
Tropidocarpum capparideum caper-fruited tropidocarpum	PDBRA2R010	None	None	G1	S1	1B.1
Tuctoria greenei Greene's tuctoria	PMPOA6N010	Endangered	Rare	G1	S1	1B.1
Vireo bellii pusillus least Bell's vireo	ABPBW01114	Endangered	Endangered	G5T2	S2	
Vulpes macrotis mutica San Joaquin kit fox	AMAJA03041	Endangered	Threatened	G4T2	S2	

Record Count: 52

CNPS California Native Plant Society

*The database used to provide updates to the Online Inventory is under construction. View updates and changes made since May 2019 here.

Plant List

14 matches found. *Click on scientific name for details*

Search Criteria

Found in Quads 3611988, 3611987, 3611986, 3611978, 3611977, 3611976, 3611968 3611967 and 3611966;

Modify Search Criteria | Export to Excel | Modify Columns | Modify Sort | Display Photos

Scientific Name	Common Name	Family	Lifeform	Blooming Period	CA Rare Plant Rank	State Rank	Global Rank
Calycadenia hooveri	Hoover's calycadenia	Asteraceae	annual herb	Jul-Sep	1B.3	S2	G2
Castilleja campestris var. succulenta	succulent owl's-clover	Orobanchaceae	annual herb (hemiparasitic)	(Mar)Apr-May	1B.2	S2S3	G4? T2T3
Caulanthus californicus	California jewelflower	Brassicaceae	annual herb	Feb-May	1B.1	S1	G1
Delphinium hansenii ssp. ewanianum	Ewan's larkspur	Ranunculaceae	perennial herb	Mar-May	4.2	S3	G4T3
Downingia pusilla	dwarf downingia	Campanulaceae	annual herb	Mar-May	2B.2	S2	GU
Eryngium spinosepalum	spiny-sepaled button-celery	Apiaceae	annual / perennial herb	Apr-Jun	1B.2	S2	G2
Imperata brevifolia	California satintail	Poaceae	perennial rhizomatous herb	Sep-May	2B.1	S3	G4
Leptosiphon serrulatus	Madera leptosiphon	Polemoniaceae	annual herb	Apr-May	1B.2	S3	G3
Orcuttia inaequalis	San Joaquin Valley Orcutt grass	Poaceae	annual herb	Apr-Sep	1B.1	S1	G1
Orcuttia pilosa	hairy Orcutt grass	Poaceae	annual herb	May-Sep	1B.1	S1	G1
Pseudobahia bahiifolia	Hartweg's golden sunburst	Asteraceae	annual herb	Mar-Apr	1B.1	S2	G2
Sagittaria sanfordii	Sanford's arrowhead	Alismataceae	perennial rhizomatous herb (emergent)	May-Oct(Nov)	1B.2	S3	G3
Tropidocarpum capparideum	caper-fruited tropidocarpum	Brassicaceae	annual herb	Mar-Apr	1B.1	S1	G1
Tuctoria greenei	Greene's tuctoria	Poaceae	annual herb	May-Jul(Sep)	1B.1	S1	G1

Suggested Citation

California Native Plant Society, Rare Plant Program. 2020. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Website http://www.rareplants.cnps.org [accessed 09 April 2020].

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IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

NOT FOR CONSULTATION

Location

Fresno County, California



Local office

Sacramento Fish And Wildlife Office

(916) 414-6600
(916) 414-6713

Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

NOT FOR CONSULTATION

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

Fresno Kangaroo Rat Dipodomys nitratoides exilis — Endangered
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/5150

San Joaquin Kit Fox Vulpes macrotis mutica — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/2873

Reptiles

NAME	STATUS
Blunt-nosed Leopard Lizard Gambelia silus No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/625	Endangered
Giant Garter Snake Thamnophis gigas No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4482	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog Rana draytonii There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/2891	Threatened
California Tiger Salamander Ambystoma californiense There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/2076	Threatened

Fishes

NAME	STATUS
Delta Smelt Hypomesus transpacificus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/321	Threatened

Crustaceans

NAME	STATUS

NOT FOR CONSULTATION

Vernal Pool Fairy Shrimp Branchinecta lynchi There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/498	Threatened

Flowering Plants

NAME	STATUS
Fleshy Owl's-clover Castilleja campestris ssp. succulenta There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/8095	Threatened
San Joaquin Orcutt Grass Orcuttia inaequalis There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/5506	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

NOT FOR CONSULTATION

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php

- Nationwide conservation measures for birds
  http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NOT FOR CONSULTATION

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Jan 1 to Aug 31
Burrowing Owl Athene cunicularia This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9737	Breeds Mar 15 to Aug 31
California Thrasher Toxostoma redivivum This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jan 1 to Jul 31

Clark's Grebe Aechmophorus clarkii — Breeds Jan 1 to Dec 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Common Yellowthroat Geothlypis trichas sinuosa — Breeds May 20 to Jul 31
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/2084

Costa's Hummingbird Calypte costae — Breeds Jan 15 to Jun 10
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9470

Golden Eagle Aquila chrysaetos — Breeds Jan 1 to Aug 31
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1680

Lawrence's Goldfinch Carduelis lawrencei — Breeds Mar 20 to Sep 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9464

Lewis's Woodpecker Melanerpes lewis — Breeds Apr 20 to Sep 30
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9408

Long-billed Curlew Numenius americanus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/5511

Nuttall's Woodpecker Picoides nuttallii — Breeds Apr 1 to Jul 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9410

Oak Titmouse Baeolophus inornatus — Breeds Mar 15 to Jul 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9656

NOT FOR CONSULTATION

Rufous Hummingbird selasphorus rufus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8002	Breeds elsewhere
Short-billed Dowitcher Limnodromus griseus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Song Sparrow Melospiza melodia This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Feb 20 to Sep 5
Spotted Towhee Pipilo maculatus clementae This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/4243	Breeds Apr 15 to Jul 20
Tricolored Blackbird Agelaius tricolor This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3910	Breeds Mar 15 to Aug 10
Wrentit Chamaea fasciata This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 10

NOT FOR CONSULTATION

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that

week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

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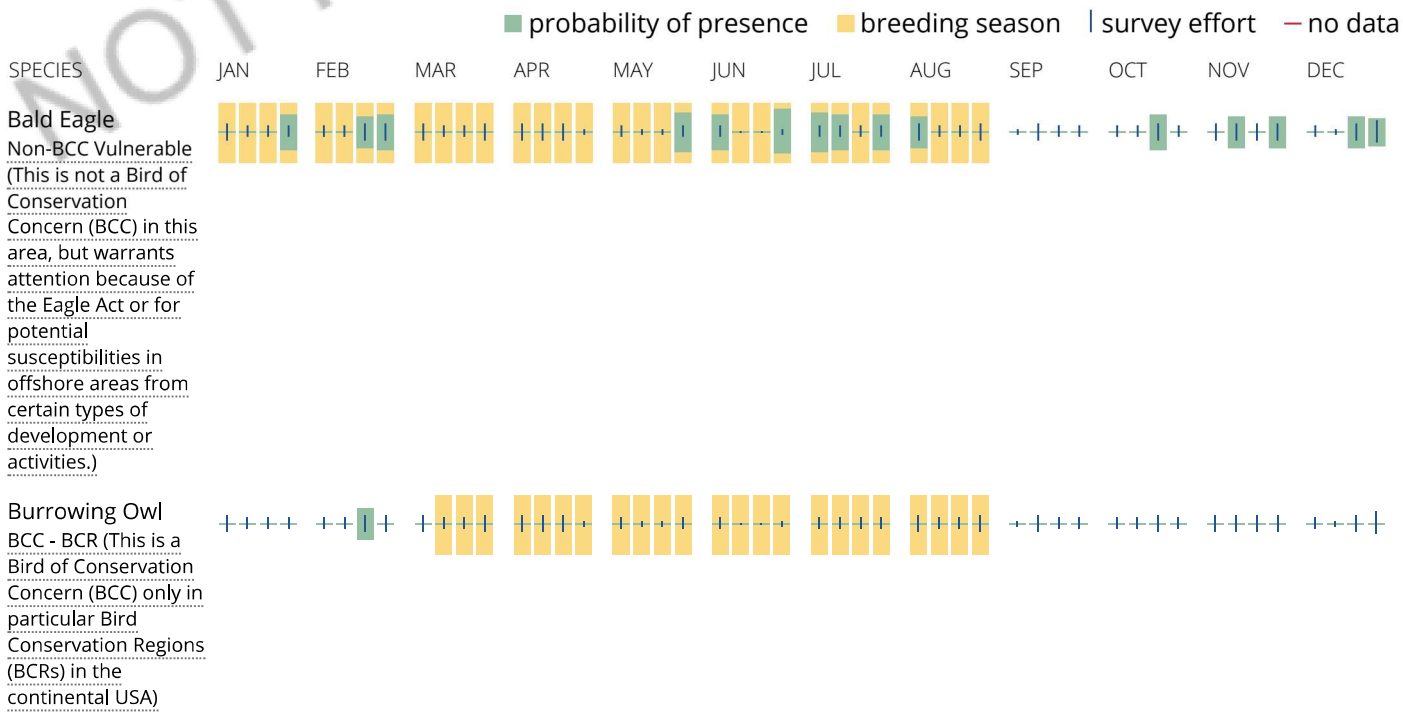
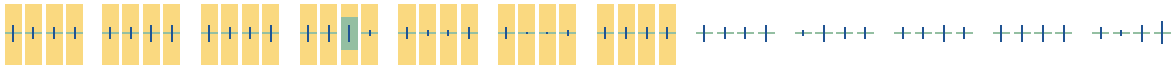
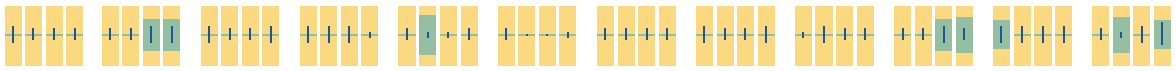


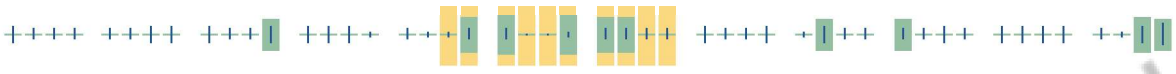
California Thrasher
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Clark's Grebe
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



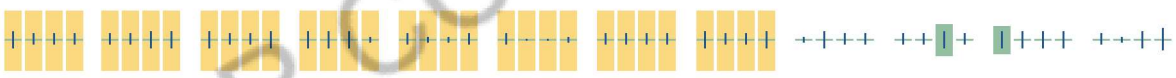
Common Yellowthroat
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



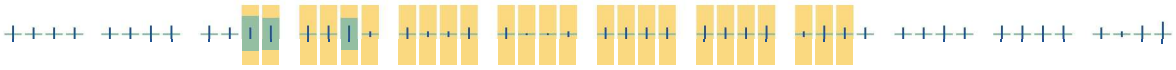
Costa's Hummingbird
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



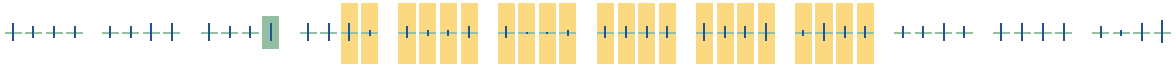
Golden Eagle
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



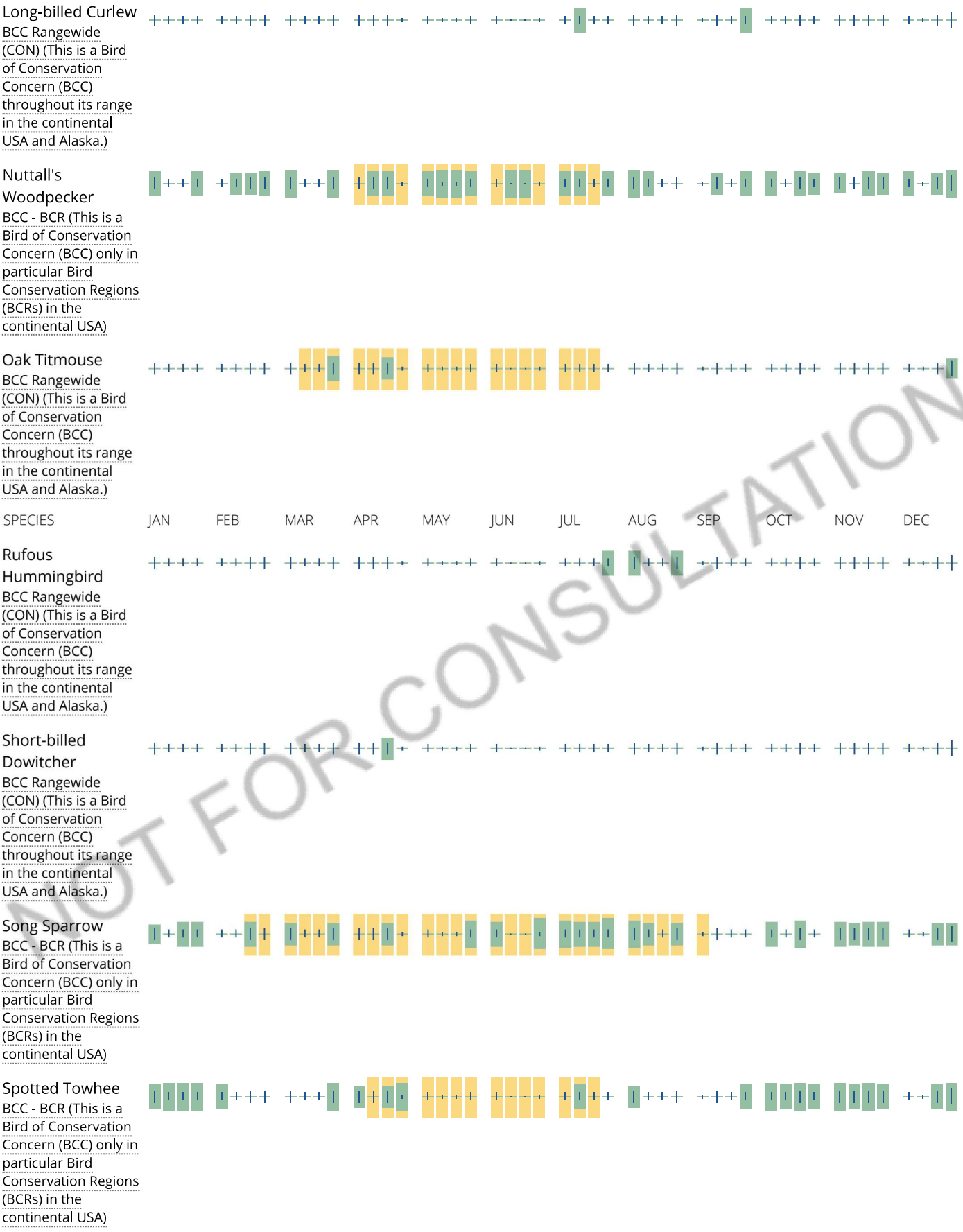
Lawrence's Goldfinch
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Lewis's Woodpecker
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



NOT FOR CONSULTATION



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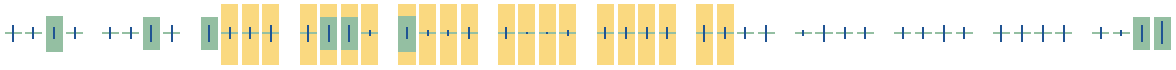
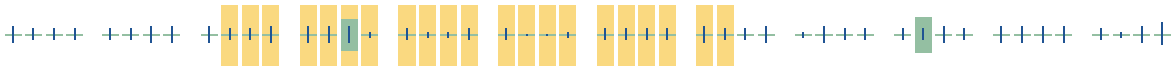
Tricolored Blackbird
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Wrentit
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

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To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the “no data” indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to

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confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

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THERE ARE NO KNOWN WETLANDS AT THIS LOCATION.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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Attachment B

Representative Photographs of the Study Area



Looking south at the ruderal lands of the Study Area.



Small area of wetland vegetation in the northeastern corner of the Study Area.



Looking north at the soil stockpiles and light-colored sandy soil of the Study Area.



Developed portion of the Study Area.

Attachment C

Aquatic Resources Data Sheet

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Kaiser Medical Office Building Project City/County: Fresno County Sampling Date: 4/28/2020

Applicant/Owner: Kaiser Foundation Health Plan, Inc. State: CA Sampling Point: DP1

Investigator(s): A. Godinho Section, Township, Range: S34, T12S, R20E

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): none Slope (%): 0

Subregion (LRR): C - Mediterranean California Lat: 36°50'31.10"N Long: 119°46'34.64"W Datum: UTM Zone 1

Soil Map Unit Name: San Joaquin loam, 0 to 3 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No ____ (If no, explain in Remarks.)

Are Vegetation ✔, Soil ✔, or Hydrology ✔ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No ✔
Hydric Soil Present?	Yes ____	No ✔	
Wetland Hydrology Present?	Yes ____	No ✔	

Remarks:

Pit taken in seasonally ponded area (<.001-ac.) supporting hydrophytic vegetation within a ruderal field. Field has experienced historical ground disturbance (i.e. discing).

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 1m^2)			
1. Juncus bufonius	47.5	Y	FACW
2. Polygonum aviculare	10	N	FAC
3. Lythrum hyssopifolia	10	N	OBL
4. Malva parviflora	2.5	N	UPL
5. Avena fatua	5	N	UPL
6. Lactuca serriola	5	N	FACU
7. Bromus diandrus	5	N	UPL
8.			
	85	= Total Cover	
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 15 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

✔ Dominance Test is >50%

____ Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✔ No ____

Remarks:

SOIL

Sampling Point: DP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/3	100					SC	
8-12	7.5YR 3/4	50	5YR 4/6	50	C	M	C	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Clay hardpan

Depth (inches): 2

Hydric Soil Present? Yes ☐ No ✔

Remarks:

Used pick to break up soil, difficult to dig; deep rows from past discing.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ✔ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ✔ Depth (inches): _____

Water Table Present? Yes ☐ No ✔ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ✔ Depth (inches): _____

Wetland Hydrology Present? Yes ☐ No ✔

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Feature may be supported by stormwater runoff from parking lot to the north, although no direct drainage (e.g., culvert, storm drain) observed. Not visible on aerial imagery.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Kaiser Medical Office Building Project City/County: Fresno County Sampling Date: 4/28/2020

Applicant/Owner: Kaiser Foundation Health Plan, Inc. State: CA Sampling Point: DP2

Investigator(s): A. Godinho Section, Township, Range: S34, T12S, R20E

Landform (hillslope, terrace, etc.): fan remnant Local relief (concave, convex, none): none Slope (%): 0

Subregion (LRR): C - Mediterranean California Lat: 36°50'30.77"N Long: 119°46'34.43"W Datum: UTM Zone 1

Soil Map Unit Name: San Joaquin loam, 0 to 3 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No ____ (If no, explain in Remarks.)

Are Vegetation ✔, Soil ✔, or Hydrology ✔ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✔	**Is the Sampled Area within a Wetland?** Yes ____ No ✔
Hydric Soil Present?	Yes ____	No ✔	
Wetland Hydrology Present?	Yes ____	No ✔	

Remarks:

Pit taken southeast of DP1 within ruderal field

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 1m^2)			
1. Bromus diandrus	80	Y	UPL
2. Hordeum murinum	15	N	FACU
3. Lactuca serriola	5	N	FACU
4.			
5.			
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	20	x 4 =	80
UPL species	80	x 5 =	400
Column Totals:	100 (A)		480 (B)

Prevalence Index = B/A = 4.8

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✔

Remarks:

SOIL

Sampling Point: DP2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/3	100					SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: clay hardpan

Depth (inches): 6

Hydric Soil Present? Yes ___ No ✔

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✔ Depth (inches): ___

Water Table Present? Yes ___ No ✔ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ✔ Depth (inches): ___

Wetland Hydrology Present? Yes ___ No ✔

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Appendix C
Cultural Resources Records Search Memorandum

1630 SAN PABLO AVENUE, SUITE 300
OAKLAND, CALIFORNIA 94612
T 510.601.2500 F 510.601.2501

April 20, 2020

Christopher Teng
Kaiser Foundation Health Plan, Inc.
1950 Franklin St., 12th Floor
Oakland, CA 94612-5190

Subject: ***Cultural Resources Records Search for the Proposed Medical Office BuildingProject, City of Fresno, California***

DearMr. Teng:

This letter report documents the cultural resources records search of the California Historical Resources Information System (CHRIS) at the Southern San Joaquin Valley Information Center (SSJVIC) for the for the Proposed Medical Office Building project (Project) in the City of Fresno. The Project proposes to construct a medical office building and parking garage on an undeveloped 7-acre parcel in the City of Fresno along N. Corporate Drive and E. Locust Avenue (APN 303-20-117 and 303-20-111). The Project is located in Section 34 of Township 12 South, Range 20 East, of the Fresno North, California 7.5' USGS Quadrangle map. The Project site is flat and lies approximately 345 above mean sea level.

BACKGROUND RESEARCH

Cultural Records Search Results

A records search was completed for the Project site and a 1/2-mile radius by SSJVIC staff at CSU Bakersfield on April 13, 2020 (Confidential Appendix A). This search included a review of their collection of mapped prehistoric, historical, and built-environment resources, Department of Parks and Recreation (DPR) Site Records, technical reports, historical maps, and local inventories. Additional consulted sources included the NRHP, California Inventory of Historical Resources/CRHR and listed Office of Historic Preservation Archaeological Determinations of Eligibility, California Points of Historical Interest, and California Historical Landmarks.

Previously Conducted Studies

SSJVIC records indicate that 10 previous cultural resources technical investigations have been conducted within 1/2-mile of the Project site (Table 1). Of these studies, six include the Project site. These six studies are all large regional studies and do not specifically address the Project site.

Table 1.
Previous Technical Studies

Report Number	Date	Title	Author
Reports within the Project Site			
FR-00357	1981	Archaeological Overview and Locational Analysis of the Fresno Area	Crist, Michael K. and Varner, Dudley M.
FR-00641	1977	The Distribution of Aboriginal Occupational Sites in Fresno County, California	Peck, Billy J.
FR-01156	1968	A Proposal for an Archaeological Element in the Fresno County, General Plan	Unknown
FR-01162	1990	A Summary of the Present Archaeological Resources of Fresno County	Stuart, David R.
FR-02380	2009	Cultural Resources Sensitivity Study and Research Design for the San Joaquin River Restoration Program, Fresno, Madera, Merced, and Stanislaus Counties, California	Byrd, Brian F., Wee, Stephen, and Costello, Julia
FR-02701	2011	Archaeological Survey Report for the California High Speed Train Fresno to Bakersfield Section	Greenwald, Alexandra
Reports within the 1/2-Mile Search Site			
FR-00384	1980	Archaeological Reconnaissance for the Riverpark Properties, Fresno County, California	Cursi, Kathleen L. and Varner, Dudley M.
FR-00398	1983	Archaeological and Historical Survey for Fresno Street Widening - West Bullard t West Herndon Avenue - An Interim Capacity Project	Granskog, Jane
FR-00577	1980	Archaeological Survey Report for a Proposed Extension of Route 41; 06-Fre-41, 29.5/33.02; 06100-025650	O'Connor, Denise
FR-01685	2000	Cultural Resources Assessment of the Pacific Bell Site, CV-604-02, and Pinedale Site, City of Fresno, Fresno County, California	Peak, Melinda A.

Previously Identified Cultural Resources

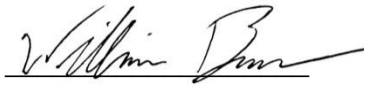
SSJVIC records indicate that no archaeological or built-environment resources are on file within or adjacent to the Project site. One resource (P-10-005934) was on file within the ½-mile records search area (Table 2). P-10-005934 is a historic canal located east of the Project site. It was found to be ineligible for listing in the National Register of Historic Places (NRHP) by the Federal Highway Administration in 2018.

Table 2.
Previously Recorded Cultural Resources

Primary Number	Trinomial	Period	Name	Type	NRHP/CRHR Status
Resources within the Project Site					
None					
Resources within the 1/2-Mile Search Site					
P-10-005934	CA-FRE-003564H	Historic	Enterprise Canal	Canal	6Y: Ineligible

If you have any questions about this report, please contact me at wburns@dudek.com.

Respectfully submitted,



William Burns, MSc, RPA

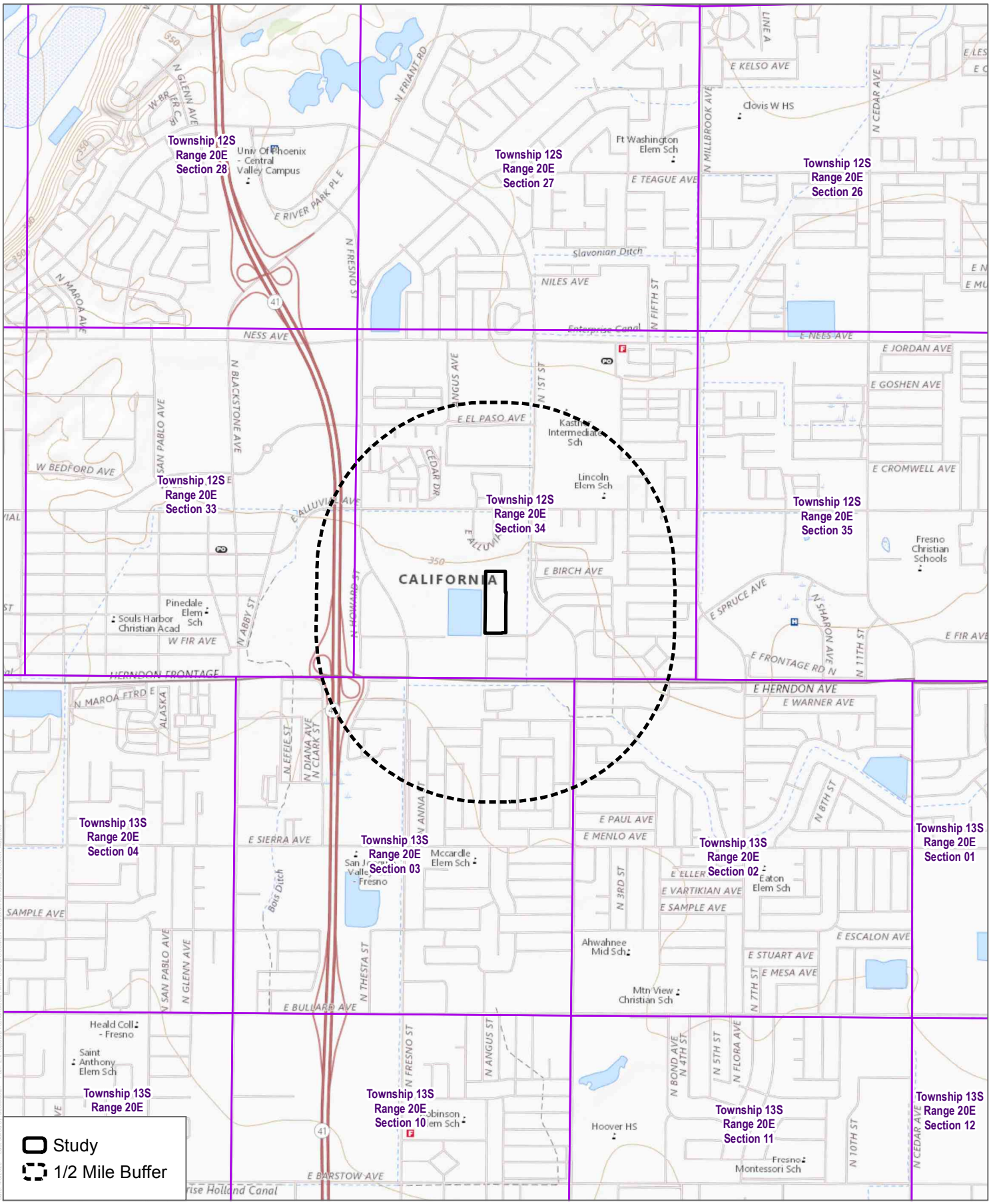
cc: *Adam Giacinto, Dudek*
Christine Kronenberg, Dudek

Att: *Appendix A: SSJVIC Records Search Results - Confidential*

APPENDIX A

CONFIDENTIAL

SSJVIC Records Search Results



SOURCE: USGS 7.5-Minute Series Fresno North Quadrangle

DUDEK

0 1,000 2,000 Feet
0 285 570 Meters
1:24,000

Records Search

Fresno Kaiser Project

California Historical Resources Information System



Fresno
Kern
Kings
Madera
Tulare

Southern San Joaquin Valley Information Center
California State University, Bakersfield
Mail Stop: 72 DOB
9001 Stockdale Highway
Bakersfield, California 93311-1022
(661) 654-2289
E-mail: ssjvic@csub.edu
Website: www.csub.edu/ssjvic

4/13/2020

William Burns
Dudek
1630 San Pablo Avenue, Suite 300
Oakland, CA 94612

Re: Kaiser Fresno, Dudek #12664
Records Search File No.: 20-153

The Southern San Joaquin Valley Information Center received your record search request for the project area referenced above, located on the Fresno North USGS 7.5' quad. The following reflects the results of the records search for the project area and the 0.5 mile radius:

As indicated on the data request form, the locations of resources and reports are provided in the following format: ☒ custom GIS maps ☐ shapefiles

Resources within project area:	None
Resources within 0.5 mile radius:	P-10-005934
Reports within project area:	FR-00357, 00641, 01156, 01162, 02380, 02701
Reports within 0.5 mile radius:	FR-00384, 00398, 00577, 01685

Resource Database Printout (list):	☒ enclosed	☐ not requested	☐ nothing listed
Resource Database Printout (details):	☐ enclosed	☒ not requested	☐ nothing listed
Resource Digital Database Records:	☒ enclosed	☐ not requested	☐ nothing listed
Report Database Printout (list):	☒ enclosed	☐ not requested	☐ nothing listed
Report Database Printout (details):	☐ enclosed	☒ not requested	☐ nothing listed
Report Digital Database Records:	☒ enclosed	☐ not requested	☐ nothing listed
Resource Record Copies:	☒ enclosed	☐ not requested	☐ nothing listed
Report Copies:	☐ enclosed	☒ not requested	☐ nothing listed
OHP Built Environment Resources Directory:	☒ enclosed	☐ not requested	☐ nothing listed
Archaeological Determinations of Eligibility:	☐ enclosed	☐ not requested	☒ nothing listed
CA Inventory of Historic Resources (1976):	☐ enclosed	☐ not requested	☒ nothing listed

Caltrans Bridge Survey: Not available at SSJVIC; please see http://www.dot.ca.gov/hq/structur/strmaint/historic.htm

Ethnographic Information: Not available at SSJVIC

Historical Literature: Not available at SSJVIC

Historical Maps: Not available at SSJVIC; please see http://historicalmaps.arcgis.com/usgs/

Local Inventories: Not available at SSJVIC

GLO and/or Rancho Plat Maps: Not available at SSJVIC; please see http://www.glorecords.blm.gov/search/default.aspx#searchTabIndex=0&searchByTypeIndex=1 and/or http://www.oac.cdlib.org/view?docId=hb8489p15p;developer=local;style=oac4;doc.view=items

Shipwreck Inventory: Not available at SSJVIC; please see http://www.slc.ca.gov/Info/Shipwrecks.html

Soil Survey Maps: Not available at SSJVIC; please see http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

Please forward a copy of any resulting reports from this project to the office as soon as possible. Due to the sensitive nature of archaeological site location data, we ask that you do not include resource location maps and resource location descriptions in your report if the report is for public distribution. If you have any questions regarding the results presented herein, please contact the office at the phone number listed above.

The provision of CHRIS Data via this records search response does not in any way constitute public disclosure of records otherwise exempt from disclosure under the California Public Records Act or any other law, including, but not limited to, records related to archeological site information maintained by or on behalf of, or in the possession of, the State of California, Department of Parks and Recreation, State Historic Preservation Officer, Office of Historic Preservation, or the State Historical Resources Commission.

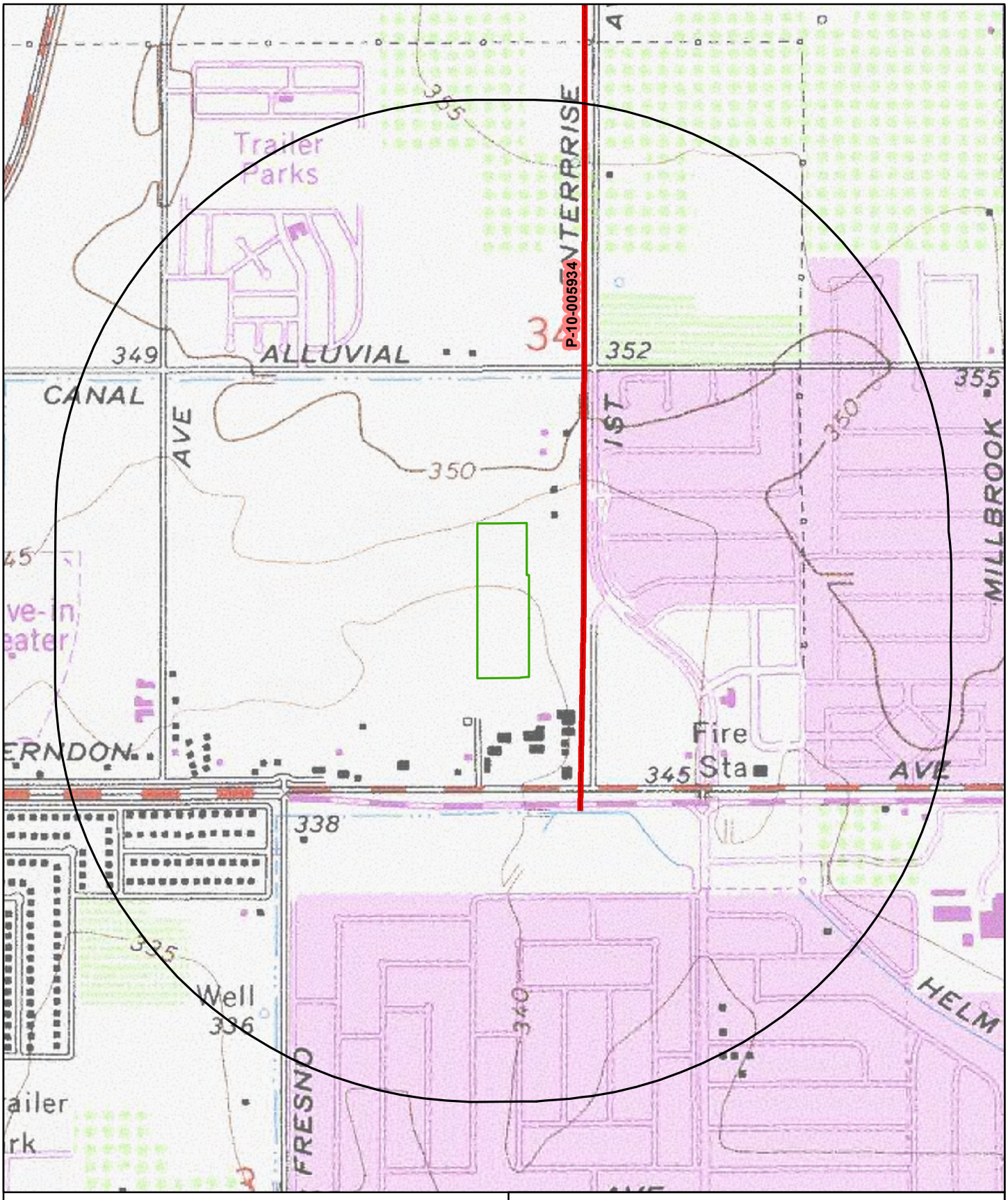
Due to processing delays and other factors, not all of the historical resource reports and resource records that have been submitted to the Office of Historic Preservation are available via this records search. Additional information may be available through the federal, state, and local agencies that produced or paid for historical resource management work in the search area. Additionally, Native American tribes have historical resource information not in the CHRIS Inventory, and you should contact the California Native American Heritage Commission for information on local/regional tribal contacts.

Should you require any additional information for the above referenced project, reference the record search number listed above when making inquiries. Invoices for Information Center services will be sent under separate cover from the California State University, Bakersfield Accounting Office.

Thank you for using the California Historical Resources Information System (CHRIS).

Sincerely,

Celeste M. Thomson
Coordinator



May depict confidential cultural resource locations.
Do not distribute.

0 0.05 0.1 0.2 Miles

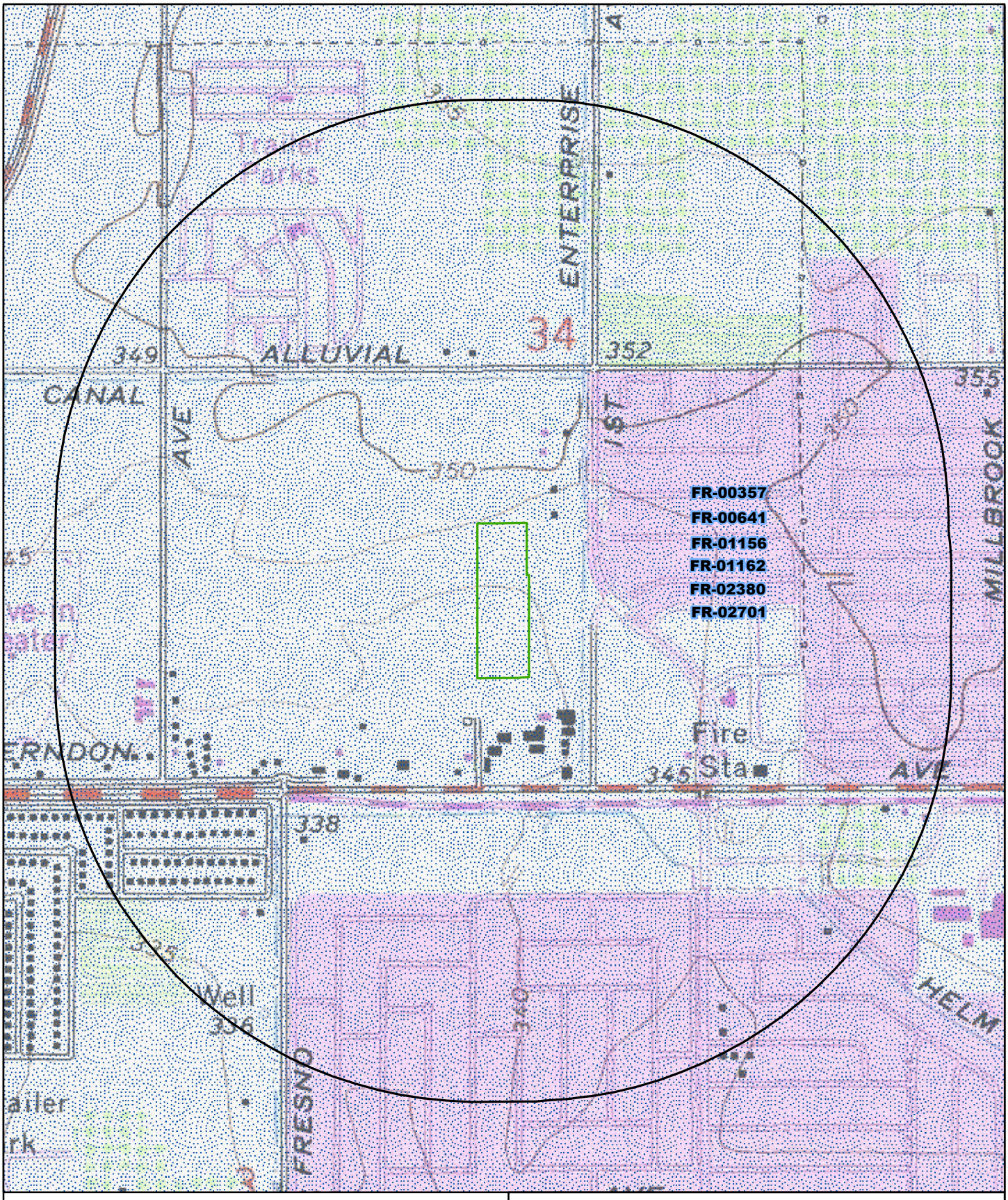
0 0.075 0.15 0.3 Kilometers

N

Project Area

Record Search radius

SSJV Information Center Record Search 20-153
Requester: William Burns, Dudek
Project Name: Kaiser fresno, Dudek #12664
USGS 7.5' Quad(s): Fresno North
County: Fresno
Resources Only



May depict confidential cultural resource locations.
Do not distribute.

0 0.05 0.1 0.2 Miles

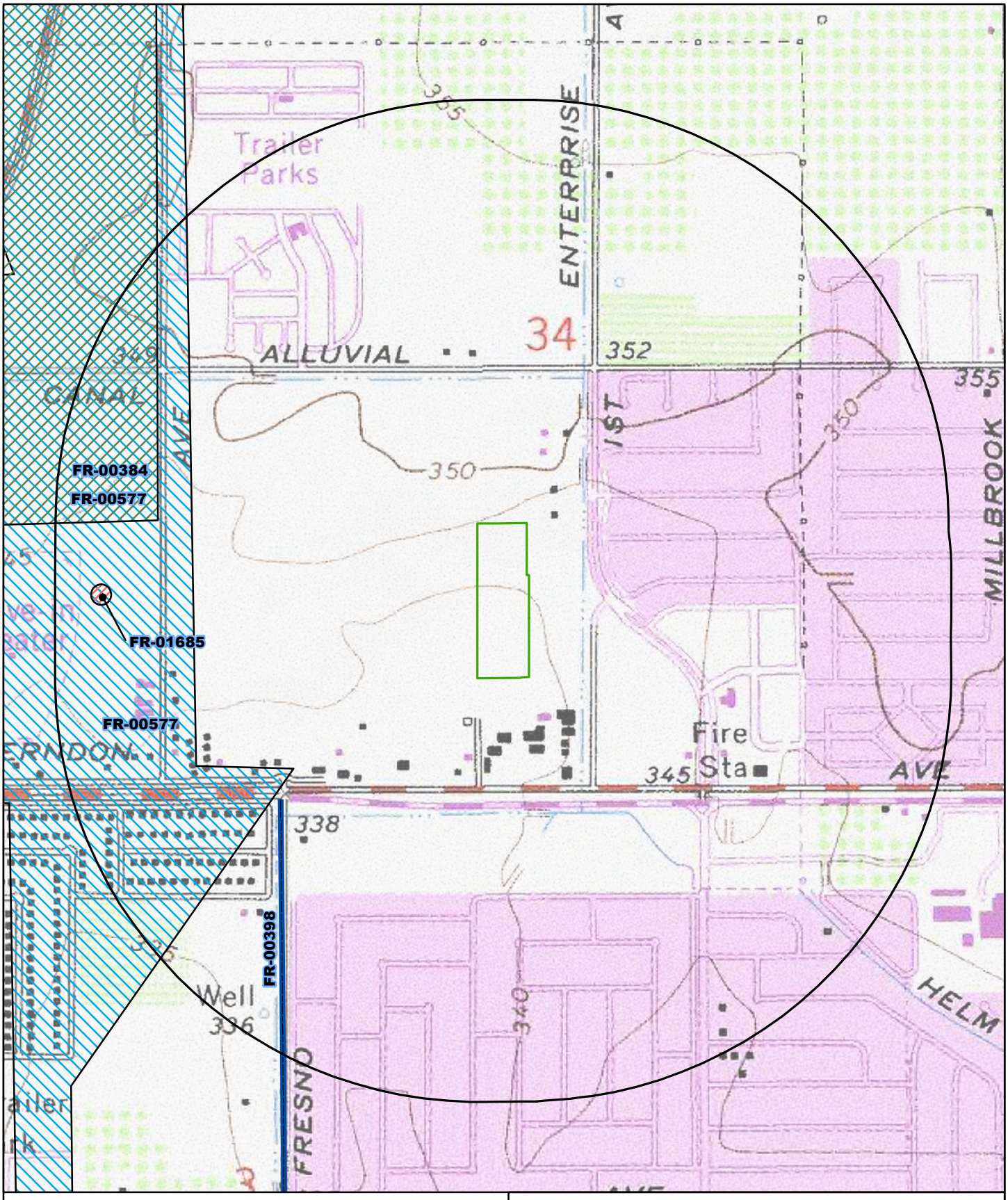
0 0.075 0.15 0.3 Kilometers

N

Project Area

Record Search radius

SSJV Information Center Record Search 20-153
Requester: William Burns, Dudek
Project Name: Kaiser fresno, Dudek #12664
USGS 7.5' Quad(s): Fresno North
County: Fresno
"Other" Reports Only



May depict confidential cultural resource locations.
Do not distribute.

0 0.05 0.1 0.2 Miles

0 0.075 0.15 0.3 Kilometers

N

Project Area

Record Search radius

SSJV Information Center Record Search 20-153
Requester: William Burns, Dudek
Project Name: Kaiser fresno, Dudek #12664
USGS 7.5' Quad(s): Fresno North
County: Fresno
Reports Only

Resource List

SSJVIC Record Search 20-153

Primary No.	Trinomial	Other IDs	Type	Age	Attribute codes	Recorded by	Reports
P-10-005934	CA-FRE-003564H	Resource Name - Enterprise Canal	Structure	Historic	HP20	2007 (R. Baloian, Applied EarthWorks, Inc.); 2013 (Randy Baloian, Applied EarthWorks, Inc.)	FR-02615, FR-02919

Supplement

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary # 10-005934 (UPDATE)
HRI #
Trinomial CA-FRE-3564H
NRHP Status Code

Other Listings
Review Code | Reviewer | Date

 Resource Name or # Enterprise Canal **Map Reference #:** 2

P1. Other Identifier:

***P2. Location: a. County:** Fresno ☐ **Not for Publication** ☒ **Unrestricted**

b. USGS 7.5′ Quad: Fresno North, CA **Date:** 1965 (photorev. 1981) T13S, R20E; Sections 3, 9, 10, 17, 20 MD **B.M.**
T12S, R20E; Sections 23, 26, 33, 34, 35

Friant, CA 1964 T12S, R20E; Sections 13, 24
T12S, R21E; Sections 17, 18, 20

Clovis, CA 1964 (photorev. 1981) T12S, R21E; Sections 20, 27, 28, 29, 34, 35
T13S, R21E; Sections 1, 2, 12
T13S, R22E; Section 7

Round Mountain, CA 1964 (photoinsp. 1978) T13S, R22E; Sections 7, 8, 9, 10, 13, 14, 15, 16
T13S, R23E; Sections 18, 19, 30, 31

Piedra, CA 1965 T13S, R23E; Sections 20, 27, 28, 29, 32, 33

c. Address: n/a

d. UTM: NAD 83, Zone 11; Head: 248275 **mE** / 4075461 **mN** Terminus: 280769 **mE** / 4071936 **mN**

e. Other Locational Data: The Enterprise canal heads on the Gould Canal near the Kings River and flows approximately 36.5 miles.

***P3a. Description:** The Enterprise Canal is an irrigation conveyance that transports water for the farmlands east, northeast, and north of the Fresno-Clovis area. Applied EarthWorks, Inc. initially recorded a segment of the canal near State Highway 168 in 2008. The current record, which serves as an update to the original record, also documents a short 200-foot segment of the canal at its intersection with Leonard Avenue in the city of Clovis. A detailed description of this segment is contained in the attached linear feature record.

***P3b. Resource Attributes:** HP 20 (Canal)

***P4. Resources Present:** ☐ Building ☒ Structure ☐ Object ☐ Site ☐ District ☐ Element of District ☐ Other:

***P5a. Photograph or Drawing:**



P5b. Description of Photo: Enterprise Canal northwest of Leonard Avenue.

***P6. Date Constructed/Age and Sources:**
☐ Prehistoric ☒ Historic ☐ Both
See BSO for construction dates.

***P7. Owner and Address:**
Fresno Irrigation District

***P8. Recorded By:** Randy Baloian
Applied EarthWorks, Inc.
1391 W. Shaw Ave., Suite C
Fresno, CA 93711

***P9. Date Recorded:** December 2013

***P10. Survey Type:** ☒ Intensive ☐ Reconnaissance ☐ Other
Describe: Built-environment survey

***P11. Report Citation:** Baloian, Randy
2014 *Historical Resources Evaluation Report: Leonard Avenue Bridge Replacement Project, City of Clovis, Fresno County, California.* Applied EarthWorks, Inc., Fresno, California. Prepared for City of Clovis Planning Department, Clovis, California. Submitted to California Department of Transportation, District 6, Fresno.

***Attachments:**
☐ NONE
☒ Building, Structure, and Object Record
☐ Photograph Record
☒ Location Map
☐ Archaeological Record
☐ Milling Station Record
☐ Other (list):
☒ Sketch Map
☐ District Record
☐ Rock Art Record
☐ Continuation Sheet
☒ Linear Feature Record
☐ Artifact Record

B1. Historic Name: Enterprise Canal

B2. Common Name: Enterprise Canal

B3. Original Use: Irrigation Conveyance **B4. Present Use:** Same

***B5. Architectural Style:** N/A

***B6. Construction History** (construction date, alterations, and dates of alterations):

General Canal History

Although local sources are not specific about the construction dates of the Enterprise Canal or its parent company, the Enterprise Canal Company (ECC), circumstantial evidence suggests that construction began sometime in the mid-1870s and continued episodically until the early 20th century when the canal appears to have reached it present-day length of 36.5 miles.

According to Willison's (1980:76, 84) account, the Kings River and Fresno Canal Company (KRFCC) agreed to supply water to the ECC following the completion of the KRFCC's Gould Canal in 1873. This agreement was the basis for the eventual creation of the Enterprise Canal. Although the Enterprise Canal is not represented on an 1875 map of the county (Willison 1980), construction may have begun shortly thereafter. Moreover, Hall's (1885) serial maps depicting irrigation in Fresno County as well as later county atlases suggests that the canal was built in stages. Whereas the first 15 miles of the Enterprise Canal (or "Enterprise Ditch") as well as its head gate on the Gould Canal are shown and labeled on the Centerville and Kingsburg Sheet of the series, the lower reaches of the canal do not appear on the Fresno Sheet. Taken at face value, Hall's (1885) maps indicate that in 1885, the Enterprise Canal terminated at Frolic Creek (present-day Dog Creek), less than a mile east from the project area. By the time of the 1891 Fresno County atlas, the canal had been lengthened through the Clovis area and to its northern most extent; however, the canal's existing southwesterly leg through what is today north Fresno had not been built yet (Thompson 1891).

Whatever the specific date(s) of the canal's construction, the ECC's dependence on the KRFCC and its Gould Canal clearly proved to be its undoing. In 1875, the KRFCC emerged from a court battle with the dominant Fresno Canal and Irrigation Company (FCIC) with its water rights still intact (Willison 1980:77–83). Ten years later, however, the companies faced-off again, but this time the FCIC succeeded in enjoining the KRFCC from drawing water from the Kings River (Mead 1901:277; Willison 1980:84). With no water rights and without access to water from the river, the KRFCC and ECC were forced to sell their canals to the FCIC. The court decision thus left the FCIC in control of all three canal systems.

Under the ownership of the FCIC, the Enterprise Canal continued to irrigate the farmlands north and east of the Fresno-Clovis area. It gave rise to several secondary canals along its route—including such Clovis-area branches as the Maupin Ditch, the Jefferson Canal, the Clovis Ditch, the Teague Ditch, and Helm Colonial Ditch—as well as numerous unnamed laterals (Willison 1980:283–285). As early as 1900, the canal and its branches irrigated about 15,000 acres (Willison 1980:76). By 1913, the lower portion of the canal

Sketch Map

See Attached

This space reserved for official comments.

Archival research found no evidence to suggest that the Enterprise Canal is directly linked to individuals significant in the history of the Fresno-Clovis area. For this reason, the Enterprise Canal is not considered significant under Criterion B/2.

Significance under Criterion C/3, when applied to canals and similar linear structures, is measured by distinctive or innovative design, methods of construction, or use of technology. Built in the 1870s, the Enterprise Canal may have garnered some significance under this criterion *in its original form*. Unfortunately, archival research uncovered little data about the original dimensions of the channel (i.e., its shape, width, depth, etc.) or related features, such as distribution gates. While it is possible that the canal did display innovative design, methods of construction, or use of technology, there is no evidence to demonstrate that the canal ever possessed these characteristics. The canal is thus not considered significant under Criterion C/3.

Criterion D/4 is most relevant for archaeological sites, but it can apply to built-environment resources if further study has the potential to yield information that cannot be obtained from other sources. Here again, if the canal's original form were somehow preserved within the recorded segment, further field examination of such a vestige would greatly add to descriptions about the Enterprise Canal in particular and early irrigation in general. However, no such remnant exists within the recorded segment. The canal—including its features—generally appears to be a modern structure. The Enterprise Canal is thus not considered significant under Criterion D/4.

Integrity

Application of the NRHP and CRHR significance criteria found that the Enterprise Canal is significant at the local level under Criterion A/1. Whereas questions of significance involve evaluation of the full linear resource (i.e., the entirety of the Enterprise Canal), assessment of integrity involves focusing on a particular segment, given that a linear resource, which can extend dozens of miles, can display varying levels of integrity and that it is usually not feasible to assess the integrity of the entire resource in a single study. For instance, even though a previous evaluation of the canal found that a segment near Highway 168 possesses poor integrity (Baloian 2008), it is unwarranted to presume that all portions of the canal demonstrate the same level of integrity (or lack thereof). Similarly, the Leonard Avenue segment of the Enterprise Canal is not considered eligible for the NRHP or the CRHR due to a lack of integrity.

B11. Additional Resource Attributes (list attributes and codes): None.

***B12. References:**

Baloian, Randy
2008 *Cultural Resources Inventory for the City of Clovis Research and Technology Business Park Expansion Project, Fresno County, California.* Applied EarthWorks, Inc., Fresno, California. Prepared for City of Clovis Planning Division, Clovis, California.

Hall, William Hammond
1885 *Irrigation Maps of Fresno County.* California Department of Engineering, Sacramento, California.

Mead, Elwood
1901 *Irrigation Investigations in California.* U.S. Department of Agriculture, Office of Experiment Stations Bulletin No. 100. Government Printing Office, Washington, D.C.

Progressive Map Service
1913 *Progressive Atlas of Fresno County*. Progressive Map Service, Fresno, California.

1920 *Progressive Atlas of Fresno County*. Progressive Map Service, Fresno, California.

Thompson, Thomas H.
1891 *Atlas of Fresno County.* Thos. H. Thompson, Tulare, California.

Willison, Paul H.
1980 *Past, Present, and Future of the Fresno Irrigation District*. Fresno Irrigation District, Fresno, California.

B13. Remarks:

***B14. Evaluator:** Randy Baloian
Date of Evaluation: June 5, 2012

appears to have been completed, bringing irrigation water to the area historically known as Forkner's Fig Gardens (Progressive Map Service 1913:19).

The Enterprise Canal, along with the rest of the FCIC's system, was acquired by the Fresno Irrigation District in 1920 (Willison 1980:115).

*B7. **Moved?:** ☐ No ☒ Yes ☐ Unknown Date: 1911–1913; 1920–1921 Original Location: See B6.

*B8. **Related Features:** metal and concrete irrigation gate

B9. **a. Architect:** Unknown **b. Builder:** Enterprise Canal Company

*B10. **Significance:** Theme: 20th Century Agricultural Diversification/Development Area: Fresno-Clovis
Period of Significance: 1874–1900 Property Type: Irrigation Canal Applicable Criteria: None
(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity.)
Evaluation of the Enterprise Canal follows the guidelines contained in the National Register Bulletin *How to Apply the National Register Criteria for Evaluation* published by the National Park Service (2002). The resource is evaluated for eligibility under the National Register Criteria A–D. Given the similarity between federal and state significance criteria, the results of the NRHP evaluation are equally applicable to determinations of eligibility for the California Register of Historical Resources (CRHR) under Criteria 1–4. Additionally, the current evaluation is partially based on a previous evaluation of the Enterprise Canal (Baloian 2008).

Classification

The evaluated resource is an irrigation canal. Segments of the canal have been recorded as a linear resource/feature (see DPR 523E), a category that also includes roads, transmission lines, and railroad lines. The current investigation recorded a 200-foot segment of the aboveground portion of the canal. In 2009, Applied EarthWorks, Inc. recorded a segment of the canal near State Highway 168.

Context, Period, Themes, and Geographical Scope

Four fairly broad periods comprise the history of agrarian development in the Clovis/Fresno area: the pioneer days in and around the Dry Creek drainage (1853–1874); the initial development of agriculture (1874–1900); the continuing development and diversification of agriculture and growing water issues (1900–1950); and modern water management (1950 to present). Research indicates that the original course of the Enterprise Canal was built sometime between 1873 and 1875. While the canal continues to operate to the present, its construction is most closely associated with the events and trends of this period regarding the early stages of agricultural development. The canal is most appropriately evaluated within a local geographical context and, thematically, as an example of the impact of irrigation in the Fresno-Clovis area.

Application of Significance Criteria

Generally speaking, a canal's significance under Criterion A/1 is largely measured by (1) its construction date relative to the beginnings of the industry, (2) its economic importance, and (3) the extent to which it created new opportunities. The Enterprise Canal fairs extremely well in all three respects. While the Enterprise was not the first major canal built in the Fresno-Clovis area, its construction occurred only a few years after the completion of the Fresno Canal and Gould Canal. At 36.5 miles, it is one of (if not the) longest canal in the area. As early as 1900, the canal and its branches irrigated about 15,000 acres or the equivalent of over 23 square miles (Willison 1980:76). Perhaps most importantly, the Enterprise Canal—like the Fresno Canal and Gould Canal systems—brought water to the previously unirrigated areas in the Fresno-Clovis area. The canal proceeds northwest from its head gate a mile west of the Kings River, crossing the rural lands east and north of Clovis, to a point within about 3 miles from the San Joaquin River; it then turns southwest towards Pinedale and through the lands that became the Fig Garden area, before terminating in present-day central Fresno. Because the Fresno Canal and Gould Canal predominantly serviced the properties south and east of Fresno, respectively, agricultural development in the north and northeast lands of the Fresno-Clovis area would have been severely retarded without the Enterprise Canal and its various branches. The subject canal is particularly representative or the impact of irrigation in local history. Consistent with previous evaluations of the canal (Baloian 2008), the Enterprise Canal is considered a significant resource at the local level under Criterion A/1.

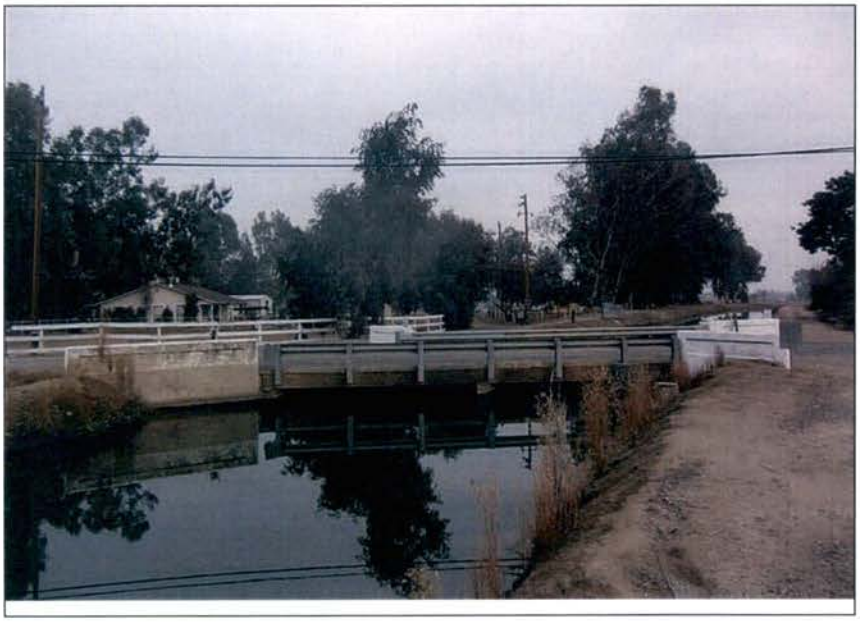
With a couple minor exceptions, the recorded segment shows a clear lack of integrity. Certainly, the recorded segment and canal in general retain integrity of **association**, given that the Enterprise Canal still serves its initial purpose as an irrigation conveyance. And even though much of east Clovis is rapidly converting from agricultural land to residential development, the **setting** of the canal remains decidedly rural.

However, because the recorded segment appears to be operationally a modern structure, it wholly lacks integrity of **materials** and **workmanship**; any remaining aspects of the canal's original construction were no doubt lost during the FID's improvement in the early 1920s. Moreover, there is nothing within the recorded segment that imparts the **feeling** that the canal is a historical structure dating to the late nineteenth century.

By far, most debilitating to integrity is the loss of **location** and **design**. The recorded segment does not share the same location as the original canal, and its existing alignment is much different than the initial route through Section 12. The recorded segment was built in the early 1920s, about 20 years after the canal's period of significance defined in this evaluation.

In sum, this segment of the canal does not approach the level of overall integrity necessary to convey its significance under Criterion A/1.

L8a. Photo, Map, or Drawing:



L8b. Description of Photo, Map, or Drawing: Enterprise Canal at Leonard Avenue, looking southeast; Bridge 42C0494 in center.

L9. Remarks: Applied EarthWorks, Inc. initially recorded a segment of the Enterprise Canal near State Highway 168 in 2009. This record serves as an update to the original documentation.

L10. Form Prepared By: Randy Baloian

L11. Date: December 2013

Supplement

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
LINEAR FEATURE RECORD

Primary # 10-005934 (UPDATE)
HRI #/Trinomial CA-FRE-3564H

 Resource Name or #: Enterprise Canal (Leonard Ave. Segment) **Map Reference #:** 2

L1. Historic and/or Common Name: Enterprise Canal

L2a. Portion Described: ☐ Entire Resource ☒ Segment ☐ Point Observation **Designation:** Main Branch
b. Location of point or segment: Intersection of the canal and Leonard Avenue in Clovis: 264800 mE / 4078213 mN

L3. Description: The current investigation recorded a 200-foot segment of the Enterprise Canal, which, in its entirety, flows 36.5 miles from its head gate on the Gould Canal near the Kings River to the center of the Fresno. The recorded segment is an unlined portion of the canal, flowing in southeast to northwest direction. It measures 35 feet from bank to bank; the canal right of way, including its shoulder banks, appears to be about 75 feet wide. The banks are even with surface level (i.e., they are not built up above the ground). At the time of documentation, water filled the canal to near capacity, preventing an accurate measure of its depth; based on prior observations, the canal is estimated to be 6–8 feet deep. One feature was observed within the recorded segment: an irrigation gate with a small circular concrete containment well set into the canal's south bank. The gate appears modern and currently functioning and presumably opens into an underground conduit, but it could not be determined what properties are irrigated by the pipe.

Segment-Specific History

The canal reached Section 12 (T13S, R21E) sometime between 1885 and 1891, yet, as depicted in the 1891 Fresno County atlas, its alignment was considerably different than its existing course through this section (Thompson 1891). The canal crossed the north/south midline of the section (i.e., present-day Leonard Avenue) at a point approximately 150–250 feet north from the recorded segment.

The portion of the canal through Section 12 was again altered sometime between 1911 and 1913. The 1913 and 1920 atlases both depict the canal with a wide but gradual bend through the northern half of the section (Progressive Map Service 1913, 1920). This realignment appears to be a transitional course between the original and existing paths of the canal. The canal flowed about 1,000 feet south of the location of the recorded segment.

Not more than a decade had passed before the course of the canal once again was changed within Section 12—this time to its existing alignment. In 1921, the newly formed Fresno Irrigation District (FID) set out to upgrade the aging system of the old FCIC, including the replacement main head gates and thousands of outlets. Rechannelization of existing canals, although not explicitly mentioned in Willison's (1980:181–182) history of the district, also appears to have been among these improvements. The 1923 Clovis, California, USGS 7.5-minute topographic quadrangle, which was based on data collected from a 1921 survey, indicates that the FID removed the single bend and re-constructed the canal in Section 12 (T13S, R21E) with a double bend, presumably to make its course more closely conform to the contours of the natural terrain. The route of the canal shown on the 1923 map mirrors that of its existing alignment. The recorded segment is thus not an original part of the canal but was built in the early 1920s.

L4. Dimensions:
a. Top Width: 35 feet
b. Bottom Width: estimated 20 feet
c. Height or Depth: estimated 6-8 feet
d. Length of Segment: 200 feet

L4e. Sketch or Cross Section ☐ attached ☒ none **Facing:**

L5. Associated Resources: Bridge 42C0494

L6. Setting: Rural

L7. Integrity Considerations: Application of the state and national significance criteria found that the Enterprise Canal is significant at the local level under Criterion A/1. The following discussion addresses whether the recorded segment retains sufficient integrity to convey the general significance of the canal. Whereas questions of significance involve evaluation of the full linear resource (i.e., the entirety of the Enterprise Canal), assessment of integrity involves focusing on the recorded segment, given that a linear resource, which can cross dozens of miles, can display varying levels of integrity and that it is usually not feasible to assess the integrity of the entire resource in a single study. For instance, even though the previous evaluation of the canal by Applied EarthWorks, Inc. found that a segment of the canal near Highway 168 possesses poor integrity (Baloian 2009 [see BSO for reference]), it is unwarranted to presume that the current segment demonstrates the same level of integrity (or lack thereof) as the previously recorded segment. In making this assessment, the current evaluation employs the seven aspects of integrity outlined in National Register Bulletin 15, *How to Apply the National Register Criteria for Evaluation,* issued by the National Park Service (revised for the Internet 2002): association, setting, materials, workmanship, feeling, location, and design.

Supplement

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
LOCATION MAP

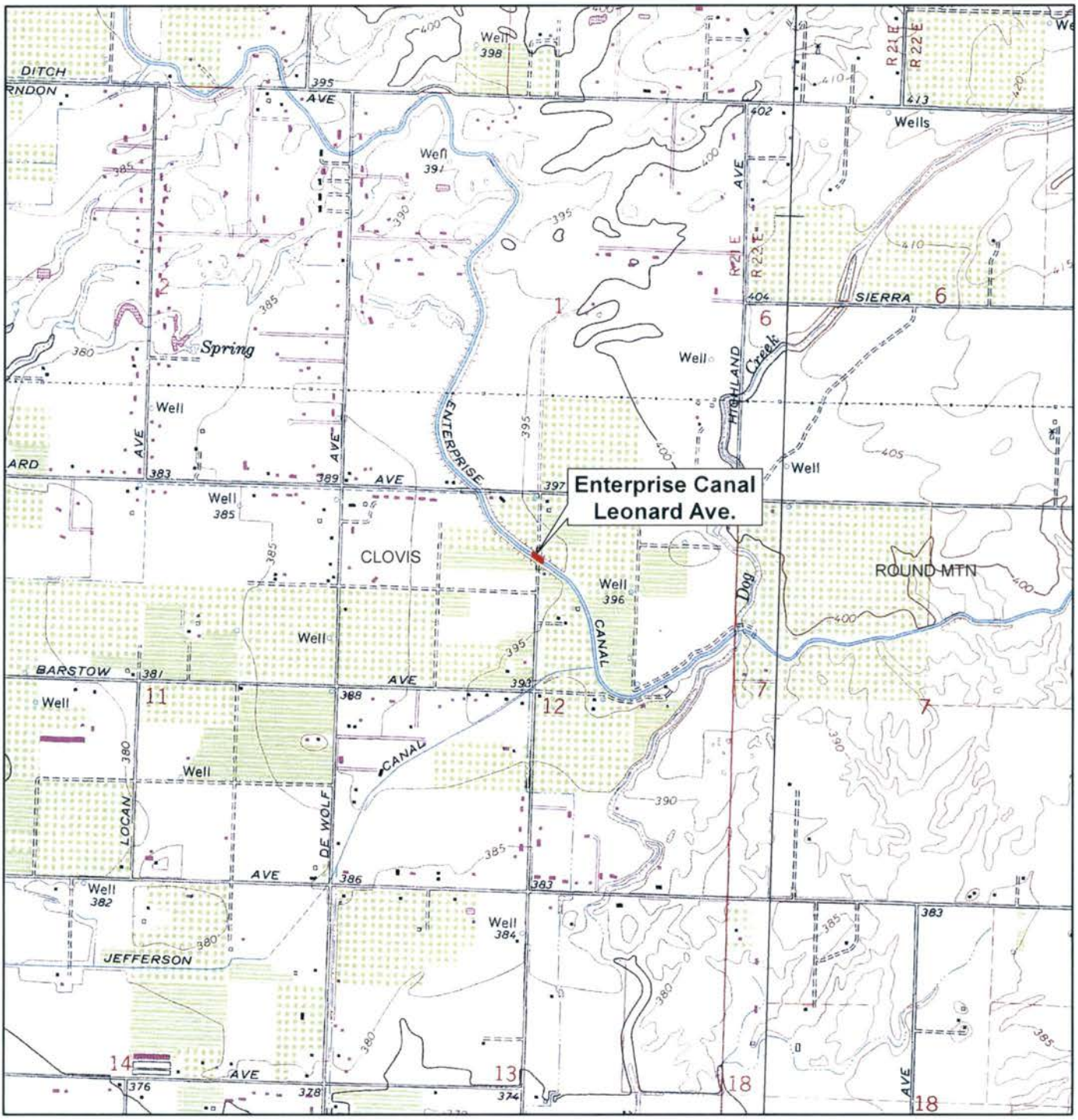
Primary # 10-005934
Trinomial CA-FRE-3564H

***Resource Name or #:** Enterprise Canal

***Scale:** 1:24,000

***Map Name:** Clovis, CA USGS 7.5' quadrangle

***Date:** 1964 (1981)



1 0.5 0 1 Miles

1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 Feet

1 0.5 0 1 Kilometers

TRUE NORTH

*Required information

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
SKETCH MAP

Primary# 10-005934
HRI#
Trinomial CA-FRE-3564H

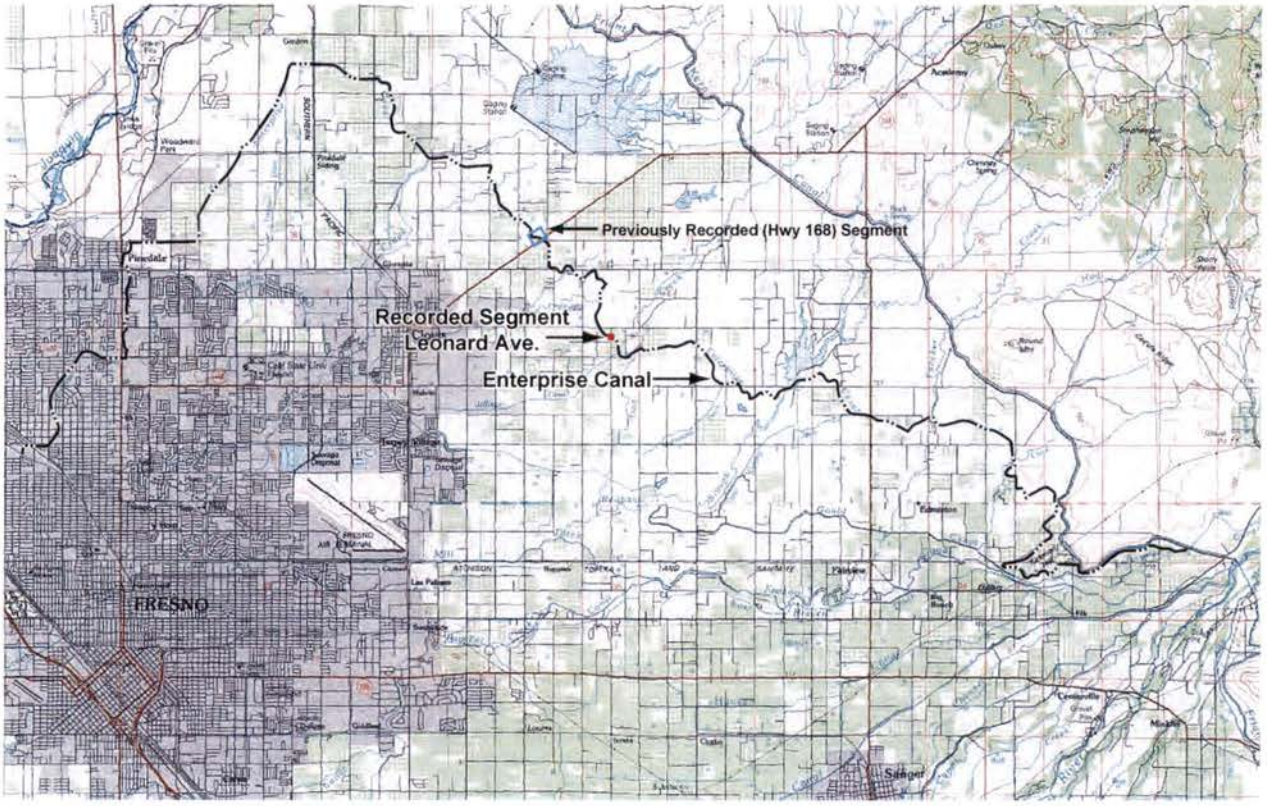
*Resource Name or # Enterprise Canal

Map Reference #: 2

*Drawn By: R. Baloian, E. Rapp

*Date: 1/13/2014

TIN



U.S.G.S. 30x60
Topographic Quadrangle
Fresno, CA
1982
1:100 000
Reduced 50%

1 0 1 2 3 4
Miles

*Required information

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

PRIMARY RECORD

Primary # P-10-005934
HRI #
Trinomial CA-FRE-3564H
NRHP Status Code

Page 1 of 6

Other Listings
Review Code | Reviewer | Date

*P1. Temporary Number/Resource Name: Enterprise Canal

*P2. Location: a. County: Fresno ■ Not for Publication ☐ Unrestricted
b. USGS 7.5′ Quad: Clovis, CA Date 1964 (revised 1981) T12S; R21E; NW 1/4 of Section 34 Mt. Diablo B.M.
c. Address:
d. UTM: NAD 27, Zone 11; Canal's intersection with SR 168 263100mE / 4080350 mN
e. Other Locational Data: The canal can be accessed by proceeding approximately 0.125 mile west from the cul-de-sac of Locan Avenue at State Route 168.

*P3a. Description: The Enterprise Canal is a bulk capacity irrigation conduit. It branches-off from the Gould Canal about 2 miles from the latter's head gate on the Kings River. The 36.5 mile course of the canal proceeds from its source in a northwesterly direction through the farmlands east and north of present-day Clovis; it reaches it northernmost extent about 5 miles from the center of town, at which point it abruptly turns southwest and flows through north Fresno and the area historically known as Forkner's Fig Gardens, where it empties into the Herndon Canal.

The recorded segment measures approximately 1,500 feet, include a 850-foot earthen section and a 650-foot concrete-lined section. Just north of State Route 168, the segment forms an elbow-like bend in the generally northwesterly trending canal.

*P3b. Resource Attributes: (List attributes and codes): HP20 Canal/Aqueduct

*P4. Resources Present: ☐ Building ■ Structure ☐ Object ☐ Site ☐ District ☐ Element of District ☐ Other:

*P5a. Photograph or Drawing (photograph required for buildings, structures, and objects): Earthen section of the Enterprise Canal, facing northwest (DSCN 0010).



*P6. Date Constructed/Age: 1875–1880
☐ Prehistoric
■ Historic
☐ Both

*P7. Owner and Address:
Fresno Irrigation District

*P8. Recorded By: R. Baloian
Applied EarthWorks, Inc.
5090 N. Fruit Ave. #101
Fresno, CA 93711

*P9. Date Recorded: 5 September 2007

*P10. Survey Type:
■ Intensive
☐ Reconnaissance
☐ Other
Describe: Survey for Research and Technology Business Park Expansion

*P11. Report Citation:
Baloian, Randy
2008 *Cultural Resources Inventory for the City of Clovis Research and Technology Business Park Expansion Project, Fresno County, California.* Applied EarthWorks, Inc., Fresno, California. Prepared for City of Clovis Planning Division.

*Attachments:
☐ NONE
■ Building, Structure, and Object Record
☐ Photograph Record
■ Location Map
☐ Archaeological Record
☐ Milling Station Record
☐ Other (list):
☐ Site/Sketch Map
☐ District Record
☐ Rock Art Record
☐ Continuation Sheet
■ Linear Feature Record
☐ Artifact Record

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
LOCATION MAP

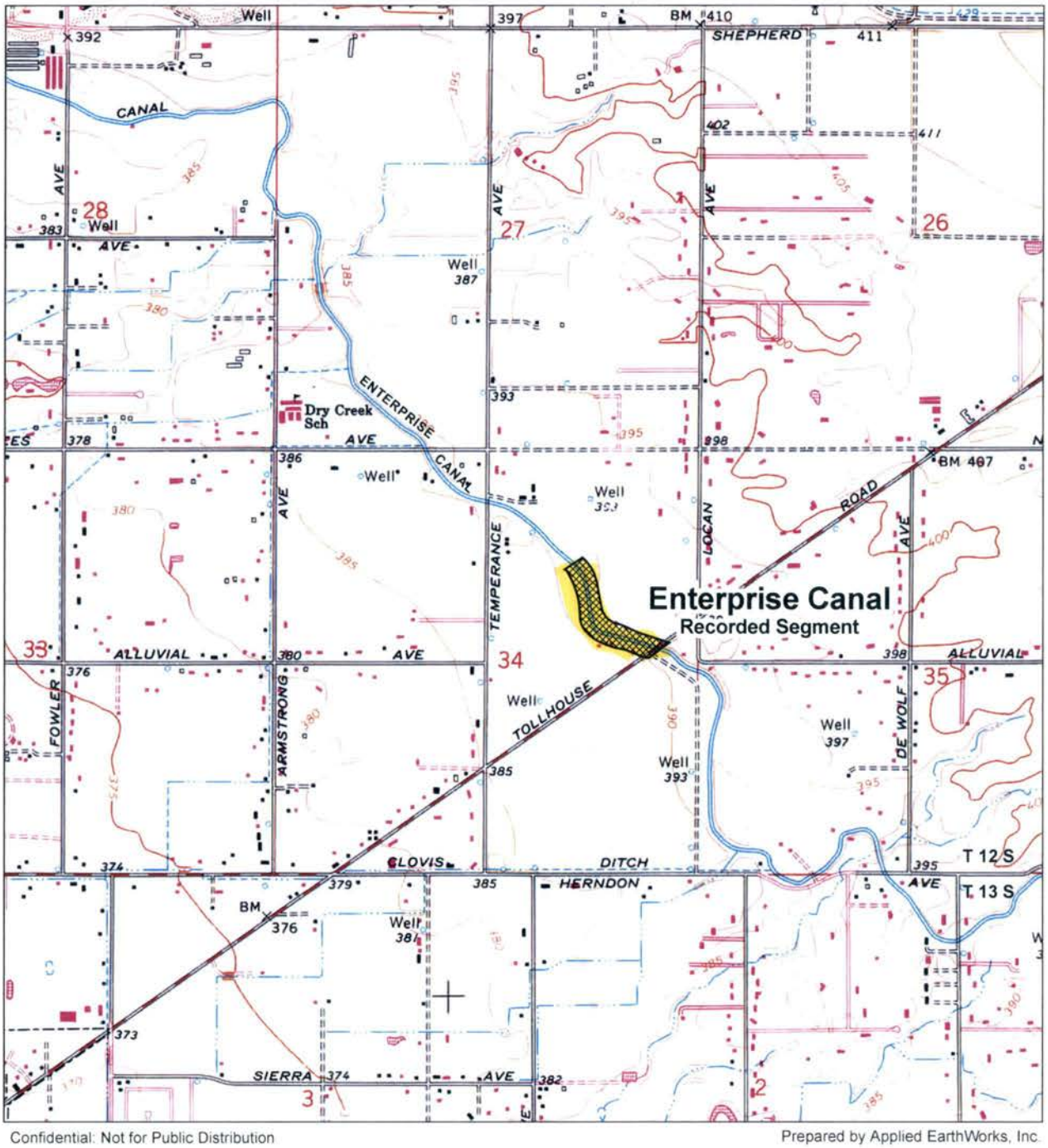
Primary # P-10-005934
Trinomial CA-FRE-3564H

*Resource Name or #: Enterprise Canal

*Map Name: Clovis, CA, 7.5-min. quad

*Scale: 1:24,000

*Date of Map: 1964, photorev. 1982



Confidential: Not for Public Distribution

Prepared by Applied EarthWorks, Inc.

N

0 ½ 1

Miles

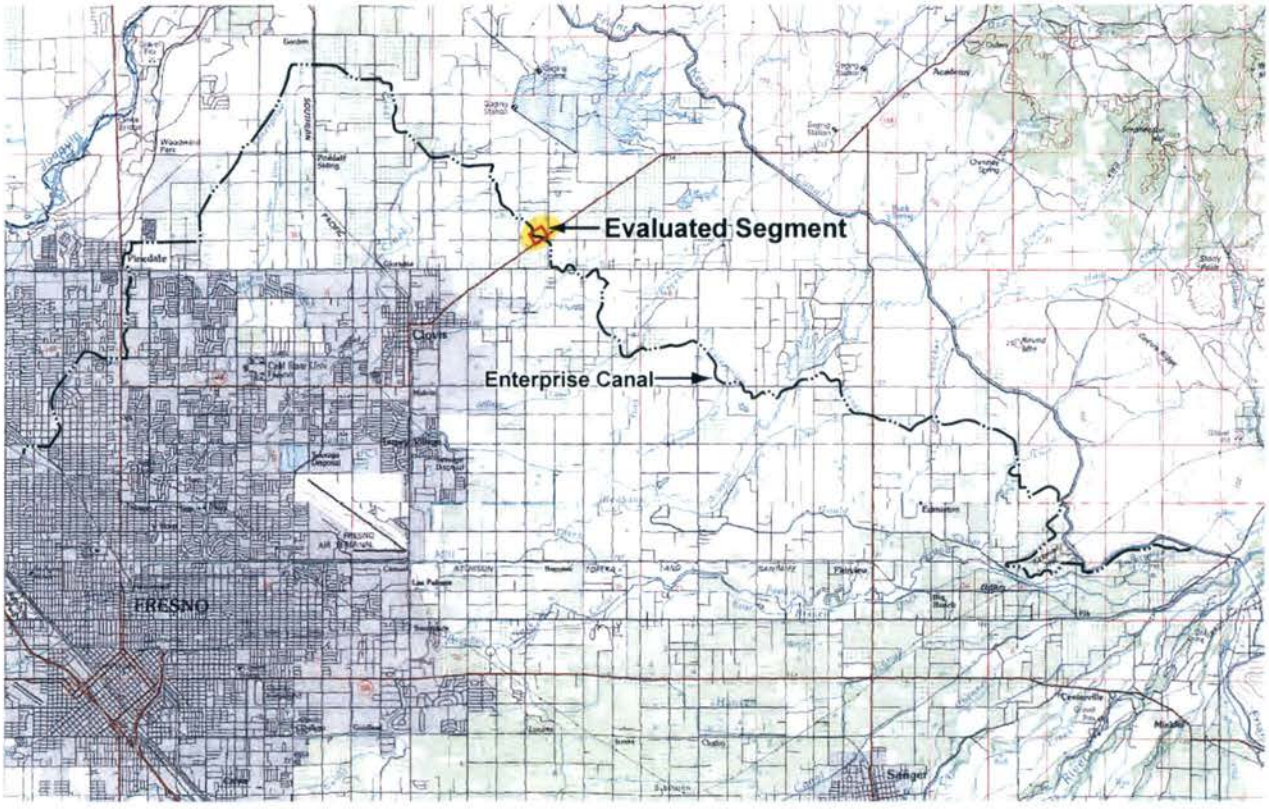
Contour Interval: 5 Feet

*Required information

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
SKETCH MAP

Primary # P-10-005934
HRI #/Trinomial CA-FRE-3564H

Temporary Number/Resource Name: Enterprise Canal



Confidential: Not for Public Distribution

Prepared by Applied EarthWorks, Inc.

U.S.G.S. 30x60
Topographic Quadrangle
Fresno, CA
1982
1:100 000
Reduced 50%

N

1 0 1 2 3 4
Miles

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

LINEAR FEATURE RECORD

Primary # P-10-005934
HRI #
Trinomial CA-FRE-3564 H

 Resource Name or No.: Enterprise Canal

L1. Historic and/or Common Name: Enterprise Canal

L2a. Portion Described: ☐ Entire Resource ■ Segment ☐ Point Observation **Designation:** Main Branch

b. Location of point or segment: south end (at SR 168) 263100**mE** /4080350 **mN**
north end 262750**mE** /4081150 **mN**

L3. Description: Built sometime in the mid- or late 1870s, the 36.5 mile long Enterprise Canal provides bulk irrigation water to the greater Clovis area as well as north Fresno. It gave rise to several secondary canals—including such Clovis-area branches as the Maupin Ditch, the Jefferson Canal, the Clovis Ditch, the Teague Ditch, and Helm Colonial Ditch—as well as numerous unnamed laterals. As early as 1900, the Enterprise Canal and its scions irrigated about 15,000 acres—the equivalent of over 23 sections.

L4. Dimensions:
a. Top Width: 50 feet
b. Bottom Width: (approximate) 30 feet
c. Height or Depth: (approximate) 6–10 feet
d. Length of Segment: 1,500 feet

L4e. Sketch or Cross Section ☐ attached ■ none **Facing:**

L5. Associated Resources: A concrete culvert, constructed in the early 2000, carries water underneath State Route 168.

L6. Setting: Shortly following Moses Church and A. Y. Easterby's initial irrigation project in the early 1870s, a network of canals and ditches sprouted from the banks of the Kings River to provide water to various other farm colonies. In particular, the agricultural lands surrounding Clovis are primarily irrigated by the Enterprise Canal and the Gould Canal, built in 1873 by nurseryman L. A. Gould. For Church and other wealthy landowners, the intended effect of irrigation was to increase the value of their properties so that they could be subdivided and sold to newly arriving homesteaders at a hefty profit. While this primary purpose was certainly achieved, the advent of intensive irrigation additionally led to a shift in both the types of crops grown and the size of a typical farm. Pioneers initially grew wheat and other grain crops or raised cattle—both large-scale ventures requiring substantial acreage. As irrigation water became more readily available, individual farmers realized that premium crops like grapes, citrus, and tree fruit could be profitably grown on lots as small as 20 acres.

L7. Integrity Considerations: The overall canal was probably substantially altered in the early 1920s when the Fresno Irrigation District began making changes to its newly acquired irrigation system. Regarding the segment, the course of the canal appears to have been shift on at least two occasions—sometime between 1907 and 1909 and more recently in early 2000. In addition, a 650-foot section of this segment has been lined with concrete,

L8. Photo, Map, or Drawing: See Primary Record.

L9. Remarks: See Building, Structure and Object Record for evaluation.

L10. Form Prepared By: Randy Baloian

L11. Date: 25 September 2007

BUILDING, STRUCTURE, AND OBJECT RECORD

*NRHP Status Code

B1. Historic Name: Enterprise Canal

B2. Common Name: Enterprise Canal

B3. Original Use: Bulk Irrigation Canal **B4. Present Use:** Same

***B5. Architectural Style:** N/A

***B6. Construction History (construction date, alterations, and dates of alterations):** The available evidence indicates that the Enterprise Canal was conceived and marketed by the Fresno Canal and Irrigation Company in the mid-1870s. While the Enterprise Canal is not depicted on an October 1875 map of the Kings River irrigation system, it seems likely that construction was underway, if not partially completed, at that time (Willison 1980).

The current investigation revealed at least three episodes of modifications to the canal in general, including the evaluated segment. Archival research found no data regarding the initial dimensions of the Enterprise Canal, which may have substantiated its probable enlarged capacity. Based on comparisons of Fresno County atlases, the channel of the canal appears to have shifted sometime between 1907 and 1909, giving the evaluated segment its distinctive elbow or dogleg shape (Guard 1909; Harvey 1907). In the first five years after the Fresno Irrigation District purchased the assets of the Fresno Canal and Irrigation Company in 1921, the district spent over $438 million on improvements to the decaying system (Willison 1980:182). While it is not known whether any specific modifications to the recorded segment occurred at this time, the overall canal no doubt lost much of its integrity during this period of its history. The most recent and obvious alterations to the evaluated segment were related to the construction of State Route 168—specifically, the installation of 650 feet of concrete lining and the replacement of the previous two-lane bridge (or culvert) with a new concrete 4-lane highway culvert. In addition, comparisons of current and 1998 aerials indicate that the alignment of the canal has been slightly modified to give it an even more acute elbow-like shape.

***B7. Moved?:** ■ No ☐ Yes ☐ Unknown Date: Original Location:

***B8. Related Features:** A recently constructed concrete culvert carries water underneath State Route 168.

B9. a. Architect: **b. Builder:** Unknown

***B10. Significance:** Theme: Initial Development of Agriculture and Irrigation Area: greater Fresno/greater Clovis
Period of Significance: 1875–1900 Property Type: Irrigation Canal Applicable Criteria: A
(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity.)

Throughout its history, the Enterprise Canal has contributed to the agribusiness of the greater Fresno area. In particular, the Enterprise Canal demonstrates themes and trends associated with the initial period of irrigation. Without it, the grain yields of Dry Creek and other area farms would have been limited, and the successful cultivation of premium crops such as grapes, tree fruit, and citrus would not have been possible until the widespread use of the electrical well pump, some 25 years after the construction of the canal. Moreover, the early history of the canal aptly illustrates how the unresolved litigious issues of water rights during the late 19th century had major

This space reserved for official comments.

Sketch Map

See full-page Sketch Map

repercussions in the economic sphere and, especially, on the structure of the irrigation industry. Thus, due its integral role in the development of irrigation and agricultural in the greater Fresno area during the period of significance 1875–1900, the Enterprise Canal qualifies as a significant local resource under National Register Criterion A.

Current observations, however, indicate that the evaluated segment no longer retains integrity. The Enterprise Canal continues essentially to function as it did 130 years ago, but most of its original features and characteristics have long been lost in the continual process of upgrades and additions. In particular, the construction and path of the evaluated segment bears little resemblance to the corresponding segment from the late 1800s; thus, this segment no longer retains integrity from the canal's period of significance. Consequently, due to a loss of integrity, the evaluated segment of Enterprise Canal is not eligible for inclusion in the National Register or Historic Places or the California Register of Historical Resources.

B11. Additional Resource Attributes (list attributes and codes):

***B12. References:**

Clough, Charles W., and William B. Secrest, Jr.
1984 Fresno County—The Pioneer Years: From the Beginnings to 1900. Panorama West Books, Fresno, California.

Guard, W. C.
1909 *Atlas of Fresno County.* W. C. Guard, Fresno, California.

Harvey, William, Sr.
1907 *Atlas of Fresno County.* William Harvey, Sr., Fresno, California.

Willison, Paul H.
1980 Past, Present, & Future of the Fresno Irrigation District. District manuscript, August 1.

B13. Remarks:

***B14. Evaluator:** Randy Baloian
Date of Evaluation: September 25, 2007

Report List

SSJVIC Record Search 20-153

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
FR-00357		1981	Crist, Michael K. and Varner, Dudley M.	Archaeological Overview and Locational Analysis of the Fresno Area	California State University, Fresno	10-001014
FR-00384		1980	Cursi, Kathleen L. and Varner, Dudley M.	Archaeological Reconnaissance for the Riverpark Properties, Fresno County, California	California State University, Fresno	
FR-00398		1983	Granskog, Jane	Archaeological and Historical Survey for Fresno Street Widening - West Bullard t West Herndon Avenue - An Interim Capacity Project	California State University, Bakersfield	
FR-00577	Caltrans - 06-FRE-41 PM 29.5/33.02 EA 06100-025650	1980	O'Connor, Denise	Archaeological Survey Report for a Proposed Extension of Route 41; 06-Fre-41, 29.5/33.02; 06100-025650	California Department of Transportation	
FR-00641		1977	Peck, Billy J.	The Distribution of Aboriginal Occupational Sites in Fresno County, California	California State University, Fresno	
FR-01156		1968	Unknown	A Proposal for an Archaeological Element in the Fresno County, General Plan	Committee on Sierra Foothills Public Archaeology	
FR-01162		1990	Stuart, David R.	A Summary of the Present Archaeological Resources of Fresno County	California Department of Parks and Recreation	
FR-01685		2000	Peak, Melinda A.	Cultural Resources Assessment of the Pacific Bell Site, CV-604-02, and Pinedale Site, City of Fresno, Fresno County, California	Peak & Associates, Inc.	
FR-02380		2009	Byrd, Brian F., Wee, Stephen, and Costello, Julia	Cultural Resources Sensitivity Study and Research Design for the San Joaquin River Restoration Program, Fresno, Madera, Merced, and Stanislaus Counties, California	Far Western Anthropological Research Group, Inc; JRP Historical Consulting; Foothill Resources Ltd.	
FR-02701		2011	Greenwald, Alexandra	Archaeological Survey Report for the California High Speed Train Fresno to Bakersfield Section	URS Corporation	

Appendix D
Geotechnical Investigation



GEOTECHNICAL ENGINEERING STUDY

KAISER FRESNO MEDICAL OFFICE BUILDING & PARKING STRUCTURE

East Locust Avenue and North Orchard Street
Fresno, California 93720

PREPARED FOR:

Ms. Allison L. Hedberg
Kaiser Permanente
National Facilities Services
NCAL Major Project Delivery MOPD COE
501 J Street
Sacramento, California 95814

PREPARED BY:

Atlas Technical Consultants LLC
2001 Crow Canyon Road, Suite 210
San Ramon, California 94583

October 7, 2022

2001 Crow Canyon Road, Suite 210
San Ramon, CA 94583
(925) 314-7100 | oneatlas.com

October 7, 2022

Kaiser Permanente
National Facilities Services
NCAL Major Project Delivery MOPD COE
501 J Street
Sacramento, CA 95814

Attention: Ms. Allison L. Hedberg | Senior Project Manager

Subject: **Geotechnical Engineering Study**
Kaiser Fresno Medical Office Building and Parking Structure
East Locust Avenue and North Orchard Street, Fresno, California 93720
Atlas Project No. 91-04768-B

Dear Ms. Hedberg:

Atlas Technical Consultants LLC (Atlas) has completed a Geotechnical Engineering Study for the proposed multi-story Medical Office Building (MOB) and Parking Structure project in Fresno, California. Transmitted herewith are the results of our findings, conclusions, and recommendations for the design and construction of the foundation support for this project. In general, we consider the proposed improvements at the site geotechnically feasible provided the recommendations of this report are implemented in the design and construction of the project.

Should you or members of the design team have questions or need additional information, please contact either of the undersigned at (925) 314-7180, or by e-mail, either at manuel.zea@oneatlas.com or corey.dare@oneatlas.com. We greatly appreciate the opportunity to be of service to Kaiser Permanente and to be involved in the design of this project.

Sincerely,
ATLAS TECHNICAL CONSULTANTS LLC

Manuel E. Zea, P.E.
Senior Project Engineer

Corey T. Dare, P.E., G.E.
Principal Geotechnical Engineer



Distribution: PDF to Addressee; Allison.L.Hedberg@kp.org

MZ/CTD:pf

ATLAS

TABLE OF CONTENTS

NOTES
1.0 INTRODUCTION 1
1.1 Purpose and Scope 1
1.2 Site Description 1
1.3 Proposed Development 2
1.4 Validity of Report 3
2.0 PROCEDURES AND RESULTS 4
2.1 Literature Review 4
2.2 Field Exploration 4
2.3 Laboratory Testing 6
3.0 GEOLOGIC AND SEISMIC OVERVIEW 8
3.1 Geologic Setting 8
3.2 Seismic Setting 8
4.0 SUBSURFACE CONDITIONS 10
4.1 Subsurface Soil Conditions 10
4.2 Groundwater Conditions 11
4.3 Corrosion Testing 11
5.0 GEOLOGIC HAZARDS 14
5.1 Seismic Induced Hazards 14
5.2 Other Hazards 17
6.0 CONCLUSIONS AND RECOMMENDATIONS 19
6.1 Conclusions 19
6.2 Seismic Design Parameters 20
6.3 Site Preparation and Grading 23
6.4 Utility Trench Construction 27
6.5 Temporary Excavation Slopes and Shoring 29
6.6 Foundations 30
6.7 Concrete Slabs-on-Grade 32
6.8 Pavement Design 33
6.9 Plan Review 35
6.10 Observation and Testing During Construction 36
7.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS 37
8.0 REFERENCES 39

TABLE OF CONTENTS (continued)

PLATES
Plate 1 – Site Vicinity Map
Plate 2 – Site Plan
Plate 3 – Development Plan
Plate 4 – Regional Geologic Map
Plate 5 – Regional Fault Map

APPENDIX A
FIELD EXPLORATION
Key to Boring Log Symbols
Boring Logs
Cone Penetration Test Results

APPENDIX B
LABORATORY TEST RESULTS
Summary of Laboratory Test Results
Liquid and Plastic Limits Test Report
Particle Size Distribution Report (3)
Direct Shear Test Reports (3)
Corrosivity Tests Summary (2)
R Value Test Reports (2)

APPENDIX C
SEISMIC SETTLEMENT ANALYSIS RESULTS

APPENDIX D
SITE SPECIFIC GROUND MOTION ANALYSIS RESULTS

NOTES

Overview

The City of Fresno ("City") adopted its current General Plan on December 18, 2014 and certified a Master Environmental Impact Report ("EIR") for the General Plan (State Clearinghouse Number 2012111015) (the "General Plan EIR"). The proposed Kaiser Permanente Medical Office Building ("MOB Project") would be located within the "Office" use designation under the General Plan, which permits professional and medical offices up to a maximum floor area ratio of 2.0. The MOB Project is a permitted use and proposes a floor area ratio of approximately 0.47 (assuming 145,000 square feet of development on the 7.1-acre site), so it is consistent with the General Plan's use and density regulations.

Public Resources Code Section 21083.3 and California Environmental Quality Act ("CEQA") Guidelines Section 15183 provide that proposed projects that are consistent with a "community plan" (including the General Plan) for which an EIR was certified is exempt from CEQA, "except as might be necessary to examine whether there are project-specific significant effects which are peculiar to the Project or its site." CEQA Guidelines Section 15183(c) specifies that "if an impact is not peculiar to the parcel or to the proposed Project, has been addressed as a significant effect in the prior EIR, or can be substantially mitigated by the imposition of uniformly applied development policies or standards…, then an EIR need not be prepared for the project solely on the basis of that impact."

In other words, projects consistent with the General Plan are exempt from subsequent CEQA review unless they would result in project-specific impacts. If a project's impacts are within the universe of effects previously covered in the General Plan EIR, or if they can be reduced to a less than significant level through the imposition of uniformly applied development standards (such as General Plan policies, zoning requirements, General Plan EIR mitigation measures, or standards from other plans), no new CEQA document (e.g., a Mitigated Negative Declaration or and EIR) is required.

Pursuant to CEQA Guidelines Section 15183, the analysis included in this report can be used by the City of Fresno to determine if the MOB Project would result in project-specific effects peculiar to the MOB Project or its site that differ from those impacts already analyzed and disclosed in the General Plan EIR. As discussed within this report, the analysis provides substantial evidence in support of the conclusion that the MOB Project would not result in any significant impacts that: (1) are peculiar to the MOB Project or its site; (2) were not identified as significant in the General Plan EIR; or (3) were previously identified

significant effects but that would have a substantial increase in severity as compared to the General Plan EIR.

Potential Environmental Effects

The General Plan EIR stated that General Plan implementation would result in less than significant impacts associated with earthquakes, seismic ground shaking, seismic ground failure, landslides, soil erosion/topsoil loss, unstable geologic soils, expansive soils, and soils capable of supporting wastewater disposal systems.

The MOB Project would be required to comply with local, state, and federal regulations regarding geotechnical issues. As discussed in this report, compliance with such measures and incorporation of the report's recommendations into the MOB Project's design would ensure that the MOB Project would not result in project- or site-specific significant environmental effects that are peculiar to the MOB Project.

GEOTECHNICAL ENGINEERING STUDY

Project: Kaiser Fresno Medical Office Building
Fresno, California

Client: Kaiser Permanente National Facilities Services
Sacramento, California

1.0 INTRODUCTION

1.1 Purpose and Scope

The purpose of this study was to evaluate the subsurface conditions at the site and prepare geotechnical recommendations for the proposed multi-story Medical Office Building (MOB), new Parking Structure, and associated new infrastructure. This study provides recommendations for foundation design, interior and exterior concrete slabs, site preparation and grading, drainage, utility trench backfilling, and pavements. We performed this study in accordance with the scope of work outlined in our approved proposal to Kaiser dated October 14, 2019, and Change Order Request #2 dated May 11, 2020, and a geotechnical study report for the project was issued by our local predecessor firm, Geosphere Consultants, Inc., dated July 15, 2020. In September 2022, Kaiser requested the report to be updated to be consistent with the 2022 California Building Code (CBC).

The scope of this study included the review of available geologic literature for the site area, a field exploration program, laboratory testing of selected samples, engineering analysis, and preparation of this report. The conclusions and recommendations presented in this report were based on the limited samples collected and analyzed during this study, and on prudent engineering judgment and experience. This study did not include an assessment of potentially toxic or hazardous materials that may be present on or beneath the site.

1.2 Site Description

The proposed development is located to the east of the existing Kaiser Fresno Medical Center complex, northeast of the intersection of North Orchard Street and East Locust Avenue in Fresno, California, as shown on Plate 1, *Site Vicinity Map.* The project site is a relatively level, rectangular-shaped parcel of about 7.1 acres which was used as agricultural land from the late 1930s through at least the early 1970s (Terracon, 2018), as shown on Plate 2, *Site Plan*. The project area is bound on the west by a Fresno Metropolitan Flood Control District stormwater detention basin and the River Park Little League baseball complex, on the south by East Locust Avenue, on the east by an unnamed access road and a multi-

tenant medical-dental services complex, and on the north by a multi-tenant medical-commercial services complex.

At the time of our study, the project site was undeveloped and covered with vegetation. The southwest portion of the site contained numerous stockpiles of landscape debris and dumped, imported soil and demolition debris. The site slopes gently downwards from north to south with elevations ranging from +340 to +348, based on the site topographic map prepared by Provost & Pritchard (March 2020). For analysis purposes, we used project site coordinates of 36.8407° north latitude and 119.7766° west longitude.

1.3 Proposed Development

We understand that the proposed development will include construction of an at-grade, four-story, Medical Office Building of steel-frame construction with an approximate footprint of 42,623 square feet in plan area (approximate total footprint of 146,000 square feet for the four stories), as shown on Plate 3, *Development Plan*. A three-story (i.e., ground level plus two elevated decks) parking structure will be constructed on the north side of the new MOB. At the time this report was prepared, the exact location and configuration of the parking structure had not been established. Hardscape flatwork, driveways, an at-grade paved parking lot on the south side of the MOB, and landscaping will comprise the remaining developed areas. The building floor will consist of a reinforced concrete slab-on-grade with no below-grade levels. The bottom of the elevator pit will be 5 feet below the finished floor elevation and excavations up to 9 feet are expected to be necessary to construct the deepened footing foundations around the elevator pit perimeter. According to project structural engineer KPFF Consulting Engineers, Inc., maximum Dead, and Dead plus Live Loads on the MOB footings were calculated to be 368 and 494 kips, respectively. For footings also subject to seismic loads, maximum column loads were computed to be 532 kips.

Preliminary grading plans prepared by project civil engineer Provost & Pritchard dated March 25, 2020, indicate that site grading to construct the MOB pad and to establish site drainage will consist primarily of cut excavations up to about 2 feet across the site, with minor fills mainly located along the west side of the planned MOB pad. Site grading to construct the parking structure pad is anticipated to consist of cut excavations up to about 4 feet on the northeast side of the pad and minor fills along the west side of the parking structure pad.

1.4 Validity of Report

This report is valid for three years after publication. If construction begins after this period, Atlas should be contacted to confirm that the site conditions have not changed significantly. If the proposed development or structural loads differs considerably from that described above, Atlas should be notified to determine if additional recommendations are required. Additionally, if Atlas is not involved during the geotechnical aspects of construction, this report may become wholly or in part invalid; since Atlas's geotechnical personnel need to verify that the subsurface conditions anticipated preparing this report are similar to the subsurface conditions revealed during construction. Atlas's involvement should include foundation and grading plan review; observation of foundation excavations; and grading and pavement observation and testing.

2.0 PROCEDURES AND RESULTS

2.1 Literature Review

Pertinent geologic and geotechnical literature pertaining to the site area was reviewed. These included various publications and maps issued by the United States Geological Survey (USGS), California Geological Survey (CGS), California Division of Mines and Geology (CDMG), and other government agencies, as listed in the References section, as well as various online sources.

2.2 Field Exploration

Our field exploration program consisted of performing a combination of drilled test borings and Cone Penetration Test (CPT) probes at the site. A total of 18 test borings were drilled and eight CPTs were advanced at locations intended to cover the development area. The locations of the field explorations in close proximity to the proposed new construction are shown on Plates 2 and 3.

2.2.1 Test Borings

Ten test borings, designated as B-1 through B-10, were drilled on January 21 and 22, 2020, for the proposed MOB and eight test borings, designated B-11 through B-18, were drilled on June 18 and 19, 2020, for the proposed parking structure, as observed by an Atlas field engineer under the supervision of a California-registered Geotechnical Engineer. Boring locations were selected for sufficient coverage across the development area, as well as to facilitate development of soil cross section profiles across the area of the subject project.

The borings were drilled to depths ranging from 5 to 45 feet below the existing surface using a truck-mounted, CME-45 drill rig equipped with 6-inch diameter hollow stem augers and 4-inch solid flight augers. The Atlas engineer visually classified the materials encountered in the borings according to the Unified Soil Classification System as the borings were advanced. Relatively undisturbed soil samples were recovered at selected intervals using a 3-inch outside diameter Modified California split spoon sampler containing 6-inch-long brass liners, and a 2-inch outside diameter Standard Penetration Test (SPT) sampler. The samplers were driven by means of a 140-pound automatic trip hammer with an approximate 30-inch fall. Resistance to penetration was recorded as the number of hammer blows required to drive the sampler the final foot of an 18-inch drive. Following the completion of drilling, the boreholes were backfilled using a cement grout mixture.

All of the field blow counts recorded using Modified California (MC) split spoon sampler were converted in the final logs to equivalent SPT blow counts using appropriate modification factors suggested by Burmister (1948), i.e., a factor of 0.65 with inner diameter of 2.5 inches. Therefore, all blow counts shown on the final boring logs are either directly measured (SPT sampler) or equivalent SPT (MC sampler) blow counts.

The boring logs with descriptions of the various materials encountered in each boring, a key to the boring symbols, and select laboratory test results are included in Appendix A. The ground surface elevations indicated on the soil boring logs were estimated to the nearest foot using Google Earth Pro.

2.2.2 Cone Penetration Tests (CPT)

Eight CPTs, designated as CPT-1 to CPT-8, were conducted on June 2, 2020 to depths ranging from 4 to 50 feet below existing ground surface. Please note that planned depth of all CPTs was 50 feet below the existing surface. However, CPT refusal was encountered at locations CPT-1, CPT-3, and CPT-7 at depths between 4 and 7 feet below existing ground surface within very dense soil conditions. A “dummy” rod (typically used to advance the rod without damaging the cone tip) was used to try to advance the CPTs through the very dense soil conditions at these locations, but only CPT-7 was able to advance. Once the “dummy” rod bypassed the very dense soil conditions, the test rod was switched back to a cone to obtain information below the very dense soil. Therefore, soil conditions and properties indicated in the upper 7 feet of CPT-7 should be ignored, as they are not representative of actual conditions.

Middle Earth Geo Testing, Inc., of Orange, California conducted the CPTs for this project, using a specially designed, truck-mounted, 25-ton cone apparatus. The instrumented cone assembly used for this project included a cone tip with a 60-degree apex, diameter of 44.45 millimeters (mm), and a projected cross-sectional area of 15 square centimeters (cm^2), a sleeve segment with a surface area of 225 cm^2, and a pore pressure transducer near the base (shoulder) of the cone tip.

Prior to the start of the test, the truck was jacked up and leveled on four pads to provide a stable reaction for the cone thrust. During the test, the instrumented cone was hydraulically pushed into the ground at a rate of about 20 millimeters per second (about 4 feet per minute), and continuous readings of cone tip resistance, sleeve friction, and pore pressure were digitally recorded. As the cone was advanced, additional cone rods were added. PC-based data acquisition hardware in the CPT truck received electric signals from strain gauges mounted in the cone assembly, and generated graphical logs including cone

resistance, friction resistance, friction ratio, and pore pressure ratio versus depth. CPT data was subsequently processed based on generally accepted soil behavior type correlations (Robertson et al., 1989) to interpret soil classification, and other properties such as SPT N-value and undrained shear strength were also estimated through correlations. CPT data plots and detailed tabulated logs are presented in Appendix A.

2.3 Laboratory Testing

Laboratory tests were performed on selected samples to determine some of the physical and engineering properties of the subsurface soils. The results of the laboratory testing are either presented on the boring logs, and/or are included in Appendix B. The following soil tests were performed for this study:

Dry Density and Moisture Content (ASTM D2216 and ASTM 2937) – In-situ dry density and/or moisture tests were conducted on select samples to measure the in-place dry density and moisture content of the subsurface materials. These properties provide useful information for evaluating the physical characteristics of the subsurface soils. Test results are shown on the boring logs.

Atterberg Limits (ASTM D4318 and CT204) - Atterberg Limits tests were performed on four samples of cohesive soils encountered at the site. Liquid Limit, Plastic Limit, and Plasticity Index are useful in the classification and characterization of the engineering properties of soil, and help to evaluate the expansive characteristics of the soil and determine the USCS soil classification. Test results are presented in Appendix B, and on the boring logs.

Particle Size Analysis (Wet and Dry Sieve, ASTM D6913, D1140, and CT202) - Sieve analysis testing, including fines content measurements, was conducted on select samples to measure the soil particle size distribution and/or the total percentage of fines (i.e., percent passing the USCS No. 200 sieve). This information is useful for characterizing the soil type according to USCS and assists in the evaluation of liquefaction and dynamic densification susceptibility of granular soils. Test results are presented in Appendix B and on the boring logs.

Direct Shear (modified ASTM D3080) - Direct shear tests were performed on three samples of onsite soil materials to measure the angle of internal friction and cohesion of the tested material. This data can be utilized in developing allowable bearing capacities, below-grade wall design parameters, and strength characteristics of the materials. Direct shear specimens were wetted to near saturation and consolidated

under 1,000, 3,000 and 5,000 pounds per square foot (psf) normal (axial) loads prior to and during testing. Test results are presented in Appendix B.

Soil Corrosivity, Redox (ASTM D1498), pH (ASTM D4972), Resistivity (ASTM G57), Chloride (ASTM D4327), and Sulfate (ASTM D4327) - Soil corrosivity testing is performed to determine the effects of constituents in the soil on buried steel and concrete. The California Building Code (CBC) and International Building Code (IBC) requires water-soluble sulfate testing. Test results are summarized in Appendix B and are discussed in Section 4.3.

R-Value Test (ASTM D2844 and CT301) – Two R-value tests were conducted on bulk composite samples of near-surface sandy materials collected from cuttings generated from Borings B-7 and B-8, and Borings B-9 and B-10 between depths of zero and 5 feet. These tests provide data on prospective subgrade materials for pavement design, and test results are discussed in Section 6.8.1 and presented in Appendix B.

3.0 GEOLOGIC AND SEISMIC OVERVIEW

3.1 Geologic Setting

The project site is located in the central to southeastern portion of the San Joaquin Valley in Central California, denominated within the Great Valley Geomorphic province of California. The Great Valley consists of Cenozoic and Mesozoic sediments derived from alluvial processes in the surrounding Coast, Cascade, and Sierra Nevada Ranges. The San Joaquin Valley is a northwest to southeast-trending, structural trough situated between the Coast Ranges on the southwest and the Sierra Nevada on the northeast, two mountain ranges initially formed by uplift during the Jurassic and Cretaceous periods, with renewed uplift of the Sierra Nevada occurring since the late Tertiary period through the present time. The near-surface soils consist of Pleistocene sediments, with younger Holocene sediments adjacent to the currently active rivers and flood channels.

The San Joaquin Valley is drained primarily by the San Joaquin River in the north and the Kings River in the south, with several other river drainages (e.g., Merced, Tuolumne, and Stanislaus Rivers) emanating from the western slopes of the Sierra Nevada Mountains combining with the San Joaquin River. The San Joaquin River converges with the Sacramento River from the north at the San Joaquin-Sacramento Delta, the combined flow of which drains out to the Pacific Ocean through the Carquinez Strait and San Francisco Bay.

Alluvium deposits including the Riverbank Formation, Basin Deposits, Lake Deposits, and the Modesto Formation predominantly underlie the region. Locally, the site is identified as being underlain by the lower unit of the non-marine Formation (map symbol Qc) of Pleistocene age (Matthews and Burnett, 1965). These alluvial deposits generally consist of interlayered, moderately consolidated clay, silt, sand, and gravel deposits. Plate 4, *Regional Geologic Map,* presents a geologic map of the Fresno area including the project site based on Matthews and Burnett (CDMG, 1965).

3.2 Seismic Setting

The subject site is situated in an area of low to moderate seismic activity. According to CGS publications, the site does not lie within or near an identified Earthquake Fault Zone, as defined by the Alquist-Priolo Act of 1972. Also, according to published mapping by CGS, no known fault traces cross the site. The closest principal active faults to the project area are associated with the San Andreas Fault zone, located

approximately 70 miles southwest of the site, and the Owens Valley Fault zone located approximately 85 miles to the northeast of the site, as indicated on Plate 5, *Regional Fault Map*.

Tectonically, the San Joaquin Valley is situated between several major active fault systems including the San Andreas Fault System and Coast Range-Central Valley (CRCV) geomorphic block boundary to the west and the Sierra Nevada Fault System to the east. The San Andreas and Sierra Nevada systems are well known for Holocene rupture that has continued into historic time and represent the source of most of California's seismic history. The CRCV and Foothills Fault Systems have a lesser recurrence interval and therefore less historical seismicity.

Geographic information system databases and the CGS Fault Activity Map of California (Jennings and Bryant, 2010) indicate the closest mapped, potentially active to active faults to the project site include the following:

- Nunez Fault, located at its closest point about 50 miles southwest of the site near Coalinga.
- San Joaquin-O'Neill-Ortigalita Fault system, located at its closest point about 55 to 60 miles west of the site.
- Kern Canyon Fault, located at its closest point about 75 miles southeast of the property.
- Foothills Fault system, located at its closest point about 85 miles northwest of the property.

4.0 SUBSURFACE CONDITIONS

4.1 Subsurface Soil Conditions

During our subsurface exploration program, we investigated the subsurface soils and evaluated soil conditions to maximum depth of about 50 feet as performed for this study. From our field exploration and collected data, we conclude that where explored, subsurface soils below the topsoil in our borings consisted of primarily granular, native sandy alluvial soils to the maximum depth explored, with variable consistency ranging between locally loose, to dense. Other than material stockpiles of offsite origin noted in the southern portion of the site, we did not encounter soils suggestive of surficial fill from offsite sources during our exploration within the proposed MOB and Parking Structure areas.

In the area of the MOB building footprint, the near-surface soils encountered in the test borings and CPTs consisted of stratified, medium dense to very dense silty to clayey sands extending to depths ranging roughly between 7 and 10 feet below ground surface (bgs) at the time of exploration. These near-surface soils were underlain by a more uniform layer of primarily medium dense, relatively clean sand to silty sand to a depth of about 25 feet, in turn underlain by more stratified, medium dense to dense, silty to clayey sands and very stiff silt to sandy silt to the maximum depth explored of 50 feet.

Within the aforementioned sand layer between depths of 7 to 25 feet, some blow counts indicative of loose soils were measured in Borings B-1, B-2 and B-6 drilled in January 2020. However, a subsequent Boring B-2B drilled in June 2020 about 20 feet from B-2, as well as CPT-2 and CPT-4 through CPT-7 indicated this sand layer to be uniformly medium dense in consistency.

Test borings drilled in June 2020 to a maximum depth of 35 feet within the limits of the proposed new Parking Structure encountered generally similar subsurface conditions as at the MOB footprint. However, blow counts indicative of very loose, to loose soils were measured in Boring B-11 between approximate depths of 3 and 10 feet, and in B-14 at an approximate depth of 15 feet. An additional shallow boring, B-11B, was subsequently drilled about 15 feet southeast of B-11, encountering dense silty sand to a depth of 9 feet, becoming medium dense at the maximum depth of exploration at 10 feet.

Atterberg Limit tests performed on three samples of the near-surface soils with significant amount of fines (Borings B-1, B-4, and B-12 at 1.0-foot-deep) resulted in measured Liquid Limits (LL) between 16 and 17, and Plasticity Indices (PI) between 2 and 8, indicative of low plasticity and low expansion potential. An Atterberg Limit test performed on a slightly deeper sample (Boring B-6 at 3.5-foot deep) resulted in a

measured LL of 31 and a corresponding respective PI of 18, indicative of low plasticity and low to moderate expansion potential.

Additional details of materials encountered in the borings, including laboratory test results, are included in the boring logs in Appendix A, and laboratory test summaries are presented in Appendix B.

4.2 Groundwater Conditions

Groundwater was encountered in one of the borings (B-1) during drilling for this study at a depth of 39.5 feet. Groundwater was not encountered in any of the other borings, which were drilled to a maximum depth of 40 feet or less. Local groundwater was also interpreted in CPT-6 to be present at a depth of about 25 feet, based on a pore-pressure dissipation test.

A review of the online DWR "Groundwater Levels Data Library" indicated that Well #12S20E34N002M (Ground Surface Elevation 342.49), located at about 0.25 miles southwest of the site, had a recorded groundwater level of 100 feet (-242.49 El.) on 2/19/2002. The DWR data also indicated that highest (i.e., shallowest) water depth recorded since 1974 was 72.8 feet (269.69 El.), as measured on 10/27/1994. In addition, the most recent groundwater elevation contour map published by Provost and Pritchard representing winter 2005 conditions indicated a groundwater table elevation deeper than El. 198 in the project site vicinity, corresponding to a groundwater depth of at least 147 feet. Based on this available information and other regional measurements, we judge the historic high depth of water at the project site to be well over 70 feet below existing ground elevation, and that shallower groundwater encountered during our field investigations represent locally perched groundwater present in likely discontinuous, more permeable alluvial strata.

Groundwater levels can vary in response to time of year, variations in seasonal rainfall, well pumping, irrigation, and alterations to site drainage. We did not perform a detailed investigation of local groundwater conditions, which was beyond the scope of this study.

4.3 Corrosion Testing

Samples collected from the upper 5 feet of the soil profile at Borings B-1, B-4, and B-12 were tested to measure sulfate content, chloride content, redox potential, pH, resistivity, and presence of sulfides. Test results are included in Appendix B and summarized on the following table.

Table 1: Summary of Corrosion Test Results

Soil Description	Sample Depth (feet)	Sulfate (mg/kg)	Chloride (mg/kg)	Redox (mV)	Resistivity (ohm-cm)	Sulfide	pH
Dark Reddish Brown Clayey SAND (B-1)	0-5	88	11	483	6,825	Negative	6.6
Dark Reddish Brown Silty SAND (B-4)	0-5	145	7	504	5,072	Negative	6.9
Yellowish Brown Sandy Clay w/ Gravel (B-12)	0-5	84	2	426	6,067	Negative	7.7

Water-soluble sulfate can affect the concrete mix design for concrete in contact with the ground, such as shallow foundations, piles, piers, and concrete slabs. Section 4.3.1 in American Concrete Institute (ACI) 318, as referenced by the CBC, provides the following evaluation criteria:

Table 2: Sulfate Evaluation Criteria

Sulfate Exposure	Water-Soluble Sulfate in Soil, Percentage by Weight or (mg/kg)	Sulfate in Water, ppm	Cement Type	Max. Water Cementitious Ratio by Weight	Min. Unconfined Compressive Strength, psi
Negligible	0.00-0.10 (0-1,000)	0-150	NA	NA	NA
Moderate	0.10-0.20 (1,000-2,000)	150-1,500	II, IP (MS), IS (MS)	0.50	4,000
Severe	0.20-2.00 (2,000-20,000)	1,500-10,000	V	0.45	4,500
Very Severe	Over 2.00 (20,000)	Over 10,000	V plus pozzolan	0.45	4,500

Measured water-soluble sulfate contents were 88 mg/kg or 0.0088% by dry weight for the sample at B-1; 145 mg/kg or 0.0145% by dry weight for the sample at B-4; and 84 mg/kg or 0.0084% by dry weight for the sample at B-12. These results suggest the site soils should have negligible impact on buried concrete structures at the site. However, we note that water-soluble sulfate concentrations can vary due to the addition of fertilizer, irrigation, and other possible development activities.

Table 4.4.1 in ACI 318 suggests use of mitigation measures to protect reinforcing steel from corrosion where chloride ion contents are above 0.06% by dry weight. Measured chloride contents were 2 mg/kg, 7 mg/kg, and 11 mg/kg, or 0.0002%, 0.0006%, and 0.0011% by dry weight in the soil samples. Therefore,

the test results for chloride content does not suggest a corrosion hazard for mortar-coated steel and reinforced concrete structures due to high concentration of chloride.

In addition to sulfate and chloride contents described above, pH, oxidation-reduction potential (Redox), and resistivity values were measured in the soil samples. For cast and ductile iron pipes, we conducted a corrosion evaluation based on the 10-Point scaling method developed by the Cast Iron Pipe Research Association (CIPRA) and as detailed in Appendix A of the American Water Works Association (AWWA) publication C-105, and as shown on Table 3 below.

Table 3: Soil Test Evaluation Criteria (AWWA C-105)

Soil Characteristics	Points		Soil Characteristics	Points
Resistivity, ohm-cm, based on single probe or water-saturated soil box.			**Redox Potential, mV**	
<700	10		>+100	0
700-1,000	8		+50 to +100	3.5
1,000-1,200	5		0 to 50	4
1,200-1,500	2		Negative	5
1.500-2,000	1		**Sulfides**	
>2,000	0		Positive	3.5
PH			Trace	2
0-2	5		Negative	0
2-4	3		**Moisture**	
4-6.5	0		Poor drainage, continuously wet	2
6.5-7.5	0		Fair drainage, generally moist	1
7.5-8.5	0		Good drainage, generally dry	0
>8.5	5			

Assuming fair site drainage, the tested soil samples each had a total score of 1 point, indicating a low corrosive rating. When total points on the AWWA corrosivity scale are at least 10, the soil is classified as corrosive to cast and ductile iron pipe, and use of cathodic corrosion protection is often recommended.

These results are preliminary and provide information only on the specific soil sampled and tested. Other soil at the site may be more corrosive. Providing a complete assessment of the corrosion potential of the site soils and development of corrosion protection systems, if needed, is not within our scope of work, and if required, a California-registered professional corrosion engineer should be retained to provide these specialized services.

5.0 GEOLOGIC HAZARDS

5.1 Seismic Induced Hazards

Seismic hazards resulting from the effects of an earthquake generally include ground shaking, liquefaction, lateral spreading, dynamic settlement, fault ground rupture and fault creep, dam inundation, and tsunamis and seiches. Not all of these potential seismic hazards necessarily affect the site. Potential seismic hazards in relation to the planned construction are evaluated and discussed in the following sections.

5.1.1 Ground Shaking

The site may experience moderately strong ground shaking from a number of significant faults in the greater San Francisco Bay Area, and potentially from closer faults to the project site such as the Great Valley Fault System. Earthquake intensities vary throughout the region depending upon the magnitude of the earthquake, the distance of the site from the causative fault, the type of materials underlying the site and other factors. The California Building Code (CBC) governs structural design of buildings to accommodate potential earthquake ground shaking without loss of life.

5.1.2 Liquefaction Induced Phenomena

Research and historical data indicate that soil liquefaction generally occurs in saturated, loose granular soil (primarily fine to medium-grained, clean sand deposits) during or after strong seismic ground shaking and is typified by a loss of shear strength in the affected soil layer, thereby causing the soil to flow as a liquid. However, because of the higher inter-granular pressure of the soil at greater depths, the potential for liquefaction is generally limited to the upper 40 feet of the soil. Potential hazards associated with soil liquefaction below or near a structure include loss of foundation support, lateral spreading, sand boils, and areal and differential settlement.

Lateral spreading is lateral ground movement, with some vertical component, resulting from liquefaction. The soil literally rides on top of the liquefied layer. Lateral spreading can occur on relatively flat sites with slopes less than 2 percent under certain circumstances. Lateral spreading can cause ground cracking and settlement.

The site as well as most of the San Joaquin Valley is not currently within a mapped State of California Special Study Zone. Subsurface site soils explored consisted of alluvial layers of medium dense to very

dense clayey/silty sand and stiff to very stiff silt, with possible localized loose sand zones. Free groundwater was encountered only in exploratory Boring B-1 at a depth of 39.5 feet. In addition, groundwater was interpreted in CPT-6 using pore pressure dissipation testing to be at a depth of 25 feet, and both may be representative of locally perched groundwater. Available groundwater data suggests the historic high groundwater table depth is at least 70 feet below existing ground surface. Therefore, based on the information collected during the field investigation and laboratory testing, as well as a lack of a consistent shallow groundwater table, and the calculated seismic shaking at the site used for analysis, we anticipate the potential for liquefaction at the project site to be essentially nil.

5.1.3 Dynamic Compaction (Settlement)

Dynamic compaction is a phenomenon where loose, relatively clean sandy soils located above the water table densify due to vibratory loading, typically from strong seismic shaking, or vibratory equipment. Discontinuous layers of medium coarse-grained clean to silty sand were encountered in the borings and CPTs, which may be susceptible to dynamic compaction.

The initiation of dry settlement occurs as a result of strong seismic shaking, with the magnitude of settlement increasing with increasing site ground accelerations. The 2022 CBC specifies use of a Peak Ground Acceleration (PGA_M adjusted for Site Class per ASCE 7-16) as defined in the CBC, for liquefaction and other seismic analyses. This resulted in a PGA used in our analysis of 0.345 g. We also used a Mean Magnitude of 6.7 based on the return period of 10 percent in 50 years in Unified Hazard Tool Deaggregation Report. We assumed a groundwater elevation of 40 feet for analysis, and a Factor-of-Safety (FS) of 1.0 to initiate dry settlement.

We utilized the software LiquefyPro, Version 5 (CivilTech Software, 2011) to perform our dry settlement analysis for the borings, which calculates estimated dry settlement of clean sands, in addition to liquefaction settlements. Additionally, we utilized the CLiq v 2.2.1.11 software (CLiq), developed by Geologismiki, Geotechnical Software for the CPTs. Calculation of soil resistance against liquefaction is performed according to the Robertson (NCEER R&W 1998, 2009) procedure and as recommended on CGS Special Publication 117A (2008). The procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). This methodology compares a critical Cyclic Shear Stress (CSR) against the field Cyclic Resistance Ratio (CRR). When the CSR exceeds the CRR, the Factor-of Safety (FS) falls below 1.0 and liquefaction can occur.

The following Table 4 presents a summary of our analysis results. Calculation graphic printouts of our analyses are presented in Appendix C of this report. We note that dynamic settlements calculated from CPT data are generally considered more realistic than settlements calculated from borings since CPT data is recorded continuously as opposed to blow counts from borings, which were recorded at, and averaged over 5-foot depth intervals.

Table 4: Summary of Seismic Settlement Analysis Results

Boring No.	Calculated Liquefaction Settlement (inches)*	Calculated Dynamic Compaction Settlement (inches)	Calculated Total Seismic Settlement (inches)
B-1	0.0	0.65	0.65
B-2	0.0	0.62	0.62
B-3**	0.0	0.12	0.12+
B-4**	0.0	0.22	0.22+
B-5	0.0	0.15	0.15
B-6**	0.0	0.24	0.24+
CPT-2	0.0	0.11	0.11
CPT-4	0.0	0.12	0.12
CPT-5	0.0	0.12	0.12
CPT-6	0.0	0.11	0.11
CPT-7	0.0	0.11	0.11
CPT-8	0.0	0.13	0.13

* Considered zero due to lack of groundwater table
** Liquefiable layer extends below bottom of boring

Lateral spreading is lateral ground movement, with some vertical component, resulting from liquefaction. The soil literally rides on top of the liquefied layer. Lateral spreading can occur on relatively flat sites with slopes less than 2 percent under certain circumstances, generally when the liquefied layer is in relatively close proximity to an open, free slope face such as the bank of a creek channel. Lateral spreading can cause surficial ground tension cracking (i.e., lurch cracking) and settlement. Since no continuous, saturated layers of liquefaction-susceptible soils are present at the project site, we judge the potential for lateral spreading to occur at the site to be nil.

5.1.4 Fault Ground Rupture and Fault Creep

The State of California adopted the Alquist-Priolo Earthquake Fault Zone Act of 1972 (Chapter 7.5, Division 2, Sections 2621 – 2630, California Public Resources Code), which regulates development near active faults for the purpose of preventing surface fault rupture hazards to structures for human occupancy. In accordance with the Alquist-Priolo Act, the California Geological Survey established

boundary zones, or Earthquake Fault Zones, surrounding faults or fault segments judged sufficiently active, well defined, and mapped for some distance. Structures for human occupancy within designated Earthquake Fault Zone boundaries are not permitted unless surface fault rupture and fault creep hazards are adequately addressed in a site-specific evaluation of the development site.

The site is not currently within a designated Earthquake Fault Zone as defined by the State (Hart and Bryant, 1997). The closest mapped Earthquake Fault Zone to the site is associated with the Nunez Fault, located about 50 miles southwest of the site (see Plate 4). Since the site is not within or near an Earthquake Fault Zone, the potential for fault ground rupture and fault creep hazards is essentially nil.

5.2 Other Hazards

Potential geologic hazards other than those caused by a seismic event generally include ground failure and subsidence, consolidation settlement, landslides, expansive and collapsible soils, flooding, and soil erosion. These are discussed and evaluated in the following sections.

5.2.1 Ground Cracking and Subsidence

Withdrawal of groundwater and other fluids (i.e., petroleum and the extraction of natural gas) from beneath the surface has been linked to large-scale, regional land subsidence and associated cracking on the ground surface. Other causes for ground cracking and subsidence include the oxidation and resultant compaction of peat beds, the decline of groundwater levels and consequent compaction of aquifers, hydrocompaction and subsequent settlement of alluvial deposits above the water table from irrigation, or a combination of any of these causes. Historic ground subsidence has occurred within the San Joaquin Valley due to groundwater pumping, and a study of potential future subsidence of the project vicinity is beyond the scope of this study. However, any potential future subsidence would likely be regional and gradual in nature and is not expected to significantly affect the project.

5.2.2 Consolidation Settlement

Consolidation is the densification of soil into a denser arrangement from additional loading, such as new fills or foundations. Consolidation of clayey soils is usually a long-term process, whereby the water is squeezed out of the soil matrix with time. Sandy soils consolidate relatively rapidly with an introduction of a load. Consolidation of soft and loose soil layers and lenses can cause settlement of the ground surface or buildings. Based on testing in the field, laboratory testing, nature of the soil encountered (i.e.,

lack of saturated soft compressible clays), and lack of a groundwater table within compressible soils, the subsurface soils are not anticipated to consolidate significantly under project loads.

5.2.3 Expansive and Collapsible Soils

The subsurface deposits encountered during the drilling program consisted of an intermittent surficial layer of low plasticity, medium dense to very dense silty/clayey sand. Collapsible soils are loose fine sandy and silty soils laid down by the action of flowing water, usually in alluvial fan deposits. Terrace deposits and fluvial deposits can also contain collapsible soil deposits. The soil particles are usually bound together with a mineral precipitate. The soil maintains a loose structure until a load is imposed on the soil and water is introduced. The water breaks down the inter-particle bonds and the newly imposed loading densifies the soil. The soil samples retrieved during this study did not have the characteristics of collapsible soil and the site is not in an area known for such soils.

Visual observation of selective samples and laboratory tests conducted for this study indicated the soils to be of low plasticity and the near-surface soils are therefore generally very low, to low in expansion potential.

5.2.4 Landsliding/ Slope Stability

The general topography of the site as well as the surrounding area is relatively flat. Therefore, the site is not prone to landsliding.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based upon the analysis of the information gathered during the course of this study and our understanding of the proposed improvements.

6.1 Conclusions

The site is considered geotechnically suitable for the proposed improvements provided the recommendations of this report are incorporated into the design and implemented during construction. The predominant geotechnical and geological issues that need to be addressed at this site are summarized below.

Variation in Consistency of Onsite Granular Soils – Some of the soils encountered at various depths in the subsurface profile by the test borings encountered material that based on sampler blow counts appeared to be relatively loose and weak (i.e., compressible) granular sands, and as such possibly prone to settlement in response to structural loading. However, our explorations using borings and CPTs did not establish a consistent lateral and vertical extent of such weak soils. We generally encountered such soils within borings advanced along the western perimeter of the site (Borings B-1, B-6, B-11 and B-14) as well as in Boring B-2 east of the MOB footprint. However, supplemental borings advanced adjacent to B-2 and B-11 did not encounter the weak soils at the same depth, and our CPTs did not encounter subsurface soils interpreted to be weak.

In order to account for the presence of possible weak and compressible soils in the structure footprints, we reduced allowable bearing capacities to account for such uncertainties. In addition, we recommend evaluating foundation excavations on an individual basis during construction in order to assess whether any additional remedial measures (e.g., over-excavation and compaction below footings) are warranted.

Seismic Settlements - Additional, relatively minor site settlements may potentially occur based on settlement of discontinuous, relatively loose and clean granular sand layers underlying the site in response to the design seismic event. Using analysis results based on continuously recorded CPT data for analysis as opposed to SPT blow counts taken from test borings at wider depth intervals, we estimate maximum seismic settlements at the site to be likely less than ¼ inch. These settlements should be considered in design of structure foundations in addition to short-term settlements of foundations based on structural loads.

Seismic Ground Shaking – The site is located within a seismically low to moderate region. However, as a minimum, the building design should consider the effects of seismic activity in accordance with the latest edition of the California Building Code (CBC 2022).

Fill Stockpiles - Debris fill stockpiles were encountered in the southern portion of the site resulting from dumping from outside sources. These materials are generally unsuitable for reuse as part of the project and should generally be removed from the site. However, a portion of this material if free from trash and debris could be reused in non-structural (e.g., landscape) areas if accepted by the landscape architect.

Other potential geotechnical considerations, including those that should not significantly affect the project are explained below.

Winter Construction – If grading occurs in the winter rainy season, appropriate erosion control measures may be required and weatherproofing of the structural pad may need to be considered. Winter rains may also impact foundation excavations and underground utility construction.

Groundwater – Groundwater was not encountered at shallow depth in borings and should not have a significant impact on construction excavations to the anticipated depths (i.e., less than 10 feet) except for encountering possible localized perched water resulting from seasonal rainfall or irrigation that may collect on top of local and unknown, less permeable soil layers.

6.2 Seismic Design Parameters

The proposed development should be designed in accordance with local design practice to resist the lateral forces generated by ground shaking associated with a major earthquake occurring within the central portion of California. Based on the subsurface conditions encountered in our borings, our evaluation of the site geology, and extrapolating the alluvial soil site conditions to the uppermost 100 feet of the soil profile, we estimate the average soil N value to be at least 30 blows per foot (V_{s30} of 260 meter/second), classifying the site as Site Class “D”. In accordance with ASCE 7-16, Section 11.4.8, a ground motion hazard analysis is required for structures on Site Class “D” with S_1 greater than or equal to 0.2 (unless Exceptions are taken).

Since an S_1 value of 0.22 was calculated for the site, a site-specific ground motion analysis in accordance with CBC 2022 and ASCE 7-16, Section 21.2.1.2, was therefore performed for the site, and as requested by the Structural Engineer.

6.2.1 Probabilistic (MCE_R) Ground Motions

We performed a Probabilistic Seismic Hazard Analysis for a 2,475-year return-period ground motion corresponding to a 2 percent probability that the ground motion will be exceeded over a 50-year period. The analysis was performed using the 2014 USGS Unified Hazard Tool, Dynamic Ed., which includes the attenuation relationships of Abrahamson et al. (2014) NGA West 2, Boore et al. (2014) NGA West 2, Campbell-Bozorgnia (2014) NGA West 2, and Chiou-Youngs (2014) NGA West 2. The Method 2 analysis was carried out using the USGS Risk-Targeted Ground Motion Calculator. The resultant spectral accelerations were then scaled up by maximum direction scale factors presented in Section 21.2. Appendix D, *Site Specific Ground Motion Analysis*, includes the results of the site-specific analysis.

6.2.2 Deterministic (MCE_R) Ground Motions

A site-specific deterministic analysis (ASCE 7-16, Section 21.2.2), was not performed for the site since the largest spectral response acceleration of the probabilistic ground motion response spectrum is less than $1.2F_a$. F_a value for the project site is 1.355 and largest spectral response acceleration was calculated to be 0.97g.

6.2.3 Site-Specific MCE_R

The site-specific Risk Targeted Maximum Considered Earthquake ground motion was then determined per ASCE 7-16, Section 21.2.3 by taking the lower of the spectral accelerations taken from the probabilistic and deterministic analysis. Since deterministic analysis was not required, probabilistic spectral accelerations were taken. The results are presented in Appendix D.

6.2.4 Design Response Spectrum

The design response spectral acceleration was calculated per ASCE 7-16, Section 21.3 and compared to the design response spectrum from ASCE 7-16, Section 11.4.6 to verify that the values from the site-specific analysis meet the requirement of not less than 80 percent of the accelerations obtained from Section 11.4.6. If the values were less than the 80 percent requirement, they were then raised to the 80 percent value to obtain the final Design Response Spectrum S_a (g). The results are presented in Appendix D.

The adjusted maximum spectral response accelerations and designed spectral response acceleration values were determined from the site-specific analysis as per ASCE 7-16, Section 21.4 and were

confirmed that the values are not less than 80 percent of the values obtained from, ASCE 7-16, Section 11.4.3 and 11.4.4.

6.2.5 Design Acceleration Parameters

The design acceleration parameters were calculated per ASCE 7-16, Section 21.4 and the values were compared to verify that the values meet the requirement of not less than 80 percent of the values determined in accordance with ASCE Section 11.4.3 and 11.4.4.

6.2.6 Site-Specific Peak Ground Acceleration (PGA_M)

Peak Ground Acceleration (PGA_M) was determined per ASCE 7-16, Section 21.5 by taking the lower of the PGA determined from the probabilistic and deterministic ground motions, not less than 80 percent of PGA_M determined from ASCE 7-16, equation 11.8 -1. Since deterministic analysis was not required, the probabilistic PGA was used. The results are presented in Appendix D.

6.2.7 Conclusions

For design of site structures in accordance with the seismic provisions of the CBC 2022 and American Society of Civil Engineers (ASCE) 7-16 (including Supplements 1 through 3), we recommend using the following design seismic ground motion values. See Appendix D for detailed results.

Table 5: Seismic Design Parameters Based on 2022 CBC (ASCE 7-16)

Site Class	D
Mapped Spectral Response Accelerations Short Period, S_S 1-second Period, S_1	 0.557 g 0.22 g
Site-Specific Adjusted Maximum Spectral Response Accelerations Short Period, S_{MS} 1-second Period, S_{M1}	 0.872 g 0.668 g
Site-Specific Design Spectral Response Accelerations Short Period, S_{DS} 1-second Period, S_{D1}	 0.581 g 0.445 g
Site-Specific Peak Ground Acceleration (PGA_M)	0.345 g

ASCE 7-16 § 11.6-1 and 11.6-2 indicate that the Seismic Design Category for all Occupancy Categories is “D”.

6.3 Site Preparation and Grading

Site preparation and grading should be performed in accordance with these recommendations. During the standard pre-construction conference held at the jobsite with representatives from the owner, general contractor, grading contractor, and the geotechnical engineer prior to starting the clearing operations at the site, geotechnical considerations affecting grading operations should be included as part of the standard meeting agenda.

Site grading will consist of cut excavation and minor fills to construct the MOB and parking structure pads, and to establish drainage grades for the surrounding new pavements and other site infrastructure. As noted in Section 7.0, the geotechnical engineer should observe, and test, as appropriate, all aspects of site grading, including building pad, parking structure pad, and paved area preparation.

6.3.1 Site Preparation

Site preparation (clearing) should consist of stripping of all existing vegetation and organic topsoil, and removing all foreign onsite stockpiles containing vegetation, trash, debris, dumped import soils, existing undocumented fill where encountered, and other deleterious materials within the proposed development area. Please note that we observed landscape waste stockpiles only on the south side of the property and did not conclusively encounter surficial undocumented fill from postulated (by others) previous site grading in any of the exploratory borings during the field exploration. At the landscape architect's option, the grading contractor may reuse stripped soils containing organics, but free of trash, contaminated soil and construction debris as non-structural, non-engineered fill in landscape areas only.

The geotechnical engineer's representative should observe and confirm the adequacy of site clearing operations during construction prior to engineered fill placement and observe and confirm all backfilling operations for any excavations to remove deleterious material. Loose, soft, or otherwise unsuitable soils should be excavated until firm native soil is exposed to the satisfaction of the geotechnical engineer. Holes resulting from the removal of any underground obstructions or root balls that would extend below the proposed finish grade should be cleaned of remaining loose material to expose firm soil. The resulting over-excavated surfaces should be scarified, moisture conditioned, and then backfilled using compacted engineered fill, or an alternate material acceptable to the Geotechnical Engineer, such as a flowable sand-cement slurry (Controlled Density Fill, or CDF).

6.3.2 Engineered Fill Materials and Placement

The geotechnical engineer should receive samples of, and approve all proposed import fill materials prior to use on site. Imported soil for engineered fill should be free of environmental contaminants, organic materials and debris and should be relatively non-expansive, having a Plasticity Index of 15 or less, an R-Value greater than 40, and contain sufficient fines content (generally between 6 and 12 percent) so the soil can bind together. Additionally, imported materials for engineered fill should not contain rocks or lumps greater than 6 inches in maximum size, and should have at least 95 percent smaller than 3 inches in maximum size. On-site soils having an organic content of less than 3 percent by weight and meeting the aforementioned size requirements for import fill can be reused as engineered fill as approved by the geotechnical engineer.

Following excavation to the required grades, subgrades in areas to receive engineered fill, as well as subgrades for slabs-on-grade or pavements, should be scarified to a depth of at least 8 inches; moisture conditioned, and compacted to the requirements for engineered fill presented in Section 6.3.3. Engineered fill should be moisture conditioned and thoroughly mixed during placement to provide uniformity in each layer. In order to achieve satisfactory compaction of the subgrade and engineered fill materials, it may be necessary to adjust the water content at the time of construction. This may require addition of water to soils that are too dry, or that scarification and aeration be performed for soils that are too wet.

The fill material should be evenly spread and compacted in relatively uniform lifts not exceeding 8 inches in pre-compacted (i.e., loose lift) thickness. Smaller lifts may be necessary to achieve the minimum required compaction using lighter weight compaction equipment. Moisture conditioning may be more difficult to achieve during cold, wet periods of the year, or during extreme temperatures and after precipitation events. The final compacted surface should be firm and unyielding and should be protected from damage caused by traffic or weather. Soil subgrades should be kept moist during construction.

6.3.3 Project Compaction Recommendations

The following table provides the recommended compaction requirements for this project. Not all soils, aggregates and scenarios listed below may be applicable for this project. Specific grading recommendations are discussed individually within applicable sections of this report.

Table 6: Project Compaction Requirements

Description	Percent Relative Compaction	Minimum Percent Above Optimum Moisture Content
Building Pad, Onsite or Imported Soil	90	2
Building Pad, Subgrade Soil (upper 12 inches)	90	2
Building Pad, Lime-Cement Treated Soil	90	3
AC Pavement, Subgrade, Upper 8”	95	2
AC Pavement, Import Fill	90	2
AC Pavement, Onsite Soil	90	2
AC Pavement, Class 2 Baserock	95	2
AC Pavement, Lime-Cement Treated Soil, Subgrade	93	2
Concrete Flatwork, Class 2 Baserock	90	2
Concrete Flatwork, Subgrade Soil	90	2
Retaining Wall Backfill, Upper 5’	90	2
Retaining Wall Backfill, 5’ and Deeper	95	2
Underground Utility Trench Backfill, Import	90	2
Underground Utility Trench Backfill, Onsite Soil	90	2
Underground Utility Trench Backfill - Landscape Areas (not including areas below flatwork)	85	2
Underground Utility Trench Backfill, Clean Sand	95	4
Underground Utility Trench Backfill, Upper 3’ below Pavement Sections	95	2

6.3.4 Building Pad Preparation

Following site preparation and removal of all unsuitable supporting materials in accordance with Section 6.3.1, including organic topsoil, surficial disturbed soils (e.g., agriculturally tilled soils) and undocumented fills where encountered, the new building pad should be constructed in accordance with the grading, material, and fill construction recommendations presented in Sections 6.3.2 and 6.3.3. In addition, to achieve a uniform supporting subgrade, as a minimum, the uppermost 12 inches of the finished building pad subgrade should consist of reworked, scarified soil or newly placed fill compacted as engineered fill to a minimum 90 percent relative compaction. The engineered fill layer should extend a minimum 5-foot distance beyond the perimeter of the building footprint.

The completed building pad should be essentially stable, displaying minimal deflection or rutting under proof loading using rubber-tired construction equipment, prior to building pad certification. If the building pad subgrade is unstable at the time the subgrade reaches design pad elevation, the pad subgrade soils

could be reworked by ripping, drying, and re-compacting the subgrade soils if the construction schedule allows, or alternatively, stabilization methods described in Section 6.3.6 may be employed.

6.3.5 Grading Pavement and Flatwork Areas

Areas to receive pavement and/or flatwork should be scarified to a depth of 8 inches below existing grade or final subgrade, whichever is lower. Scarified areas should be moisture conditioned and compacted to the requirements indicated in Table 6. Where required to reach design subgrade elevations, engineered fill should be placed and compacted per the recommendations presented in Section 6.3.2. Once the compacted pavement subgrade has been reached, it is recommended that baserock in paved and on-grade concrete slab areas be placed as soon as practical after grading to protect the subgrade soil from drying. Alternatively, the subgrade should be kept moist by watering as needed until baserock is placed.

Rubber-tired heavy construction equipment, such as a full water truck, should be used to proof load exposed subgrade areas in the presence of the geotechnical engineer where pumping is suspected. Proof loading will determine if the subgrade soil is capable of supporting construction equipment without excessive pumping or rutting.

6.3.6 Site Winterization and Unstable Subgrade Conditions

If grading occurs in the winter rainy season, unstable and unworkable subgrade conditions may be locally present and compaction of onsite soils may not be feasible. These conditions may be remedied using soil admixtures, such as lime-cement. A 4 percent mixture of lime-cement based on a dry soil unit weight of 115 pounds per cubic foot (pcf) may be assumed for planning purposes. Treatment may vary between 12 to 18 inches, depending on the severity of the instability and the anticipated construction equipment loads. More detailed and final recommendations can be provided during construction if needed. Stabilizing subgrade in small, isolated areas can generally be accomplished with the approval of the geotechnical engineer by over-excavating 1 foot, placing Tensar TriAx TX-140 or equivalent geogrid on the soil, and then placing 12 inches of Class 2 baserock on the geogrid. The upper 6 inches of the baserock should be compacted to at least 90 percent relative compaction.

6.3.7 Site Drainage

Final grades should be designed to provide drainage away from structures and the top of slopes. Exposed soil areas within 10 feet of proposed structures or as applicable from the site conditions should slope at

a minimum of 5 percent away from the structures. Adjacent concrete flatwork should slope a minimum 2 percent away from the structures. Roof leaders and downspouts should not discharge into landscape areas adjacent to structures and should discharge onto paved surfaces sloping away from structures or into a closed pipe system channeled away from the structure to an approved collector or outfall.

6.4 Utility Trench Construction

6.4.1 Trench Backfilling

Utility trenches may be backfilled with onsite or approved import soil above the utility bedding and shading materials. If rocks or concrete larger than 4 inches in maximum size are encountered, they should be removed from the fill material prior to placement in the utility trenches. Utility bedding and shading compaction requirements should be in conformance with the requirements of the local agencies having jurisdiction and as recommended by the pipe manufacturers. Jetting of trench backfill is not recommended. Compaction recommendations are presented in Table 6.

Pea gravel, rod mill, or other similar self-compacting material should not be utilized for trench backfill since this material will most readily transmit possible shallow groundwater, perched groundwater, or irrigation water to other locations within the site and potentially beneath the buildings. Additionally, fines may migrate into the voids in the pea gravel or rod mill, which could cause settlement of the ground surface above the trench.

If rain is expected and the trench will remain open, the bottom of the trench may be lined with 1 to 2 inches of gravel. This would provide a working surface in the trench bottom. The trench bottom may have to be sloped to a low point to pump the water out of the trench.

6.4.2 Pipe Bedding and Shading

Pipe bedding material is placed in the utility trench bottom to provide a uniform surface, a cushion, and protection for the utility pipe. Shading material is placed around the utility pipe after installation and testing to protect the pipe. Bedding and shading material and placement are typically specified by the pipe manufacturer, agency, or project designer. Agency and pipe manufacturer recommendations may supersede our suggestions. These suggestions are intended as guidelines and our opinions based on our experience to provide the most cost-effective method for protecting the utility pipe and surrounding

structures. Other geotechnical engineers, agency personnel, contractors, and civil engineers may have different opinions regarding this matter.

Bedding and Shading Material - The bedding and shading material should be the same material to simplify construction. The material should be clean, uniformly graded, fine to medium-grained sand. We suggest that bedding and shading material contain less than 3 percent fines with 100 percent passing the No. 8 sieve. Coarse sand, angular gravel or baserock should be avoided since this type of shading material may bridge when backfilling around the pipe, possibly creating voids, and may be too stiff as bedding material. Open graded gravel should be avoided for shading since this material contains voids, and the surrounding soil could wash into the voids, potentially causing future ground settlement. However, open graded gravel may be required for bedding material when water is entering the trench. This would provide a stable working surface and a drainage path to a sump pit in the trench for collected trench water. The maximum size for bedding material should be limited to about ¾ inch.

Bedding Material Placement - The thickness of the bedding material should be minimized to reduce the amount of trench excavation, soil export, and imported bedding material. We suggest a bedding thickness of 2 to 3 inches for pipes less than 8-inches in diameter and about 4 to 6 inches for larger pipes. Bedding for very large diameter pipes is typically specified by the pipe manufacturer. Compaction is not required for thin layers of bedding material. The pipe needs to be able to set into the bedding and walking on a thin layer of bedding material should sufficiently compact the sand. Rounded gravel may be unstable during construction, but once the pipe and shading material is in place, the rounded gravel will be confined and stable.

Shading Material Placement – We do not recommend jetting since the type of shading material is unknown when preparing the geotechnical report and agencies typically do not permit jetting. If the sand contains fines or if the sand is well graded, jetting will not work. Additionally, if too much water is used during jetting, this could create a wet and unstable condition. The shading material should be able to flow around and under the utility pipe during placement. The contractor should perform some compaction effort along the sides of the pipe to consolidate the shading material around the pipe. A minimum thickness of about 6 inches of shading material should be placed over the pipe to protect the pipe from compaction of the soil above the shading material. The contractor should also provide some compaction effort to densify the shading material above the pipe. Relative compaction testing is not usually performed

on the shading material. However, the contractor is ultimately responsible for the integrity of the utility pipe.

6.5 Temporary Excavation Slopes and Shoring

Where temporary excavation slopes are required, the Contractor should incorporate all appropriate requirements of OSHA/ Cal OSHA into the design of any temporary construction slopes used during construction. OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, Subpart P, provides excavation safety regulations that apply to excavations greater than 5 feet in depth.

The Contractor, or his specialty subcontractor, should design temporary construction slopes to conform to the OSHA regulations and should determine actual temporary slope inclinations based on the subsurface conditions exposed at the time of construction. For pre-construction planning purposes, the subsurface materials in near-surface areas of the site where excavation may take place may be assumed to consist of a stiff silty-sand mix categorized as OSHA Type B with temporary slope inclination of no steeper than 1:1 (horizontal to vertical). Soils exposed by excavations significantly deeper than 8 feet, if any, should be initially categorized as clean, granular Type C soils with a temporary slope inclination of no steeper than 1.5:1. The maximum slope ratio is assumed uniform from top to toe of the slope. The type of slope material and actual temporary construction slopes should be confirmed or adjusted during construction by a person who is trained as a “competent person” as designated by OSHA and directly responsible to the grading contractor.

If temporary slopes are left open for extended periods of time, exposure to weather and rain could have detrimental effects such as sloughing and erosion on surficial soils exposed in the excavations. We recommend that all vehicles and other surcharge loads be kept at least 10 feet away from the top of temporary slopes, and that such temporary slopes are protected from excessive drying or saturation during construction. In addition, adequate provisions should be made to prevent water from ponding on top of the slope and from flowing over the slope face. Desiccation or excessive moisture in the excavation could reduce stability and require shoring or laying back of the side slopes.

6.6 Foundations

6.6.1 Shallow Foundations

The proposed MOB and Parking Structure can be supported on conventional shallow spread footings bearing on approved, undisturbed native material or on engineered fill. Footings should be founded a minimum of 24 inches below lowest adjacent finished grade (exterior grade or building pad subgrade elevation, as applicable). Continuous footings should have a minimum width of at least 18 inches, and isolated column footings should have a minimum width of at least 24 inches. In addition, footings located adjacent to other footings or utility trenches should bear below an imaginary 1:1 (horizontal to vertical) plane projected upward from the bottom edge of the adjacent footings or utility trenches. Footing reinforcement design is the responsibility of the project Structural Engineer.

Footings should be designed for the following allowable bearing pressures presented on Table 7. These allowable pressures were based on allowable settlement considerations, which control in granular soil conditions as opposed to ultimate bearing capacities.

Table 7: Allowable Bearing Pressures for Spread Footings

Load Condition	Allowable Net Bearing Pressure (psf)
Dead plus Live Loads	4,200
Total Loads (including wind or seismic)	5,600

The bearing pressures presented in Table 7 may be used for shallow footings likely founded at approximate 3 to 4½ foot depth below building pad grade at both the MOB and Parking Structure. These values may also be used for the deeper MOB footings in the elevator area anticipated to be founded about 9 feet below grade, for which we evaluated specifically using the CPT exploration program results.

If site preparation and foundation observation services are conducted as outlined in the Geotechnical Study report, static vertical settlement is expected to be up to 1 inch for footings bearing within the materials described in the report and designed to the aforementioned allowable bearing pressures. Estimated settlements for lower bearing pressures may be considered proportionally less than the settlement indicated assuming the maximum bearing pressure. Static settlements should be expected to occur relatively rapidly as the loads are applied. Differential settlement across the structure can be considered to be approximately ½ the total value or less across a typical 30-foot column bay spacing.

Potential settlements of ¼ inch or less in the event of a design seismic event in addition to the static settlement should also be considered in the design of new foundation elements.

The geotechnical engineer should be retained to observe and confirm that footing excavations prior to formwork and reinforcing steel placement bear in soils suitable for the recommended maximum design bearing pressure. Where relatively clean granular sands are exposed at the bottom of footing excavations, the uppermost 12 inches of the excavation bottoms should be compacted to a minimum 95 percent relative compaction, as directed by the Geotechnical Engineer's representative. If unsuitable bottom soil such as undocumented fill or very loose sands are present, the excavation should be deepened (over-excavated) until either suitable supporting material is encountered, or an adequate thickness of supporting engineered backfill below the footing will be attained, in the geotechnical engineer's opinion. The over excavation should be backfilled using engineered soil or if appropriate, lean concrete (or a sand-cement slurry mix acceptable to the geotechnical engineer) up to the bottom of the footing concrete.

Footing excavations should have firm bottoms and be free from excessive slough prior to concrete or reinforcing steel placement. Care should also be taken to prevent excessive wetting or drying of the bearing materials during construction. If the geotechnical engineer observes extremely wet or dry or any loose or disturbed material at the bottom of the footing excavations, these materials should be removed prior to placing concrete. If construction occurs during the winter months, a thin layer of concrete (sometimes referred to as a rat slab) could be placed at the bottom of the footing excavations. This will protect the bearing soil and facilitate removal of water and slough if rainwater fills the excavations.

If the allowable bearing pressures presented above result in excessively large foundations and/or if the estimated static and seismic settlements are too excessive for the proposed structure, soil improvement options can be provided upon request.

6.6.2 Lateral Resistance

Shallow footing foundations can resist lateral loads with a combination of bottom friction and passive resistance. An allowable coefficient of friction of 0.40 between the base of the foundation elements and underlying material is recommended. In addition, an allowable passive resistance equal to an equivalent fluid weighing 350 pcf acting against the foundation may be used for lateral load resistance against the sides of footings perpendicular to the direction of loading where the footing is poured neat against

undisturbed material. The top foot of passive resistance at foundations not adjacent to pavement or hardscape should be neglected. In order to fully mobilize this passive resistance, a lateral footing deflection approximately 1 to 2 percent of the embedment of the footing is required. If it is desired to limit the amount of lateral deflection to mobilize the passive resistance, a proportional safety factor should be applied. The friction between the bottom of a slab-on-grade floor and the underlying soil should not be utilized to resist lateral forces.

6.7 Concrete Slabs-on-Grade

6.7.1 Concrete Floor Slabs

Non-structural concrete slabs-on-grade should be a minimum of 5 inches in thickness reinforced as a minimum by No. 4 steel reinforcement placed at 18-inch centers each way. However, the Structural Engineer should design the actual slab thickness and reinforcing as well as slab jointing. A modulus of subgrade reaction, k of 150 pounds per cubic inch (pci) can be used for design of concrete slabs-on-grade. Onsite surficial materials appear to have a relatively low expansion potential and therefore, an underlying non-expansive fill section for building pads is not necessary.

Slab-on-grade concrete floors with moisture sensitive floor coverings may require protection from moisture transmission through the slab from the underlying subgrade soils. Geotechnical engineers are not experts in the protection of floor coverings from underslab moisture, and if of significant importance, an expert in concrete slab construction familiar with moisture transmission issues through concrete slabs should be consulted for specific slab moisture protection design. However, we provide the following general discussion on typical types of moisture protection used in local construction.

Primary protection from moisture transmission through floor concrete is typically provided by a moisture retarder consisting of a relatively impermeable vapor retarder placed between the subgrade soil and the bottom of the concrete slab. A capillary break consisting of at least 4 inches of free-draining gravel, such as ¾-inch, clean, crushed, uniformly graded gravel with less than 3 percent passing No. 200 sieve, or equivalent, has also been used by designers below the vapor retarder. The vapor retarder should be at least 10-mil thick and should conform to the requirements for ASTM E 1745 Class C Underslab Vapor Retarders (e.g., Griffolyn Type 65, Griffolyn Vapor Guard, Moistop Ultra C, or equivalent). If additional protection is desired by the owner, a higher quality vapor barrier conforming to the requirements of ASTM E 1745 Class A, with a water vapor transmission rate less than or equal to 0.006 gr/ft^2/hr (i.e., 0.012

perms) per ASTM E 96 (e.g., 15-mil thick “Stego Wrap Class A”), or to Class B (Griffolyn Type 85, Moistop Ultra B, or equivalent) may be used in place of a Class C retarder.

The vapor retarder or barrier should be placed directly under the slab. A sand layer is not required over the vapor retarder from a geotechnical standpoint. If sand on top of the vapor retarder is required by the design structural engineer, we suggest the thickness be minimized to less than 1 inch. If construction occurs in the winter months, water may pond within the sand layer since the vapor retarder may prevent the vertical percolation of rainwater.

ASTM E1643 should be utilized as a guideline for the installation of the vapor retarder. During construction, all penetrations (e.g., pipes and conduits,) overlap seams, and punctures should be completely sealed using a waterproof tape or mastic applied in accordance with the vapor retarder manufacturer’s specifications. The vapor retarder or barrier should extend to the perimeter cutoff grade beam, as applicable.

6.7.2 Exterior Concrete Flatwork (Non-Vehicular)

Exterior concrete flatwork intended for pedestrian traffic should be at least 4 inches thick and supported on either compacted native subgrade or a baserock layer constructed in accordance with the applicable recommendations presented in Sections 6.3.2 and 6.3.5.

6.8 Pavement Design

6.8.1 Flexible Pavements

Recommendations for the design of flexible asphalt concrete pavement sections were developed in accordance with the procedures outlined in the latest edition of the Caltrans Highway Design Manual. The Caltrans design method uses Traffic Indices (TI) to represent anticipated wheel loads and frequency of usage for a given design life. A design life of 20 years is typically used in California. Factors such as surface and subsurface drainage have an effect on the overall life of a pavement section.

R-values of 36 and 46 were obtained by laboratory tests performed on two samples of the near surface (i.e., within upper 5 feet) subgrade material, and used for our analyses. To account for subsurface variability of the site, an R-value of 25 was used for determining the design sections. Based on Traffic Index values of 4.5, 5.0. 6.0, and 7.0, the following resulting recommended structural asphalt concrete (AC)/aggregate base (AB) pavement sections were developed based on the provided TI values.

Table 8: Recommended Pavement Design Alternatives

Load Application (Traffic Index)	Asphalt Concrete (in.)	Class 2 AB (in.)	Total Section (in.)
Driveways and Parking Areas for Passenger Car and Light Truck Traffic (4.5)	2.5	6.0	8.5
Driveways for Passenger Car and Light Truck Traffic (5.0)	2.5	8.0	10.5
Driveways for Moderate Truck Traffic (6.0)	3.0	10.0	13.0
Driveways for Moderately Heavy Truck Traffic (7.0)	4.0	11.0	15.0

If the lighter pavements (TI = 4.5) are planned to be placed prior to, or during construction, the traffic indices and pavement sections may not be adequate for support of what is typically more frequent and heavier construction traffic. Therefore, if the pavement sections will be used for construction access, the heavier pavement section should be considered, or the asphalt concrete should be placed in phases (e.g., placement of final lift of AC after building construction is substantially completed) to minimize pavement damage caused by construction traffic.

Design based on the aforementioned traffic indices should provide the design pavement life with only a normal amount of pavement maintenance.

In areas where pavements will abut planted areas or adjacent permeable pavement sections, the pavement aggregate base layer, pavement section subgrade soils and trench backfill should be protected against saturation. Planned concrete curbs or other impermeable barrier materials should extend at least to the bottom of the aggregate base layer, forming a concrete barrier between the landscaped areas and the pavement section. In addition, water should never be allowed to pond behind the curb and gutter during or after the completion of construction.

AB for use in flexible pavements should conform to Caltrans Standard Specification Sections 26-1.02A and 26-1.02B (2010) for Class 2 AB. AB from recycled sources offered by AB suppliers as well as AC grindings mixed with existing baserock and meeting Class 2 specifications can be utilized in lieu of virgin Class 2 AB upon approval of the Geotechnical Engineer. AB used in pavement sections should be compacted to a minimum 95 percent relative compaction (ASTM D1557) and should be firm and unyielding at the time of asphalt concrete placement.

6.8.2 Rigid Pavements

As an alternative to a flexible pavement section, new pavement areas may consist of rigid concrete pavement, which in addition to our subgrade preparation recommendations presented for slabs-on-grade, should be designed and constructed in accordance with American Concrete Institute (ACI) 330R-08 – *Guide for Design and Construction of Concrete Parking Lots*. Based on an assumed 6-inch-thick aggregate base layer underlying the rigid pavement, a subgrade-subbase support strength value of 130 pci was assumed in our analysis. In addition, our design assumes that rigid pavements would be restrained laterally by concrete walls or curbs, and that the concrete will have a compressive strength of at least 4,000 psi.

Based on these assumptions, the table below shows minimum rigid pavement sections for a 20-year pavement life and maximum spacing between joints, with the designing civil engineer to select the applicable loading condition.

Table 9: Rigid Pavement Design Alternatives

Traffic Categories	Design ADTT*	Pavement Components		Total Thickness (inches)	Contraction Joints Maximum
		Portland Cement Concrete	Caltrans Class 2 Aggregate Base		
Vehicle Parking Areas	1	4.5	6.0	10.5	10
Single-Unit Truck Lanes and Parking Areas	25	6.0	6.0	12.0	15
Tractor-Trailer Truck Loading Dock, Parking Areas, and Driveway Entrances	100	6.5	6.0	12.5	15

*ADTT = Average daily truck traffic in both directions (vehicles with at least six wheels; excludes panel trucks, pickup trucks, and other four-wheel vehicles)

Reinforcing steel or fiber mesh may be used for shrinkage crack control, if desired. In addition, maximum spacing should be provided between contraction joints on both directions.

6.9 Plan Review

We recommend that Atlas be provided the opportunity to review the final project plans prior to construction. The purpose of this review is to assess the general compliance of the plans with the

recommendations provided in this report and confirm the incorporation of these recommendations into the project plans and specifications.

6.10 Observation and Testing During Construction

We recommend that Atlas be retained to provide observation and testing services during site preparation, mass grading, underground utility construction, foundation excavation, and to observe final site drainage. This is to observe compliance with the design concepts, specifications and recommendations, and to allow for possible changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.

7.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS

The recommendations of this report are based upon the soil and conditions encountered in the borings and CPTs. If variations or undesirable conditions are encountered during construction, Atlas should be contacted so that supplemental recommendations may be provided.

This report is issued with the understanding that it is the responsibility of the owner or his representatives to see that the information and recommendations contained herein are called to the attention of the other members of the design team and incorporated into the plans and specifications, and that the necessary steps are taken to see that the recommendations are implemented during construction.

The findings and recommendations presented in this report are valid as of the present time for the development as currently proposed. However, changes in the conditions of the property or adjacent properties may occur with the passage of time, whether by natural processes or the acts of other persons. In addition, changes in applicable or appropriate standards may occur through legislation or the broadening of knowledge. Accordingly, the findings and recommendations presented in this report may be invalidated, wholly or in part, by changes outside our control. Therefore, this report is subject to review by Atlas after a period of three (3) years has elapsed from the date of issuance of this report. In addition, if the currently proposed design scheme as noted in this report is altered, Atlas should be provided the opportunity to review the changed design and provide supplemental recommendations as needed.

Recommendations are presented in this report which specifically request that Atlas be provided the opportunity to review the project plans prior to construction and that we be retained to provide observation and testing services during construction. The validity of the recommendations of this report assumes that Atlas will be retained to provide these services.

This report was prepared upon your request for our services, and in accordance with currently accepted geotechnical engineering practice. No warranty based on the contents of this report is intended, and none shall be inferred from the statements or opinions expressed herein.

The scope of our services for this report did not include an environmental assessment or investigation for the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, groundwater or air, on, below or around this site. Any statements within this report or on the attached

Plates, logs or records regarding odors noted or other items or conditions observed are for the information of our client only.

8.0 REFERENCES

American Society of Civil Engineers, 2017, Minimum Design Loads for Buildings and Other Structures; ASCE/SEI Standard 7-16.

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Hart, E.W., and Bryant, W.A., 1997, Fault-rupture hazard zones in California: California Geological Survey Special Publication 42, revised 1997 with Supplements 1 and 2 added 1999, 38 p.

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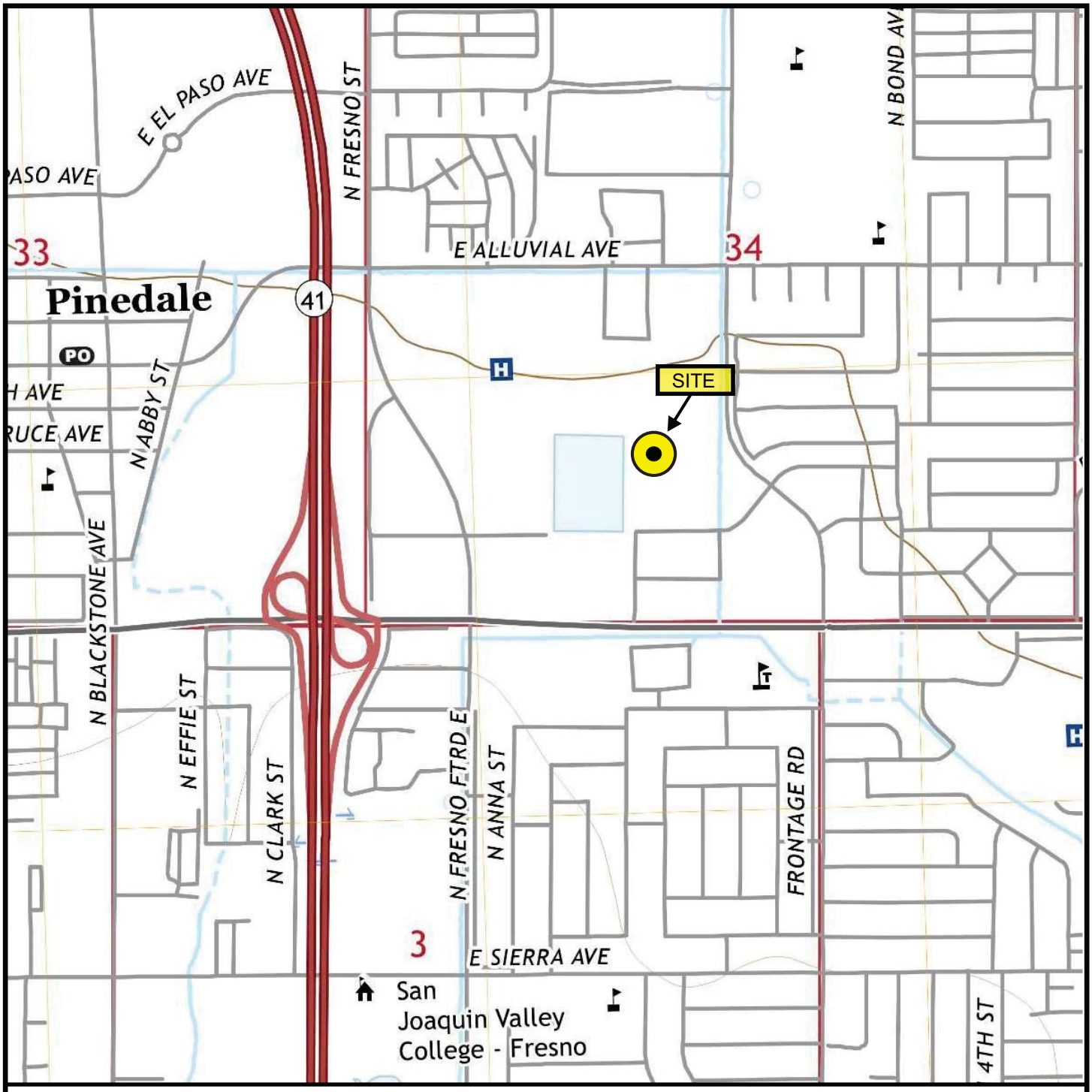
Publications may have been used as general reference and not specifically cited in the report text.

PLATES

Plate 1 - Site Vicinity Map
Plate 2 – Site Plan
Plate 3 – Development Plan
Plate 4 – Regional Geologic Map
Plate 5 - Regional Fault Map



Scale

0.25 0.5

Miles

N

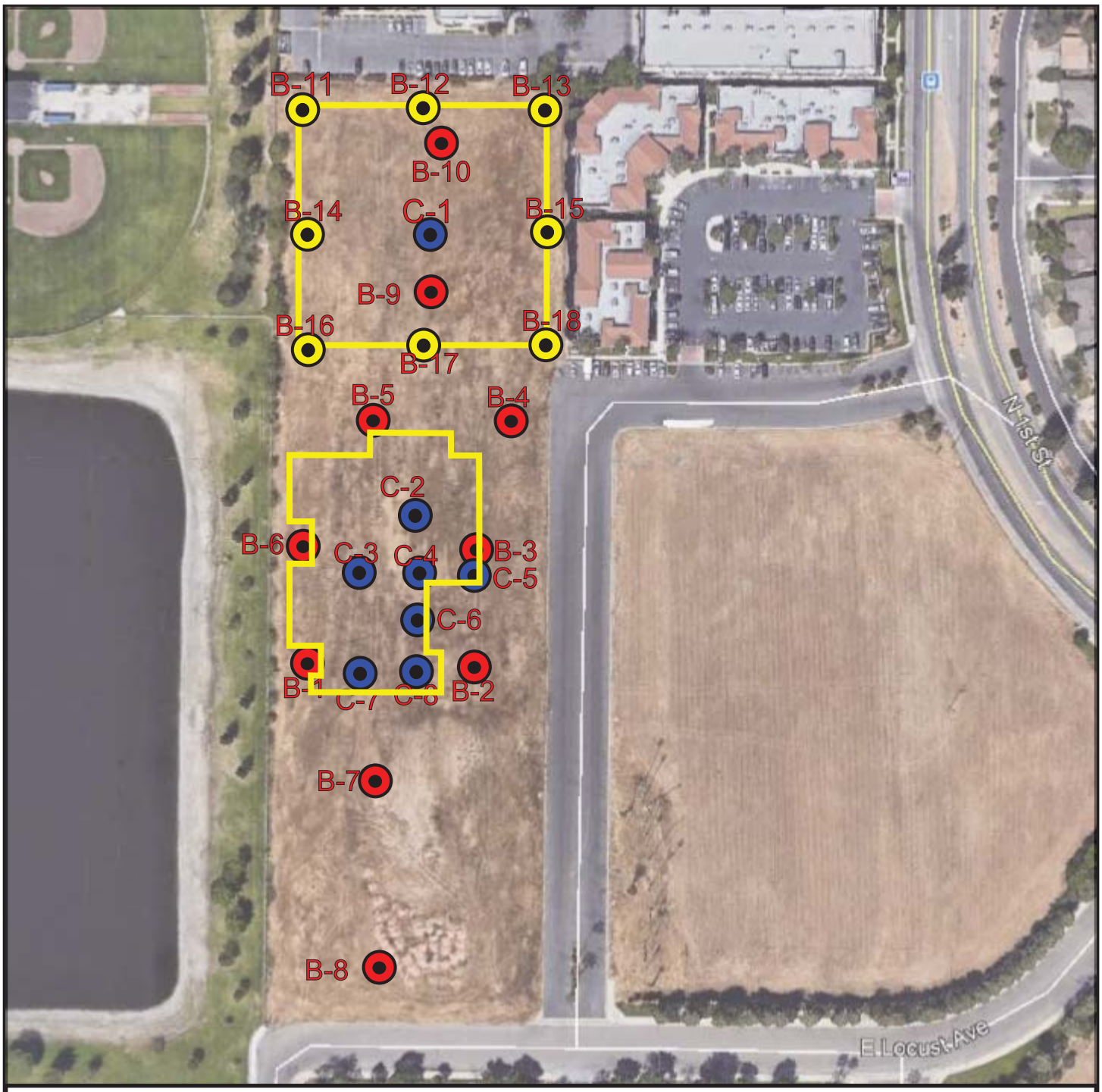
Reference: USGS Fresno North Quadrangle California 7.5-Minute Series (2018)

ATLAS

Site Vicinity Map

Kaiser Fresno MOB
E. Locust Ave. & N. Orchard St.
Fresno, California 93720

91-04768-A	July 2020	Plate 1



- Approximate Boring Location (January 21 and 22, 2020)
- Approximate CPT Location
- Approximate Boring Location (June 18 and 19, 2020)
- Proposed Improvement

N

Google Map Data (2019)

75 0 75 150

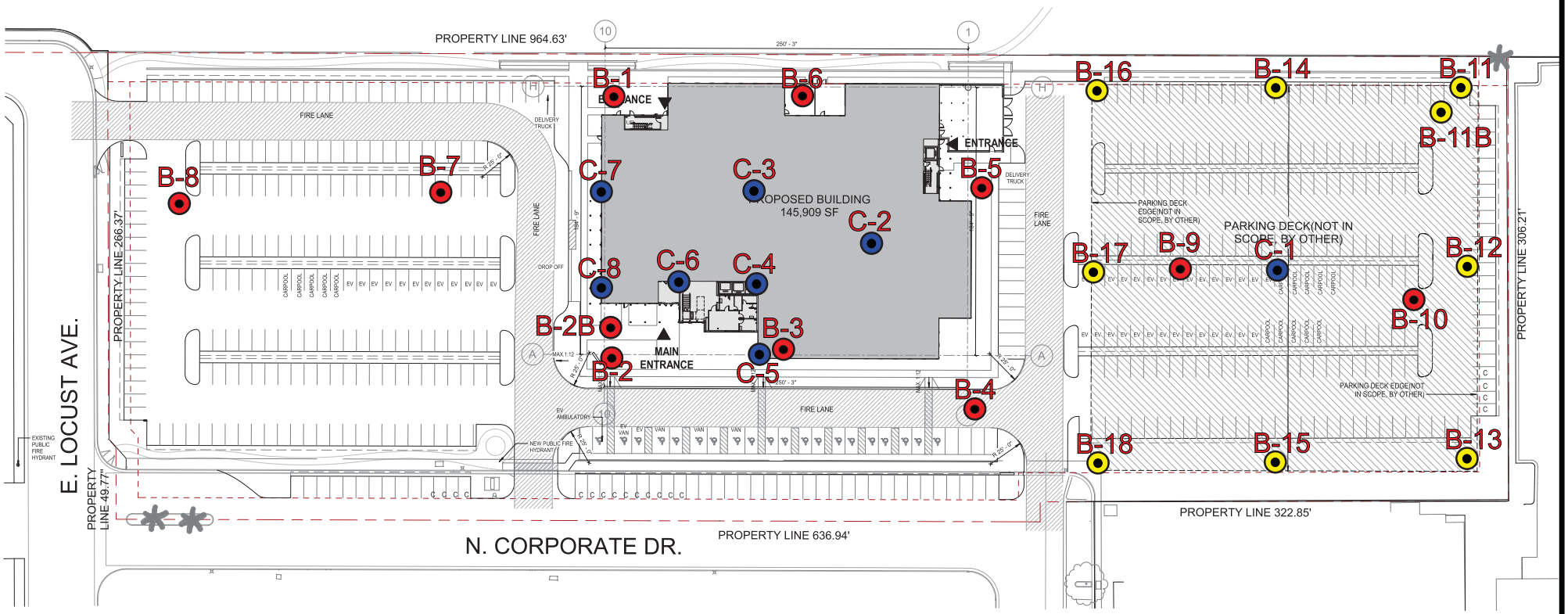
Feet

ATLAS

Site Plan

Medical Office Building
Kaiser Fresno
E. Locust Ave & N. Orchard St, Fresno, CA 94520

91-04768-A	July 2020	Plate 2



1 SITE PLAN

- Approximate Boring Location (January 21 and 22, 2020)
- Approximate CPT Location
- Approximate Boring Location (June 18 and 19, 2020)

N

100 feet
Scale

Base map: Cannon Design (3/25/2020)

ATLAS

Development Plan

Medical Office Building
Kaiser Fresno
E. Locust Ave. & N. Orchard St., Fresno, CA 94520

91-044768-A	July 2020	Plate 3



Reference: Matthews, R.A., and Burnett, J.L., 1965, Geologic of California, Fresno Sheet

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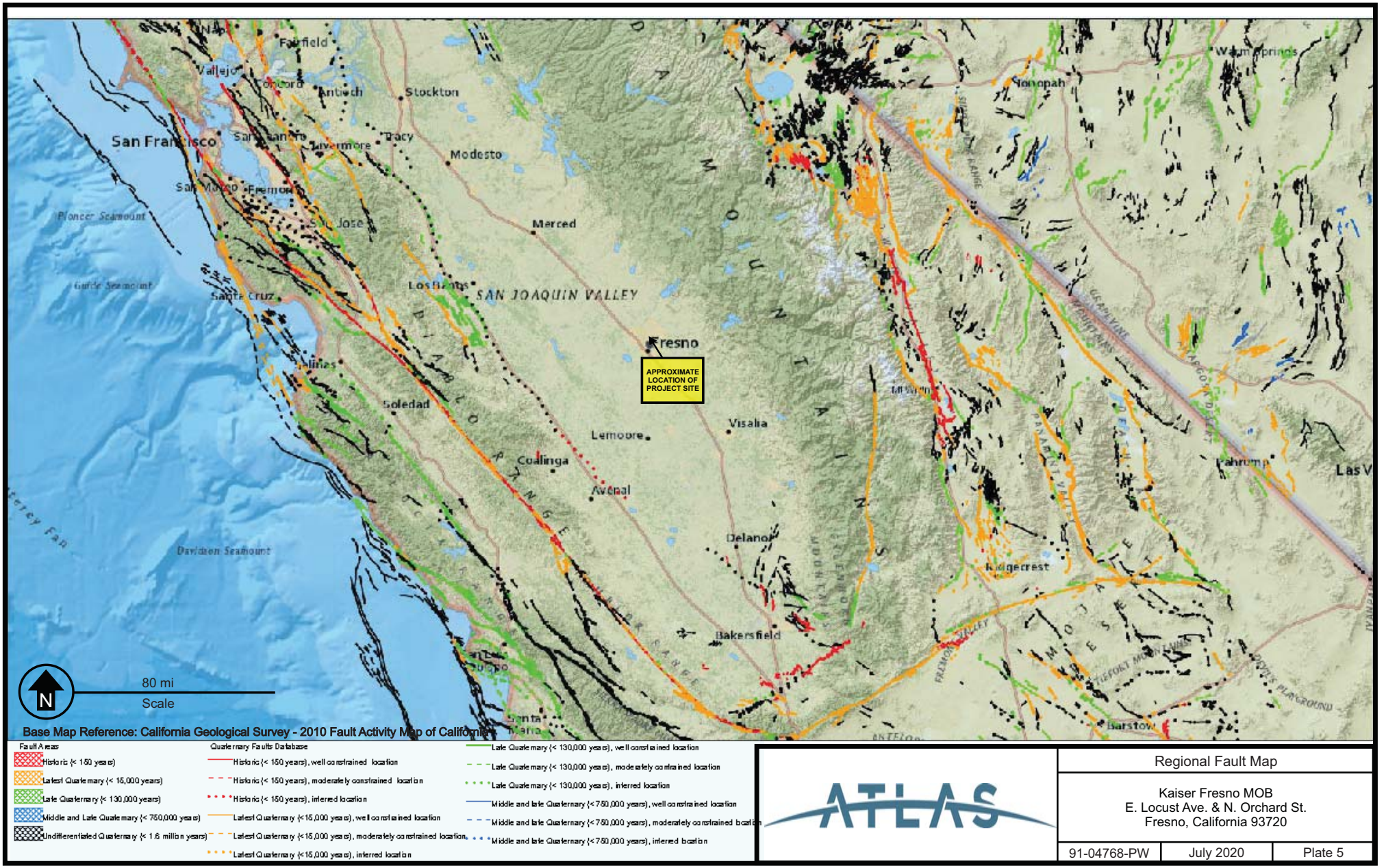
Regional Geologic Map

Kaiser Fresno MOB
E. Locust Ave. & N. Orchard St.
Fresno, California 93720

91-04768-PW	July 2020	Plate 4



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Regional Fault Map

Kaiser Fresno MOB
E. Locust Ave. & N. Orchard St.
Fresno, California 93720

91-04768-PW	July 2020	Plate 5

APPENDIX A

FIELD EXPLORATION

Key to Boring Log Symbols
Boring Logs
Cone Penetration Test Results

UNIFIED SOIL CLASSIFICATION (ASTM D-2487)						
Material Types	**Criteria for Assigning Soil Group Names**			**Group Symbol**	**Soil Group Names**	**Legend**
Coarse Grained Soils	Gravels >50% of Coarse Fraction Passes on No. 4 Sieve	Clean Gravels <5% Fines	Cu≥4 and 1≤Cc≤3	GW	Well-Graded Gravel	
			Cu<4 and/or [Cc<1 or Cc>3]	GP	Poorly-Graded Gravel	
		Gravels with Fines >12% Fines	Fines Classify as ML or MH	GM	Silty Gravel	
>50% Retained on No. 200 Sieve			Fines Classify as CL or CH	GC	Clayey Gravel	
	Sands ≥50% of Coarse Fraction Passes on No. 4 Sieve	Clean Sands <5% Fines	Cu≥6 and 1≤Cc≤3	SW	Well-Graded Sand	
			Cu<6 and/or [Cc<1 or Cc>3]	SP	Poorly-Graded Sand	
		Sands and Fines >12% Fines	Fines Classify as ML or MH	SM	Silty Sand	
			Fines Classify as CL or CH	SC	Clayey Sand	
Fine Grained Soils	Silts and Clays Liquid Limits<50	Inorganic	PI>7 and Plots≥"A" Line	CL	Lean Clay	
			PI<4 and Plots<"A" Line	ML	Silt	
		Organic	LL (Oven Dried)/LL(Not Dried <0.75)	OL	Organic Silt	
≥50% Passes No. 200 Sieve	Silts and Clays Liquid Limits≥50	Inorganic	PI Plots≥"A" Line	CH	Fat Clay	
			PI Plots<"A" Line	MH	Elastic Silt	
		Organic	LL (Oven Dried)/LL(Not Dried <0.75)	OH	Organic Clay	
Highly Organic Soils		Primarily Organic Matter, Dark in Color and Organic Odor		PT	Peat	

PENETRATION RESISTANCE (RECORDED AS BLOWS/0.5 FEET)				
SAND AND GRAVEL		SILT AND CLAY		
RELATIVE DENSITY	N-VALUE (BLOWS/FOOT)*	CONSISTENCY	N-VALUE (BLOWS/FOOT)*	COMPRESSIVE STRENGTH
Very Loose	0 - 3	Very Soft	0 - 1	0 - 0.25
Loose	4 - 10	Soft	2 - 4	0.25 - 0.50
Medium Dense	11 - 29	Medium Stiff	5 - 7	0.50 - 1.0
Dense	30 - 49	Stiff	8 - 14	1.0 - 2.0
Very Dense	50 +	Very Stiff	15 - 29	2.0 - 4.0
		Hard	30 +	Over 4.0

SOIL MOISTURE	
DESCRIPTOR	**DESCRIPTION**
Dry	Dry of Standard Proctor Optimum
Damp	Sand Dry
Moist	Near Standard Proctor Optimum
Wet	Wet of Satandard Proctor Optimum
Saturated	Free Water in Sample

PARTICLES SIZES		
COMPONENTS		**SIZE OR SIEVE NUMBER**
Boulders		Over 12 Inches
Cobbles		3 to 12 Inches
Gravels	-Coarse	3/4 to 3 Inches
	-Fine	Number 4 to 3/4 Inch
Sand	-Coarse	Number 10 to Number 4
	-Medium	Number 40 to Number 10
	-Fine	Number 200 to Number 40
Fines (Silt and Clay)		Below Number 200

Grab Bulk Sample

Standard Penetration Test

2.5 Inch Modified California

Shelby Tube

No Recovery

Initial Water Level Reading

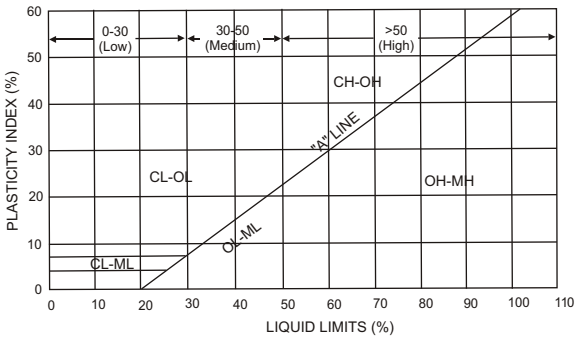
Final Water Level Reading

Blow Count
The number of blows of the sampling hammer required to drive the sampler through each of three 6-inch increments. Less than three increments may be reported if more than 50 blows are counted for any increment. The notation 50/5" indicates 50 blows recorded for 5 inches of penetration.

N-Value
Number of blows 140 LB hammer falling 30 inches to drive a 2 inch outside diameter (1-3/8 inch I.D) split barrel sampler the last 12 inches of an 18 inch drive (ASTM-1586 Standard Penetration Test)

CU -Consolidated Undrained triaxial test completed. Refer to laboratory results
DS - Results of Direct Shear test in terms of total cohesion (C, KSF) or effective cohesion and friction angles (C', KSF and degrees)
LL - Liquid Limit
PI - Plasticity Index
PP - Pocket Penetrometer test
TV - Torvane Shear Test results in terms of undrained shear strength (KSF)
UC - Unconfined Compression test results in terms of undrained shear strength (KSF)
#200 - Percent passing number 200 sieve
Cu - Coefficient of Uniformity
Cc - Coefficient of Concavity

PLASTICITY CHART



General Notes

1. The boring locations were determined by pacing, sighting and/or measuring from site features. Locations are approximate. Elevations of borings (if included) were determined by interpolation between plan contours or from another source that will be identified in the report or on the project site plan. The location and elevation of borings should be considered accurate only to the degree implied by the method used.

2. The stratification lines represent the approximate boundary between soil types. The transition may be gradual.

3. Water level readings in the drill holes were recorded at time and under conditions stated on the boring logs. This data has been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, tides, temperature and other factors at the time measurements were made.

4. The boring logs and attached data should only be used in accordance with the report.

ATLAS

KEY TO EXPLORATORY BORING LOGS

BORING NUMBER B-01

CLIENT Kaiser Permanente
PROJECT NAME Kaiser Fresno MOB
PROJECT NUMBER 91-04768-A
PROJECT LOCATION E. Locust Ave and N. Orchard St, Fresno, CA 93720
DATE STARTED 1/22/20 **COMPLETED** 1/22/20
GROUND ELEVATION 342 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR Technicon
GROUND WATER LEVELS:
DRILLING METHOD HSA CME-45
▽ **AT TIME OF DRILLING** 39.50 ft / Elev 302.50 ft
LOGGED BY AK **CHECKED BY** MZ
AT END OF DRILLING ---
NOTES Elevations based on Google Earth.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	ADJUSTED SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**3" TOPSOIL**										
		(SC) **CLAYEY SAND** : Medium dense, brown, moist.	GB 1-1 / MC 1-2		3-7-10 (17)		121	6	17	9	8	
5		Becomes very dense.	MC 1-3		9-26-33 (59)		122	7				27
		Becomes medium dense.	SPT 1-4		7-9-9 (18)							
10		(SP-SM) **POORLY GRADED SAND WITH SILT** : Medium dense, gray, moist, with coarse grained sand. Cobbles encountered.	MC 1-5		13-6-6 (12)		105	3				6
15		Becomes loose.	SPT 1-6		3-4-5 (9)			3				
20		Becomes medium dense.	SPT 1-7		3-5-5 (10)							
25		(SP) **POORLY GRADED SAND** : Loose, gray, moist, with coarse grained sand.	SPT 1-8		2-3-4 (7)			4				2
30		Becomes medium dense.	SPT 1-9		5-6-9 (15)							
35		With fine grained sand.	SPT 1-10		5-10-12 (22)			8				

(Continued Next Page)

BORING NUMBER B-01

CLIENT Kaiser Permanente **PROJECT NAME** Kaiser Fresno MOB

PROJECT NUMBER 91-04768-A **PROJECT LOCATION** E. Locust Ave and N. Orchard St, Fresno, CA 93720

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	ADJUSTED SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		(SP) **POORLY GRADED SAND** : Loose, gray, moist, with coarse grained sand. *(continued)*										
40		(ML) **SILT** : Stiff, gray, saturated.	SPT 1-11		5-6-7 (13)							
		Becomes hard.	SPT 1-12		12-32-27 (59)			27				
45		Bottom of borehole at 45.0 feet.										

BORING NUMBER B-02

CLIENT Kaiser Permanente
PROJECT NAME Kaiser Fresno MOB
PROJECT NUMBER 91-04768-A
PROJECT LOCATION E. Locust Ave and N. Orchard St, Fresno, CA 93720
DATE STARTED 1/22/20 **COMPLETED** 1/22/20
GROUND ELEVATION 345 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR Technicon
GROUND WATER LEVELS:
DRILLING METHOD HSA CME-45
AT TIME OF DRILLING --- No groundwater encountered.
LOGGED BY AK **CHECKED BY** MZ
AT END OF DRILLING ---
NOTES Elevations based on Google Earth.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	ADJUSTED SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**3" TOPSOIL**										
		(SM) **SILTY SAND** : Dense, brown, moist.	GB 2-1 / MC 2-2		4-9-28 (37)		116	4				
5		Becomes medium dense.	SPT 2-3		5-9-14 (23)							
		Becomes very dense.	MC 2-4		18-34-50 (84)		122	7				
10		No Sample Recovery, becomes very loose.	SPT 2.5		1-1-1 (2)							
			SPT 2-6		1-1-1 (2)			5				15
		Becomes loose.	SPT 2-7		1-3-5 (8)							
15		(SP-SM) **POORLY GRADED SAND WITH SILT** : Loose, brown, moist.										
20			SPT 2-8		3-4-4 (8)							
25			SPT 2-9		2-3-5 (8)							
		(ML) **SILT** : Very stiff, gray, moist.										
30			SPT 2-10		6-14-15 (29)							

Bottom of borehole at 30.0 feet.

BORING NUMBER B-02B

CLIENT Kaiser Permanente
PROJECT NAME Kaiser Fresno MOB
PROJECT NUMBER 91-04768-A
PROJECT LOCATION E. Locust Ave and N. Orchard St, Fresno, CA 93720
DATE STARTED 6/18/20 **COMPLETED** 6/18/20
GROUND ELEVATION 345 ft **HOLE SIZE**
DRILLING CONTRACTOR
GROUND WATER LEVELS:
DRILLING METHOD
AT TIME OF DRILLING --- No groundwater encountered.
LOGGED BY **CHECKED BY**
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	ADJUSTED SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**3" TOPSOIL**										
		(SM) **SILTY SAND** : Brown, moist.										
5												
		(SP) **POORLY GRADED SAND** : Med dense, brown, moist, fine to med grained.										
			MC 2B-1		5-6-6 (12)							
10			SPT 2B-2		3-6-7 (13)							

Bottom of borehole at 11.0 feet.

BORING NUMBER B-03

CLIENT Kaiser Permanente
PROJECT NAME Kaiser Fresno MOB
PROJECT NUMBER 91-04768-A
PROJECT LOCATION E. Locust Ave and N. Orchard St, Fresno, CA 93720
DATE STARTED 1/21/20 **COMPLETED** 1/21/20
GROUND ELEVATION 344 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR Technicon
GROUND WATER LEVELS:
DRILLING METHOD HSA CME-45
AT TIME OF DRILLING --- No groundwater encountered.
LOGGED BY AK **CHECKED BY** MZ
AT END OF DRILLING ---
NOTES Elevations based on Google Earth.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	ADJUSTED SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**3" TOPSOIL**	GB 3-1									
		(SC) **CLAYEY SAND** : Dense, brown, moist.	MC 3-2		9-18-20 (38)		131	5				
		(SM) **SILTY SAND** : Dense, brown, moist.										
5			MC 3-3		7-14-22 (36)							
		Becomes very dense.	MC 3-4		23-30-33 (63)		130	6				
		(CLS) **SANDY CLAY** : Very stiff, brown, moist.										
10			SPT 3-5		7-12-14 (26)			16				65
15		(SP) **POORLY GRADED SAND** : Medium dense, gray, moist.	SPT 3-6		8-10-11 (21)							
20			SPT 3-7		5-6-7 (13)							
25			SPT 3-8		5-6-9 (15)							

Bottom of borehole at 25.0 feet.

BORING NUMBER B-04

CLIENT Kaiser Permanente
PROJECT NAME Kaiser Fresno MOB
PROJECT NUMBER 91-04768-A
PROJECT LOCATION E. Locust Ave and N. Orchard St, Fresno, CA 93720
DATE STARTED 1/21/20 **COMPLETED** 1/21/20
GROUND ELEVATION 344 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR Technicon
GROUND WATER LEVELS:
DRILLING METHOD HSA CME-45
AT TIME OF DRILLING --- No groundwater encountered.
LOGGED BY AK **CHECKED BY** MZ
AT END OF DRILLING ---
NOTES Elevations based on Google Earth.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	ADJUSTED SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**3" TOPSOIL**										
		(SM) **SILTY SAND** : Dense, brown, moist.	GB 4-1 / MC 4-2		4-13-25 (38)		96	4	16	14	2	
5		Becomes very dense.	MC 4-3		6-21-100 (121)		121	7				
		Becomes dense.	MC 4-4		17-21-23 (44)		123	6				
10			MC 4-5		7-13-23 (36)		123	11				
		(SP-SM) **POORLY GRADED SAND WITH SILT** : Medium dense, light orangish brown, moist.										
15			SPT 4-6		7-8-10 (18)			6				7
20		With trace gravel.	SPT 4-7		4-5-6 (11)							
25		Becomes light gray brown.	SPT 4-8		5-8-10 (18)							
		(ML) **SILT** : Very stiff, gray, moist.										
30			SPT 4-9		5-10-19 (29)							
35			SPT 4-10		10-13-12 (25)							

(Continued Next Page)

BORING NUMBER B-04

CLIENT Kaiser Permanente **PROJECT NAME** Kaiser Fresno MOB

PROJECT NUMBER 91-04768-A **PROJECT LOCATION** E. Locust Ave and N. Orchard St, Fresno, CA 93720

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	ADJUSTED SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		(ML) **SILT** : Very stiff, gray, moist. *(continued)*										
		(SP) **POORLY GRADED SAND** : Dense, gray, moist, with fine grained sand.										
40			SPT 4-11		11-17-19 (36)							

Bottom of borehole at 40.0 feet.

BORING NUMBER B-05

CLIENT Kaiser Permanente
PROJECT NAME Kaiser Fresno MOB
PROJECT NUMBER 91-04768-A
PROJECT LOCATION E. Locust Ave and N. Orchard St, Fresno, CA 93720
DATE STARTED 1/21/20 **COMPLETED** 1/21/20
GROUND ELEVATION 347 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR Technicon
GROUND WATER LEVELS:
DRILLING METHOD HSA CME-45
AT TIME OF DRILLING --- No groundwater encountered.
LOGGED BY AK **CHECKED BY** MZ
AT END OF DRILLING ---
NOTES Elevations based on Google Earth.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	ADJUSTED SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**3" TOPSOIL**										
		(SM) **SILTY SAND** : Medium dense, light gray, moist.	GB 5-1									
			MC 5-2		9-12-10 (22)		119	4				32
		Becomes very dense.	MC 5-3		20-100		111	6				
5												
10		(SP-SM) **POORLY GRADED SAND WITH SILT** : Medium dense, light gray, moist.	MC 5-4		21-10-11 (21)		109	2				
15			MC 5-5		3-5-6 (11)		102	2				
		Becomes light gray brown with coarsed grained sand.	SPT 5-6		4-7-9 (16)							
20												
25			SPT 5-7		7-11-15 (26)							
		Becomes dense.	SPT 5-8		12-15-22 (37)							
30												
		(ML) **SILT** : Very stiff, gray, moist.	SPT 5-9		9-10-14 (24)							
35												

Bottom of borehole at 35.0 feet.

BORING NUMBER B-06

CLIENT Kaiser Permanente
PROJECT NAME Kaiser Fresno MOB
PROJECT NUMBER 91-04768-A
PROJECT LOCATION E. Locust Ave and N. Orchard St, Fresno, CA 93720
DATE STARTED 1/21/20 **COMPLETED** 1/21/20
GROUND ELEVATION 344 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR Technicon
GROUND WATER LEVELS:
DRILLING METHOD HSA CME-45
AT TIME OF DRILLING --- No groundwater encountered.
LOGGED BY AK **CHECKED BY** MZ
AT END OF DRILLING ---
NOTES Elevations based on Google Earth.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	ADJUSTED SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**3" TOPSOIL**										
		(SC) **CLAYEY SAND** : Medium dense, light brown, moist.	GB 6-1									
			MC 6-2		4-8-8 (16)		103	5				
		Becomes dense.	MC 6-3		16-19-29 (48)		120	11	31	13	18	
5												
			SPT 6-4		7-12-18 (30)							
			MC 6-5		6-10-12 (22)							
10		(SP-SM) **POORLY GRADED SAND WITH SILT** : Medium dense, gray brown, moist.										
			SPT 6-6		2-6-7 (13)							
15												
		Becomes loose.	SPT 6-7		4-4-5 (9)							
20												
		Becomes medium dense.	SPT 6-8		2-5-5 (10)							
25												

Bottom of borehole at 25.0 feet.

BORING NUMBER B-07

CLIENT Kaiser Permanente
PROJECT NAME Kaiser Fresno MOB
PROJECT NUMBER 91-04768-A
PROJECT LOCATION E. Locust Ave and N. Orchard St, Fresno, CA 93720
DATE STARTED 1/22/20 **COMPLETED** 1/22/20
GROUND ELEVATION 344 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR Technicon
GROUND WATER LEVELS:
DRILLING METHOD HSA CME-45
AT TIME OF DRILLING --- No groundwater encountered.
LOGGED BY AK **CHECKED BY** MZ
AT END OF DRILLING ---
NOTES Elevations based on Google Earth.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	ADJUSTED SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**3" TOPSOIL**										
		(SM) **SILTY SAND** : Very dense, brown, moist.	GB 7-1									
			MC 7-2		12-27-33 (60)							
5			SPT 7-3		38-50							

Bottom of borehole at 5.0 feet.

BORING NUMBER B-08

CLIENT Kaiser Permanente
PROJECT NAME Kaiser Fresno MOB
PROJECT NUMBER 91-04768-A
PROJECT LOCATION E. Locust Ave and N. Orchard St, Fresno, CA 93720
DATE STARTED 1/22/20 **COMPLETED** 1/22/20
GROUND ELEVATION 342 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR Technicon
GROUND WATER LEVELS:
DRILLING METHOD HSA CME-45
AT TIME OF DRILLING --- No groundwater encountered.
LOGGED BY AK **CHECKED BY** MZ
AT END OF DRILLING ---
NOTES Elevations based on Google Earth.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	ADJUSTED SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**3" TOPSOIL**										
		(SM) **SILTY SAND :** Medium dense, brown, moist.	GB 8-1									
			MC 8-2		10-13-16 (29)							
		Becomes very dense.										
5			SPT 8-3		28-36-31 (67)							

Bottom of borehole at 5.0 feet.

BORING NUMBER B-09

CLIENT Kaiser Permanente
PROJECT NAME Kaiser Fresno MOB
PROJECT NUMBER 91-04768-A
PROJECT LOCATION E. Locust Ave and N. Orchard St, Fresno, CA 93720
DATE STARTED 1/22/20 **COMPLETED** 1/22/20
GROUND ELEVATION 347 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR Technicon
GROUND WATER LEVELS:
DRILLING METHOD HSA CME-45
AT TIME OF DRILLING --- No groundwater encountered.
LOGGED BY AK **CHECKED BY** MZ
AT END OF DRILLING ---
NOTES Elevations based on Google Earth.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	ADJUSTED SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**3" TOPSOIL**	GB 9-1									
		(SM) **SILTY SAND :** Medium dense, brown, moist.	MC 9-2		8-12-16 (28)							
		Becomes light gray with increasing sand content.	SPT 9-3		15-15-11 (26)							
5		Bottom of borehole at 5.0 feet.										

BORING NUMBER B-10

CLIENT Kaiser Permanente
PROJECT NAME Kaiser Fresno MOB
PROJECT NUMBER 91-04768-A
PROJECT LOCATION E. Locust Ave and N. Orchard St, Fresno, CA 93720
DATE STARTED 1/22/20 **COMPLETED** 1/22/20
GROUND ELEVATION 348 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR Technicon
GROUND WATER LEVELS:
DRILLING METHOD HSA CME-45
AT TIME OF DRILLING --- No Groundwater Encountered.
LOGGED BY AK **CHECKED BY** MZ
AT END OF DRILLING ---
NOTES Elevations based on Google Earth.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	ADJUSTED SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**3" TOPSOIL**										
		(SM) **SILTY SAND :** Medium dense, brown, moist.	GB 9-1									
			MC 9-2		5-7-7 (14)							
		Becomes dense.										
5			SPT 9-3		7-12-27 (39)							

Bottom of borehole at 5.0 feet.

BORING NUMBER B-11

CLIENT Kaiser Permanente
PROJECT NAME Kaiser Fresno MOB
PROJECT NUMBER 91-04768-A
PROJECT LOCATION E. Locust Ave and N. Orchard St, Fresno, CA 93720
DATE STARTED 6/19/20 **COMPLETED** 6/19/20
GROUND ELEVATION 347 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR Technicon
GROUND WATER LEVELS:
DRILLING METHOD HSA CME-45
AT TIME OF DRILLING --- No groundwater encountered.
LOGGED BY MZ **CHECKED BY** CD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	ADJUSTED SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**3" TOPSOIL**										
		(SM) **SILTY SAND** : Very dense, light brown, moist, cemented.	SPT 11-1		16-50/5"							
		(SP-SM) **POORLY GRADED SAND WITH SILT** : Loose, brown, moist, fine to med grained.	SPT 11-2		2-2-2 (4)			7				
5			SPT 11-3		1-1-1 (2)			2				11
			SPT 11-4		1-2-3 (5)			3				
10												
		becomes med dense.	SPT 11-5		5-5-6 (11)							
15												
			SPT 11-6		4-9-10 (19)							
20												
			SPT 11-7		4-8-6 (14)							
25												
			SPT 11-8		4-8-7 (15)							
30												
			SPT 11-9		5-8-9 (17)							
35												

Bottom of borehole at 35.0 feet.

BORING NUMBER B-11B

CLIENT Kaiser Permanente
PROJECT NAME Kaiser Fresno MOB
PROJECT NUMBER 91-04768-A
PROJECT LOCATION E. Locust Ave and N. Orchard St, Fresno, CA 93720
DATE STARTED 6/19/20 **COMPLETED** 6/19/20
GROUND ELEVATION 347 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR Technicon
GROUND WATER LEVELS:
DRILLING METHOD HSA CME-45
AT TIME OF DRILLING --- No groundwater encountered.
LOGGED BY MZ **CHECKED BY** CD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	ADJUSTED SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**3" TOPSOIL**										
		(SM) **SILTY SAND** : Very dense, light brown, moist, cemented.	SPT 11B-1		13-35-20 (55)							
		[50/5" MC]	MC 11B-2		23-40		113	10				
5		becomes med dense.	SPT 11B-3		11-18-18 (36)							
		(SP) **POORLY GRADED SAND** : Loose, brown, moist, fine to med grained.	SPT 11B-4		4-4-5 (9)							
10												

Bottom of borehole at 10.0 feet.

BORING NUMBER B-12

CLIENT Kaiser Permanente
PROJECT NAME Kaiser Fresno MOB
PROJECT NUMBER 91-04768-A
PROJECT LOCATION E. Locust Ave and N. Orchard St, Fresno, CA 93720
DATE STARTED 6/18/20 **COMPLETED** 6/18/20
GROUND ELEVATION 348 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR Technicon
GROUND WATER LEVELS:
DRILLING METHOD HSA CME-45
AT TIME OF DRILLING --- No groundwater encountered.
LOGGED BY MZ **CHECKED BY** CD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	ADJUSTED SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**3" TOPSOIL**										
		(SM) **SILTY SAND** : Med dense, brown, moist, cemented.	SPT 12-1		11-11-17 (28)			4	17	14	3	
5		becomes very dense.	SPT 12-2		14-26-37 (63)							
		becomes med dense with interbedded silt lenses.	SPT 12-3		11-13-9 (22)							
		(SP) **POORLY GRADED SAND** : Med dense, brown, moist, fine to med grained.	SPT 12-4		3-10-7 (17)							
10												
15			SPT 12-5		3-6-7 (13)							
20			SPT 12-6		4-6-9 (15)							

Bottom of borehole at 20.0 feet.

BORING NUMBER B-13

CLIENT Kaiser Permanente
PROJECT NAME Kaiser Fresno MOB
PROJECT NUMBER 91-04768-A
PROJECT LOCATION E. Locust Ave and N. Orchard St, Fresno, CA 93720
DATE STARTED 6/18/20 **COMPLETED** 6/18/20
GROUND ELEVATION 348 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR Technicon
GROUND WATER LEVELS:
DRILLING METHOD HSA CME-45
AT TIME OF DRILLING --- No groundwater encountered.
LOGGED BY MZ **CHECKED BY** CD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	ADJUSTED SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**3" TOPSOIL**										
		(CL) **SANDY CLAY :** Med stiff, brown, moist, trace gravel, cemented.	SPT 13-1		5-4-4 (8)			8				52
		becomes dense. [50/5" MC]	MC 13-2		40							
5		(ML) **SILT :** Med stiff, gray, moist.	SPT 13-3		4-4-6 (10)			25				
		(SP-SM) **POORLY GRADED SAND WITH SILT :** Med dense, gray, moist, med grained.	MC 13-4		4-7-22 (29)		106	3				
10												
15			SPT 13-5		4-9-6 (15)							
20			SPT 13-6		6-9-11 (20)							

Bottom of borehole at 20.0 feet.

BORING NUMBER B-14

CLIENT Kaiser Permanente
PROJECT NAME Kaiser Fresno MOB
PROJECT NUMBER 91-04768-A
PROJECT LOCATION E. Locust Ave and N. Orchard St, Fresno, CA 93720
DATE STARTED 6/19/20 **COMPLETED** 6/19/20
GROUND ELEVATION 346 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR Technicon
GROUND WATER LEVELS:
DRILLING METHOD HSA CME-45
AT TIME OF DRILLING --- No groundwater encountered.
LOGGED BY MZ **CHECKED BY** CD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	ADJUSTED SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**3" TOPSOIL**										
		(SM) **SILTY SAND** : Med dense, light brown, moist, cemented.	SPT 14-1		4-6-8 (14)							
			SPT 14-2		8-12-11 (23)			6				
5		(SP) **POORLY GRADED SAND** : Med dense, brown, moist, fine to med grained.	MC 14-3		3-6-6 (12)							
			SPT 14-4		4-5-6 (11)							
10												
		becomes loose.	SPT 14-5		3-3-5 (8)							
15												
		becomes med dense.	SPT 14-6		5-4-7 (11)							
20												

Bottom of borehole at 20.0 feet.

BORING NUMBER B-15

CLIENT Kaiser Permanente
PROJECT NAME Kaiser Fresno MOB
PROJECT NUMBER 91-04768-A
PROJECT LOCATION E. Locust Ave and N. Orchard St, Fresno, CA 93720
DATE STARTED 6/18/20 **COMPLETED** 6/18/20
GROUND ELEVATION 347 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR Technicon
GROUND WATER LEVELS:
DRILLING METHOD HSA CME-45
AT TIME OF DRILLING --- No groundwater encountered.
LOGGED BY MZ **CHECKED BY** CD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	ADJUSTED SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**3" TOPSOIL**										
		(SM) **SILTY SAND** : Med dense, brown, moist, med grained, cemented.	MC 15-1		16-15-16 (31)							
		with trace clay.	SPT 15-2		11-10-20 (30)			9				
5		becomes dense. [50/4" MC]	MC 15-3		21-50							
		(SP-SM) **POORLY GRADED SAND WITH SILT** : Med dense, brown and gray,moist, med grained.	SPT 15-4		21-19-16 (35)							
10												
			MC 15-5		8-10-15 (25)							
15												
			SPT 15-6		4-6-7 (13)							
20												

Bottom of borehole at 20.0 feet.

BORING NUMBER B-16

CLIENT Kaiser Permanente
PROJECT NAME Kaiser Fresno MOB
PROJECT NUMBER 91-04768-A
PROJECT LOCATION E. Locust Ave and N. Orchard St, Fresno, CA 93720
DATE STARTED 6/19/20 **COMPLETED** 6/19/20
GROUND ELEVATION 345 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR Technicon
GROUND WATER LEVELS:
DRILLING METHOD HSA CME-45
AT TIME OF DRILLING --- No groundwater encountered.
LOGGED BY MZ **CHECKED BY** CD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	ADJUSTED SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**3" TOPSOIL**										
		(ML) **SANDY SILT** : Very stiff, light brown, moist, cemented.	SPT 16-1		5-5-11 (16)							
			SPT 16-2		17-31-33 (64)							
5		becomes hard.										
		(SP) **POORLY GRADED SAND** : Med dense, brown, moist, fine to med grained.	SPT 16-3		7-7-7 (14)							
			SPT 16-4		5-6-8 (14)			2				
10												
			SPT 16-5		5-7-7 (14)							
15												
			SPT 16-6		5-7-10 (17)							
20												

Bottom of borehole at 20.0 feet.

BORING NUMBER B-17

CLIENT Kaiser Permanente
PROJECT NAME Kaiser Fresno MOB
PROJECT NUMBER 91-04768-A
PROJECT LOCATION E. Locust Ave and N. Orchard St, Fresno, CA 93720
DATE STARTED 6/19/20 **COMPLETED** 6/19/20
GROUND ELEVATION 347 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR Technicon
GROUND WATER LEVELS:
DRILLING METHOD HSA CME-45
AT TIME OF DRILLING --- No groundwater encountered.
LOGGED BY MZ **CHECKED BY** CD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	ADJUSTED SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**3" TOPSOIL**										
		(SM) **SILTY SAND** : Med dense, light brown, moist, cemented.	SPT 17-1		8-9-12 (21)							
5		becomes dense.	SPT 17-2		13-19-22 (41)							
			SPT 17-3		11-11-7 (18)							
		(SP) **POORLY GRADED SAND** : Loose, brown, moist, fine to med grained.	SPT 17-4		3-5-5 (10)			11				
10												
15		becomes med dense.	SPT 17-5		3-7-7 (14)							
20			SPT 17-1		3-5-6 (11)							

Bottom of borehole at 20.0 feet.

BORING NUMBER B-18

CLIENT Kaiser Permanente
PROJECT NAME Kaiser Fresno MOB
PROJECT NUMBER 91-04768-A
PROJECT LOCATION E. Locust Ave and N. Orchard St, Fresno, CA 93720
DATE STARTED 6/18/20 **COMPLETED** 6/18/20
GROUND ELEVATION 346 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR Technicon
GROUND WATER LEVELS:
DRILLING METHOD HSA CME-45
AT TIME OF DRILLING --- No groundwater encountered.
LOGGED BY MZ **CHECKED BY** CD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	ADJUSTED SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**3" TOPSOIL**										
		(SM) **SILTY SAND** : Med dense, light brown, moist, fine to med grained, cemented.	MC 18-1		9-12-14 (26)		115	4				
		becomes dense. [50/5" MC]	MC 18-2		19-40		120	8				
5			MC 18-3		18-20-17 (37)		121	6				
		(SP) **POORLY GRADED SAND** : Med dense, brown and gray,moist, med grained.	MC 18-4		9-10-18 (28)		121	8				
10												
			SPT 18-5		8-12-12 (24)			3				
15												
			MC 18-6		5-8-10 (18)		103	4				6
20												
			SPT 18-7		7-10-14 (24)			5				
25												
			MC 18-8		10-19-40 (59)		85	35				
30		(ML) **SILT** : Hard, gray, moist. [50/5" MC]										
		(SP) **POORLY GRADED SAND** : Med dense, gray, moist, fine grained.	SPT 18-9		11-13-12 (25)			4				
35												

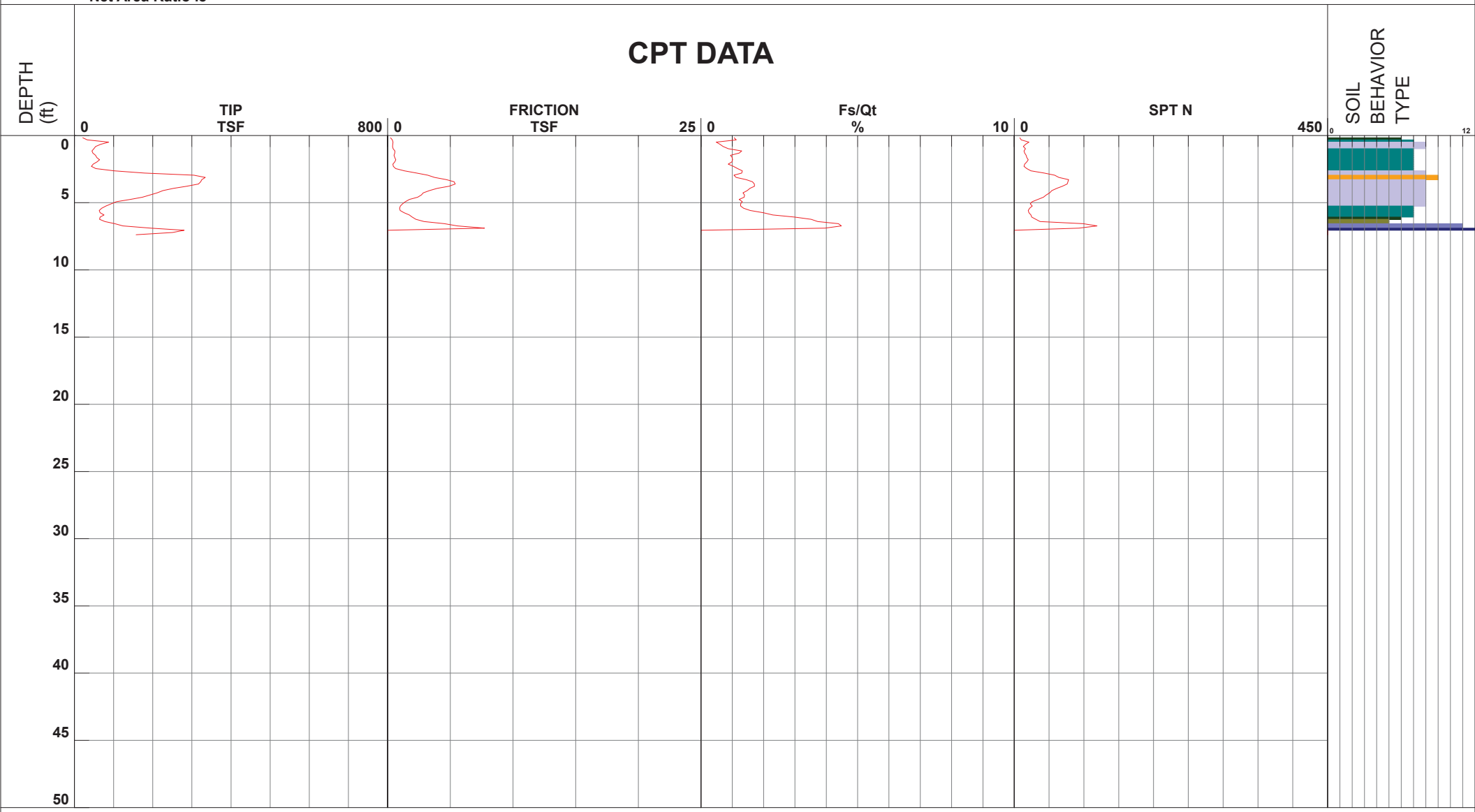
Bottom of borehole at 35.0 feet.

Geosphere Consultants, Inc.

Project	Kaiser Fresno MOB	Operator	BH-GH	Filename	SDF(153).cpt
Job Number	91-04769	Cone Number	DDG1496	GPS	
Hole Number	CPT-01	Date and Time	6/2/2020 9:26:23 AM	Maximum Depth	7.38 ft
EST GW Depth During Test		25.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

S*Soil behavior type and SPT based on data from UBC-1983

Kaiser Fresno MOB

Project ID: Geosphere Consultants, Inc. Page: 1
Data File: SDF(153).cpt Sounding ID: CPT-01
CPT Date: 6/2/2020 9:26:23 AM Project No: 91-04769
GW During Test: 25 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -
0.33	32.8	52.7	83.2	32.8	0.4	0.2	1.1	silty SAND to sandy SILT	120	3.0	18	11	11	46	48	-	-	18	2.16	16
0.49	87.5	140.3	140.3	87.5	0.4	0.1	0.5	clean SAND to silty SAND	125	5.0	28	17	24	78	48	-	-	5	1.60	16
0.66	66.7	107.0	115.2	66.8	0.4	0.7	0.6	clean SAND to silty SAND	125	5.0	21	13	19	69	48	-	-	7	1.76	16
0.82	54.2	87.0	100.9	54.2	0.4	0.1	0.7	clean SAND to silty SAND	125	5.0	17	11	16	62	48	-	-	10	1.87	16
0.98	49.7	79.8	99.0	49.7	0.4	0.0	0.9	clean SAND to silty SAND	125	5.0	16	10	15	60	48	-	-	12	1.95	16
1.15	44.7	71.7	103.7	44.7	0.6	0.1	1.3	silty SAND to sandy SILT	120	3.0	24	15	15	56	48	-	-	16	2.10	16
1.31	47.1	75.5	104.7	47.1	0.6	0.1	1.2	silty SAND to sandy SILT	120	3.0	25	16	15	58	48	-	-	15	2.06	16
1.48	54.1	86.7	106.8	54.1	0.5	0.0	0.9	clean SAND to silty SAND	125	5.0	17	11	17	62	48	-	-	11	1.94	16
1.64	57.1	91.5	112.5	57.1	0.6	0.2	1.0	clean SAND to silty SAND	125	5.0	18	11	18	64	48	-	-	11	1.94	16
1.80	64.1	102.8	122.6	64.1	0.6	0.5	1.0	clean SAND to silty SAND	125	5.0	21	13	19	68	48	-	-	10	1.90	16
1.97	57.5	92.3	113.0	57.5	0.6	0.0	1.0	clean SAND to silty SAND	125	5.0	18	12	18	64	48	-	-	11	1.94	16
2.13	47.9	76.9	96.6	47.9	0.4	0.0	0.9	clean SAND to silty SAND	125	5.0	15	10	15	58	47	-	-	12	1.96	16
2.30	43.6	69.8	95.2	43.6	0.5	0.0	1.0	clean SAND to silty SAND	125	5.0	14	9	14	55	46	-	-	14	2.04	16
2.46	54.9	88.0	114.2	54.9	0.6	0.2	1.2	clean SAND to silty SAND	125	5.0	18	11	17	63	47	-	-	13	2.00	16
2.62	101.5	162.7	184.9	101.5	1.3	0.3	1.3	clean SAND to silty SAND	125	5.0	33	20	30	83	48	-	-	9	1.84	16
2.79	178.8	286.7	292.6	178.8	2.3	0.4	1.3	clean SAND to silty SAND	125	5.0	57	36	50	95	48	-	-	6	1.67	16
2.95	305.2	489.5	489.5	305.2	3.2	0.4	1.0	clean SAND to silty SAND	125	5.0	98	61	80	95	48	-	-	5	1.47	16
3.12	334.0	535.7	535.7	334.0	3.7	0.3	1.1	clean SAND to silty SAND	125	5.0	100	67	87	95	48	-	-	5	1.47	16
3.28	325.3	521.8	521.8	325.3	4.7	0.4	1.4	clean SAND to silty SAND	125	5.0	100	65	88	95	48	-	-	5	1.57	16
3.45	322.6	517.3	517.3	322.6	5.3	0.4	1.6	clean SAND to silty SAND	125	5.0	100	65	89	95	48	-	-	5	1.62	16
3.61	316.8	508.1	506.3	316.8	5.4	0.3	1.7	clean SAND to silty SAND	125	5.0	100	63	88	95	48	-	-	5	1.64	16
3.77	286.8	459.9	465.3	286.8	4.9	0.3	1.7	clean SAND to silty SAND	125	5.0	92	57	80	95	48	-	-	5	1.66	16
3.94	252.7	405.3	408.5	252.7	3.9	0.3	1.6	clean SAND to silty SAND	125	5.0	81	51	70	95	48	-	-	5	1.66	16
4.10	225.9	362.3	366.4	225.9	3.3	0.3	1.5	clean SAND to silty SAND	125	5.0	72	45	63	95	48	-	-	5	1.66	16
4.27	211.3	338.9	338.5	211.3	2.8	0.7	1.3	clean SAND to silty SAND	125	5.0	68	42	59	95	48	-	-	5	1.64	16
4.43	193.2	309.9	317.2	193.2	2.7	0.5	1.4	clean SAND to silty SAND	125	5.0	62	39	54	95	48	-	-	6	1.68	16
4.59	173.8	278.7	290.0	173.8	2.4	0.7	1.4	clean SAND to silty SAND	125	5.0	56	35	49	95	48	-	-	6	1.70	16
4.76	142.7	228.9	239.9	142.7	1.7	0.2	1.2	clean SAND to silty SAND	125	5.0	46	29	41	94	48	-	-	6	1.72	16
4.92	107.4	172.3	193.6	107.4	1.4	0.2	1.3	clean SAND to silty SAND	125	5.0	34	21	32	85	47	-	-	9	1.82	16
5.09	94.2	151.0	173.0	94.2	1.2	0.4	1.3	clean SAND to silty SAND	125	5.0	30	19	28	81	46	-	-	9	1.85	16
5.25	80.6	129.3	153.4	80.6	1.0	0.0	1.3	clean SAND to silty SAND	125	5.0	26	16	24	75	45	-	-	10	1.90	16
5.41	69.7	111.8	140.7	69.7	0.9	-0.2	1.4	clean SAND to silty SAND	125	5.0	22	14	22	71	44	-	-	12	1.97	16
5.58	63.3	101.6	137.7	63.3	1.0	-0.3	1.6	silty SAND to sandy SILT	120	3.0	34	21	20	68	44	-	-	14	2.04	16
5.74	65.7	105.4	153.6	65.7	1.3	-0.2	2.0	silty SAND to sandy SILT	120	3.0	35	22	22	69	44	-	-	16	2.10	16
5.91	75.6	121.2	177.4	75.6	1.7	-0.2	2.3	silty SAND to sandy SILT	120	3.0	40	25	25	73	44	-	-	16	2.11	16
6.07	65.7	104.1	183.1	65.7	2.0	-0.5	3.0	silty SAND to sandy SILT	120	3.0	35	22	22	68	43	-	-	20	2.24	16
6.23	64.1	100.3	195.6	64.1	2.3	1.5	3.5	silty SAND to sandy SILT	120	3.0	33	21	22	67	43	-	-	23	2.30	16
6.40	78.0	120.5	223.5	77.9	2.9	-2.8	3.7	stiff SAND to clayy SAND	115	5.0	24	16	26	73	44	-	-	21	2.27	16
6.56	103.1	157.4	286.7	103.0	4.5	-5.0	4.4	very stiff fine SOIL	120	1.0	100	100	34	-	-	3.6	9.9	21	2.26	30
6.73	124.0	187.0	323.2	124.0	5.6	0.5	4.5	very stiff fine SOIL	120	1.0	100	100	40	-	-	4.4	9.9	20	2.22	30
6.89	195.0	290.7	412.2	195.0	7.7	-1.1	4.0	stiff SAND to clayy SAND	115	5.0	58	39	59	95	48	-	-	15	2.08	16

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

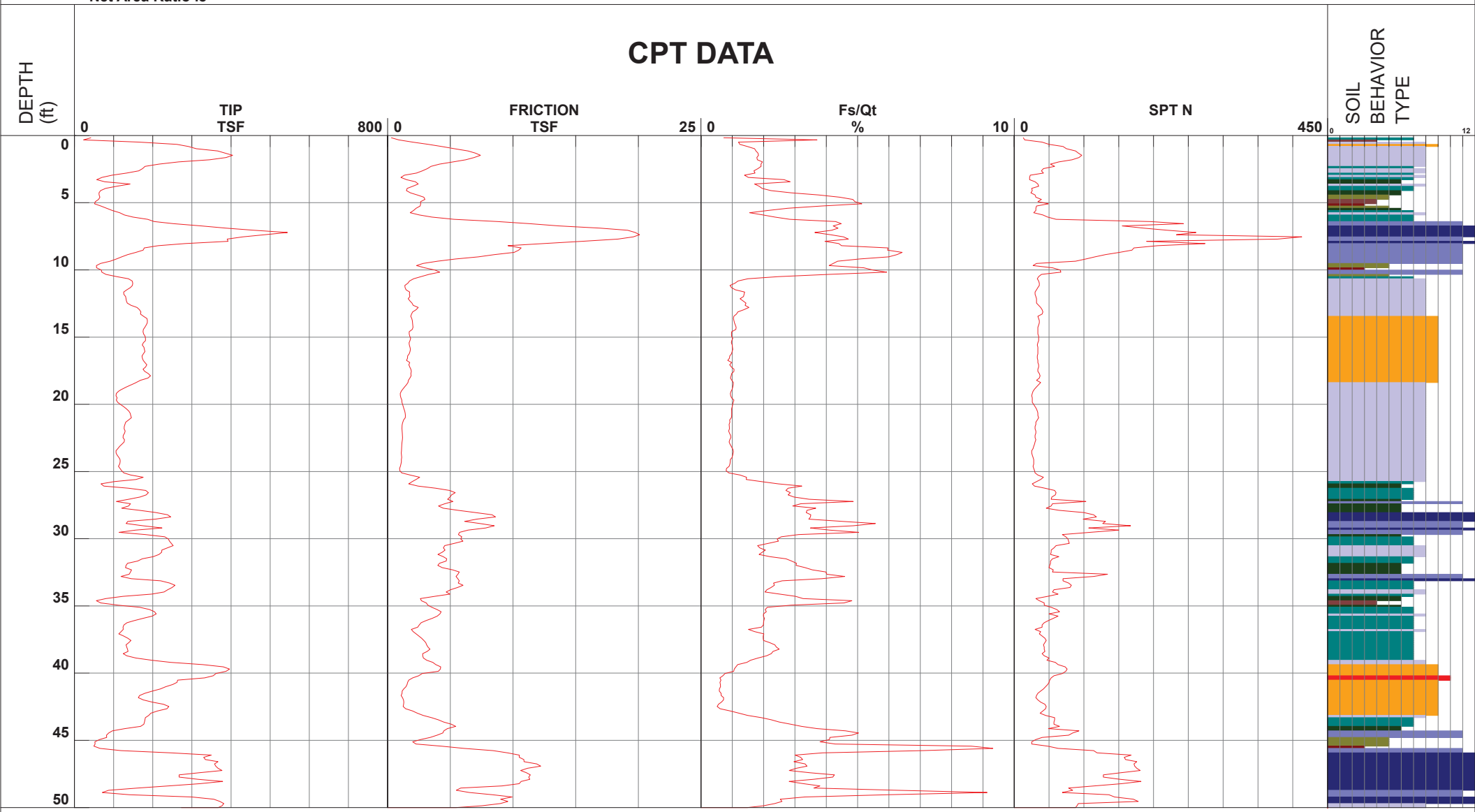
Middle Earth Geo Testing

Geosphere Consultants, Inc.

Project	Kaiser Fresno MOB	Operator	BH-GH	Filename	SDF(157).cpt
Job Number	91-04769	Cone Number	DDG1496	GPS	
Hole Number	CPT-02	Date and Time	6/2/2020 12:47:11 PM	Maximum Depth	50.52 ft
EST GW Depth During Test		25.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

S*Soil behavior type and SPT based on data from UBC-1983

Kaiser Fresno MOB

Project ID: Geosphere Consultants, Inc. Page: 1
Data File: SDF(157).cpt Sounding ID: CPT-02
CPT Date: 6/2/2020 12:47:11 PM Project No: 91-04769
GW During Test: 25 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT	Nk -
0.33	23.6	37.8	-	23.6	0.9	0.0	3.7	clayy SILT to silty CLAY	115	2.0	19	12	10	-	-	1.7	9.9	36	2.60	15
0.49	165.9	266.0	270.1	165.9	2.0	0.1	1.2	clean SAND to silty SAND	125	5.0	53	33	46	95	48	-	-	6	1.67	16
0.66	261.7	419.7	419.7	261.7	3.2	0.2	1.2	clean SAND to silty SAND	125	5.0	84	52	71	95	48	-	-	5	1.56	16
0.82	291.1	466.9	466.9	291.1	4.3	0.1	1.5	clean SAND to silty SAND	125	5.0	93	58	80	95	48	-	-	5	1.60	16
0.98	311.2	499.1	499.2	311.2	5.3	0.2	1.7	clean SAND to silty SAND	125	5.0	100	62	86	95	48	-	-	5	1.65	16
1.15	365.6	586.4	586.4	365.7	6.4	0.3	1.8	stiff SAND to clayy SAND	115	5.0	100	73	100	95	48	-	-	5	1.62	16
1.31	384.6	616.8	616.8	384.6	7.0	0.3	1.8	stiff SAND to clayy SAND	115	5.0	100	77	100	95	48	-	-	5	1.63	16
1.48	404.0	647.9	647.9	404.0	7.4	0.0	1.8	stiff SAND to clayy SAND	115	5.0	100	81	100	95	48	-	-	5	1.62	16
1.64	387.5	621.4	621.4	387.5	6.9	-0.3	1.8	stiff SAND to clayy SAND	115	5.0	100	77	100	95	48	-	-	5	1.62	16
1.80	345.3	553.7	553.7	345.3	6.2	-0.4	1.8	stiff SAND to clayy SAND	115	5.0	100	69	96	95	48	-	-	5	1.65	16
1.97	266.2	426.9	451.8	266.2	5.2	-0.1	2.0	clean SAND to silty SAND	125	5.0	85	53	76	95	48	-	-	7	1.73	16
2.13	215.6	345.8	374.8	215.6	4.1	-0.2	1.9	clean SAND to silty SAND	125	5.0	69	43	62	95	48	-	-	7	1.77	16
2.30	180.3	289.1	322.2	180.3	3.5	0.1	1.9	clean SAND to silty SAND	125	5.0	58	36	53	95	48	-	-	8	1.81	16
2.46	174.2	279.3	309.2	174.2	3.2	0.2	1.8	clean SAND to silty SAND	125	5.0	56	35	51	95	48	-	-	8	1.80	16
2.62	164.3	263.4	289.3	164.3	2.8	0.1	1.7	clean SAND to silty SAND	125	5.0	53	33	48	95	48	-	-	8	1.79	16
2.79	133.1	213.4	244.5	133.1	2.3	-0.1	1.7	clean SAND to silty SAND	125	5.0	43	27	40	92	48	-	-	9	1.85	16
2.95	96.4	154.5	179.8	96.3	1.3	-0.8	1.4	clean SAND to silty SAND	125	5.0	31	19	29	81	48	-	-	10	1.87	16
3.12	70.0	112.3	145.3	70.0	1.1	-0.3	1.5	clean SAND to silty SAND	125	5.0	22	14	22	71	47	-	-	13	1.99	16
3.28	57.0	91.3	160.0	57.0	1.5	-0.1	2.7	silty SAND to sandy SILT	120	3.0	30	19	20	64	46	-	-	20	2.23	16
3.45	77.7	124.6	198.3	77.7	2.2	-0.2	2.9	silty SAND to sandy SILT	120	3.0	42	26	26	74	47	-	-	18	2.17	16
3.61	142.2	228.0	257.7	142.2	2.4	-0.2	1.7	clean SAND to silty SAND	125	5.0	46	28	42	94	48	-	-	9	1.83	16
3.77	108.1	173.4	211.9	108.1	2.0	-0.9	1.9	clean SAND to silty SAND	125	5.0	35	22	33	85	48	-	-	11	1.93	16
3.94	79.8	128.0	172.8	79.8	1.6	-1.4	2.0	silty SAND to sandy SILT	120	3.0	43	27	25	75	46	-	-	14	2.04	16
4.10	66.8	107.1	162.4	66.8	1.5	-0.8	2.2	silty SAND to sandy SILT	120	3.0	36	22	22	69	45	-	-	17	2.13	16
4.27	62.8	100.7	176.3	62.8	1.8	-0.5	2.9	silty SAND to sandy SILT	120	3.0	34	21	22	67	45	-	-	20	2.23	16
4.43	63.0	101.0	203.4	62.9	2.4	-0.4	3.8	silty SAND to sandy SILT	120	3.0	34	21	23	67	45	-	-	23	2.32	16
4.59	65.2	104.6	228.0	65.2	2.9	-0.4	4.4	very stiff fine SOIL	120	1.0	100	65	24	-	-	2.3	9.9	25	2.37	30
4.76	61.6	98.7	233.5	61.5	3.0	-0.5	4.9	very stiff fine SOIL	120	1.0	99	62	23	-	-	2.2	9.9	27	2.41	30
4.92	53.5	85.8	219.2	53.5	2.6	-0.5	4.9	very stiff fine SOIL	120	1.0	86	53	20	-	-	1.9	9.9	29	2.46	30
5.09	51.4	82.5	220.8	51.4	2.6	-0.3	5.2	very stiff fine SOIL	120	1.0	82	51	20	-	-	1.8	9.9	30	2.48	30
5.25	67.6	108.4	214.1	67.6	2.6	-0.3	3.9	stiff SAND to clayy SAND	115	5.0	22	14	24	70	44	-	-	23	2.31	16
5.41	82.2	131.9	203.0	82.2	2.3	-0.9	2.8	silty SAND to sandy SILT	120	3.0	44	27	27	76	45	-	-	17	2.14	16
5.58	96.9	155.4	204.2	96.9	2.1	-0.3	2.1	silty SAND to sandy SILT	120	3.0	52	32	31	82	46	-	-	13	2.01	16
5.74	115.6	185.5	213.2	115.6	1.8	-0.2	1.6	clean SAND to silty SAND	125	5.0	37	23	35	87	46	-	-	9	1.86	16
5.91	127.6	204.6	245.4	127.6	2.5	-0.3	2.0	clean SAND to silty SAND	125	5.0	41	26	39	91	47	-	-	11	1.91	16
6.07	149.6	239.9	292.7	149.6	3.5	-0.1	2.4	clean SAND to silty SAND	125	5.0	48	30	46	95	47	-	-	11	1.93	16
6.23	187.0	295.8	366.5	187.0	5.3	0.1	2.8	stiff SAND to clayy SAND	115	5.0	59	37	57	95	48	-	-	12	1.95	16
6.40	203.9	318.4	458.5	203.9	8.8	1.0	4.3	very stiff fine SOIL	120	1.0	100	100	65	-	-	7.2	9.9	16	2.09	30
6.56	253.3	390.7	546.5	253.3	11.3	1.5	4.5	very stiff fine SOIL	120	1.0	100	100	79	-	-	8.9	9.9	15	2.07	30
6.73	323.7	493.2	643.0	323.8	13.7	3.4	4.2	stiff SAND to clayy SAND	115	5.0	99	65	97	95	48	-	-	13	2.00	16
6.89	387.4	583.5	751.4	387.6	17.0	8.6	4.4	very stiff fine SOIL	120	1.0	100	100	100	-	-	13.7	9.9	13	1.99	30
7.05	458.9	683.1	845.1	459.1	19.1	13.7	4.2	stiff SAND to clayy SAND	115	5.0	100	92	100	95	48	-	-	12	1.95	16
7.22	543.9	800.9	929.5	544.3	19.8	17.7	3.6	stiff SAND to clayy SAND	115	5.0	100	100	100	95	48	-	-	10	1.87	16
7.38	485.9	707.8	869.1	486.1	20.1	10.2	4.1	stiff SAND to clayy SAND	115	5.0	100	97	100	95	48	-	-	11	1.94	16
7.55	430.5	620.5	804.4	430.9	19.6	24.0	4.6	very stiff fine SOIL	120	1.0	100	100	100	-	-	15.2	9.9	13	2.00	30
7.71	390.1	556.4	744.2	396.6	18.4	332.5	4.7	very stiff fine SOIL	120	1.0	100	100	100	-	-	13.8	9.9	14	2.03	30
7.87	392.3	553.6	691.1	397.4	15.5	262.9	4.0	stiff SAND to clayy SAND	115	5.0	100	78	100	95	48	-	-	12	1.96	16
8.04	282.9	395.3	547.3	287.4	12.4	230.5	4.4	very stiff fine SOIL	120	1.0	100	100	79	-	-	10.0	9.9	15	2.06	30
8.20	213.9	295.9	443.3	215.4	9.6	74.2	4.5	very stiff fine SOIL	120	1.0	100	100	61	-	-	7.5	9.9	17	2.12	30
8.37	178.5	244.4	455.1	180.0	10.7	77.9	6.0	very stiff fine SOIL	120	1.0	100	100	54	-	-	6.3	9.9	21	2.27	30
8.53	175.5	238.0	446.6	176.9	10.5	74.1	6.0	very stiff fine SOIL	120	1.0	100	100	52	-	-	6.2	9.9	22	2.28	30
8.69	157.0	211.0	433.1	157.4	10.1	19.9	6.4	very stiff fine SOIL	120	1.0	100	100	47	-	-	5.5	9.9	24	2.33	30
8.86	136.2	181.4	387.4	136.6	8.5	16.1	6.3	very stiff fine SOIL	120	1.0	100	100	41	-	-	4.8	9.9	25	2.35	30
9.02	120.8	159.3	348.7	121.1	7.2	15.6	6.0	very stiff fine SOIL	120	1.0	100	100	36	-	-	4.2	9.9	25	2.37	30
9.19	107.3	140.2	291.3	107.6	5.4	16.9	5.1	very stiff fine SOIL	120	1.0	100	100	32	-	-	3.8	9.9	24	2.34	30
9.35	91.2	118.2	242.1	91.5	4.0	12.9	4.4	very stiff fine SOIL	120	1.0	100	91	27	-	-	3.2	9.9	24	2.33	30
9.51	66.9	85.9	200.8	67.2	2.8	16.6	4.3	clayy SILT to silty CLAY	115	2.0	43	33	20	-	-	4.7	9.9	27	2.41	15
9.68	56.4	71.9	180.9	56.7	2.3	14.9	4.1	clayy SILT to silty CLAY	115	2.0	36	28	17	-	-	3.9	9.9	28	2.45	15
9.84	56.7	71.7	208.5	57.0	2.9	17.4	5.3	clayy SILT to silty CLAY	115	2.0	36	28	18	-	-	4.0	9.9	32	2.53	15
10.01	68.8	86.2	236.1	69.1	3.8	16.1	5.5	very stiff fine SOIL	120	1.0	86	69	21	-	-	2.4	9.9	30	2.49	30
10.17	70.0	87.1	249.1	70.2	4.1	13.1	6.0	very stiff fine SOIL	120	1.0	87	70	21	-	-	2.5	9.9	31	2.52	30
10.34	80.5	99.3	212.0	80.7	3.3	9.2	4.1	very stiff fine SOIL	120	1.0	99	80	23	-	-	2.8	9.9	25	2.35	30
10.50	108.0	132.2	193.8	108.1	2.7	8.8	2.5	silty SAND to sandy SILT	120	3.0	44	36	27	76	43	-	-	16	2.11	16
10.66	138.0	167.7	195.3	138.1	2.1	4.7	1.5	clean SAND to silty SAND	125	5.0	34	28	31	84	44	-	-	10	1.87	16
10.83	147.7	178.0	194.5	147.8	1.7	3.3	1.2	clean SAND to silty SAND	125	5.0	36	30	32	86	45	-	-	8	1.78	16
10.99	149.1	178.3	191.3	149.2	1.6	3.2	1.1	clean SAND to silty SAND	125	5.0	36	30	32	86	45	-	-	7	1.75	16
11.16	148.2	175.9	183.5	148.3	1.4	2.9	0.9	clean SAND to silty SAND	125	5.0	35	30	31	86	45	-	-	6	1.71	16
11.32	142.8	168.2	178.7	142.9	1.4	2.5	1.0	clean SAND to silty SAND	125	5.0	34	29	30	84	44	-	-	7	1.74	16
11.48	134.0	156.6	172.8	134.0	1.5	2.2	1.1	clean SAND to silty SAND	125	5.0	31	27	29	82	44	-	-	8	1.80	16
11.65	125.7	145.9	172.4	125.8	1.8	1.5	1.4	clean SAND to silty SAND	125	5.0	29	25	28	79	44	-	-	10	1.89	16
11.81	126.3	145.4	171.4	126.3	1.7	1.5	1.4	clean SAND to silty SAND	125	5.0	29	25	27	79	43	-	-	10	1.89	16
11.98	130.7	149.5	174.5	130.7	1.8	1.4	1.4	clean SAND to silty SAND	125	5.0	30	26	28	80	44	-	-	10	1.88	16
12.14	131.9	149.8	171.4	132.0	1.6	1.3	1.3	clean SAND to silty SAND	125	5.0	30	26	28	80	44	-	-	9	1.85	16
12.30	132.6	149.5	174.0	132.6	1.8	1.3	1.3	clean SAND to silty SAND	125	5.0	30	27	28	80	43	-	-	10	1.87	16
12.47	135.0	151.2	178.5	135.1	1.9	1.3	1.4	clean SAND to silty SAND	125	5.0	30	27	29	81	44	-	-	10	1.89	16
12.63	144.8	161.0	186.5	144.8	2.0	1.4	1.4	clean SAND to silty SAND	125	5.0	32	29	30	83	44	-	-	10	1.87	16
12.80	159.7	176.5	204.3	159.8	2.4	1.6	1.5	clean SAND to silty SAND	125	5.0	35	32	33	86	44	-	-	10	1.87	16
12.96	166.1	182.3	204.4	166.1	2.3	1.5	1.4	clean SAND to silty SAND	125	5.0	36	33	33	87	44	-	-	9	1.82	16
13.12	169.8	185.2	200.5	169.9	2.0	1.5	1.2	clean SAND to silty SAND	125	5.0	37	34	33	87	44	-	-	7	1.77	16
13.29	168.6	182.7	196.8	168.6	1.9	1.4	1.1	clean SAND to silty SAND	125	5.0	37	34	33	87	44	-	-	7	1.76	16
13.45	176.4	190.0	200.0	176.5	1.8	1.5	1.1	clean SAND to silty SAND	125	5.0	38	35	34	88	44	-	-	7	1.72	16
13.62	185.2	198.2	206.6	185.2	1.9	1.6	1.0	clean SAND to silty SAND	125	5.0	40	37	35	90	45	-	-	6	1.71	16
13.78	186.6	198.4	207.4	186.6	2.0	1.9	1.1	clean SAND to silty SAND	125	5.0	40	37	35	90	45	-	-	6	1.71	16
13.94	186.3	196.9	206.6	186.3	2.0	1.9	1.1	clean SAND to silty SAND	125	5.0	39	37	35	89	44	-	-	6	1.72	16
14.11	183.1	192.4	203.9	183.1	2.0	1.8	1.1	clean SAND to silty SAND	125	5.0	38	37	34	89	44	-	-	7	1.73	16
14.27	179.8	187.7	201.0	179.8	2.0	1.8	1.1	clean SAND to silty SAND	125	5.0	38	36	34	88	44	-	-	7	1.75	16
14.44	176.2	182.9	196.4	176.2	2.0	1.8	1.1	clean SAND to silty SAND	125	5.0	37	35	33	87	44	-	-	7	1.75	16
14.60	175.2	180.8	189.7	175.2	1.7	2.0	1.0	clean SAND to silty SAND	125	5.0	36	35	32	87	44	-	-	6	1.72	16
14.76	176.7	181.4	189.8	176.7	1.7	1.9	1.0	clean SAND to silty SAND	125	5.0	36	35	32	87	44	-	-	6	1.71	16
14.93	180.3	184.0	192.2	180.4	1.8	1.9	1.0	clean SAND to silty SAND	125	5.0	37	36	33	87	44	-	-	6	1.71	16
15.09	181.3	184.0	193.7	181.4	1.8	2.2	1.0	clean SAND to silty SAND	125	5.0	37	36	33	87	44	-	-	7	1.72	16
15.26	181.5	183.1	191.8	181.5	1.8	2.3	1.0	clean SAND to silty SAND	125	5.0	37	36	32	87	44	-	-	6	1.71	16
15.42	176.1	176.8	185.9	176.2	1.7	2.2	1.0	clean SAND to silty SAND	125	5.0	35	35	31	86	44	-	-	7	1.72	16

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Geosphere Consultants, Inc. Page: 2
Data File: SDF(157).cpt Sounding ID: CPT-02
CPT Date: 6/2/2020 12:47:11 PM Project No: 91-04769
GW During Test: 25 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -
15.58	173.1	172.8	183.7	173.1	1.7	2.2	1.0	clean SAND to silty SAND	125	5.0	35	35	31	85	44	-	-	7	1.74	16
15.75	177.3	176.0	186.6	177.4	1.8	2.3	1.0	clean SAND to silty SAND	125	5.0	35	35	31	86	44	-	-	7	1.73	16
15.91	178.5	176.3	187.2	178.6	1.8	2.4	1.0	clean SAND to silty SAND	125	5.0	35	36	31	86	44	-	-	7	1.74	16
16.08	179.9	176.7	186.8	180.0	1.8	2.4	1.0	clean SAND to silty SAND	125	5.0	35	36	31	86	44	-	-	7	1.73	16
16.24	176.1	172.1	182.1	176.1	1.7	2.4	1.0	clean SAND to silty SAND	125	5.0	34	35	31	85	43	-	-	7	1.73	16
16.40	172.6	167.8	176.6	172.7	1.6	2.4	0.9	clean SAND to silty SAND	125	5.0	34	35	30	84	43	-	-	7	1.72	16
16.57	173.7	168.0	176.3	173.7	1.6	2.3	0.9	clean SAND to silty SAND	125	5.0	34	35	30	84	43	-	-	6	1.72	16
16.73	175.8	169.1	175.3	175.8	1.5	2.3	0.9	clean SAND to silty SAND	125	5.0	34	35	30	84	43	-	-	6	1.70	16
16.90	179.9	172.3	182.6	180.0	1.8	2.4	1.0	clean SAND to silty SAND	125	5.0	34	36	31	85	43	-	-	7	1.73	16
17.06	185.0	176.3	183.5	185.1	1.7	2.5	0.9	clean SAND to silty SAND	125	5.0	35	37	31	86	43	-	-	6	1.70	16
17.23	181.7	172.3	182.2	181.8	1.8	2.4	1.0	clean SAND to silty SAND	125	5.0	34	36	31	85	43	-	-	7	1.73	16
17.39	175.4	165.4	179.3	175.4	1.9	2.6	1.1	clean SAND to silty SAND	125	5.0	33	35	30	84	43	-	-	7	1.77	16
17.55	179.5	168.5	181.9	179.5	1.9	2.4	1.1	clean SAND to silty SAND	125	5.0	34	36	30	84	43	-	-	7	1.76	16
17.72	188.5	176.1	185.8	188.5	1.8	2.5	1.0	clean SAND to silty SAND	125	5.0	35	38	31	86	43	-	-	7	1.73	16
17.88	194.3	180.7	189.1	194.3	1.9	2.6	1.0	clean SAND to silty SAND	125	5.0	36	39	32	87	43	-	-	6	1.71	16
18.05	187.9	174.0	182.5	188.0	1.8	2.8	0.9	clean SAND to silty SAND	125	5.0	35	38	31	85	43	-	-	6	1.72	16
18.21	168.5	155.3	168.2	168.6	1.7	2.6	1.0	clean SAND to silty SAND	125	5.0	31	34	28	82	43	-	-	7	1.77	16
18.37	157.3	144.3	160.1	157.3	1.6	2.5	1.0	clean SAND to silty SAND	125	5.0	29	31	26	79	42	-	-	8	1.80	16
18.54	146.3	133.6	150.7	146.4	1.5	2.4	1.0	clean SAND to silty SAND	125	5.0	27	29	25	77	42	-	-	9	1.83	16
18.70	133.6	121.4	139.6	133.6	1.4	2.3	1.0	clean SAND to silty SAND	125	5.0	24	27	23	73	41	-	-	9	1.86	16
18.87	121.5	110.0	129.0	121.5	1.2	2.2	1.0	clean SAND to silty SAND	125	5.0	22	24	21	70	41	-	-	10	1.88	16
19.03	112.6	101.5	120.8	112.7	1.1	2.1	1.0	clean SAND to silty SAND	125	5.0	20	23	19	67	40	-	-	10	1.90	16
19.19	107.0	96.0	115.3	107.0	1.0	2.0	0.9	clean SAND to silty SAND	125	5.0	19	21	18	66	40	-	-	11	1.91	16
19.36	106.4	95.0	114.8	106.4	1.0	2.0	1.0	clean SAND to silty SAND	125	5.0	19	21	18	65	40	-	-	11	1.92	16
19.52	108.8	96.8	117.1	108.9	1.1	2.0	1.0	clean SAND to silty SAND	125	5.0	19	22	18	66	40	-	-	11	1.92	16
19.69	107.1	94.8	117.4	107.1	1.1	2.0	1.1	clean SAND to silty SAND	125	5.0	19	21	18	65	40	-	-	12	1.95	16
19.85	110.5	97.4	119.1	110.5	1.1	1.9	1.0	clean SAND to silty SAND	125	5.0	19	22	19	66	40	-	-	11	1.93	16
20.01	117.7	103.3	123.7	117.7	1.2	2.0	1.0	clean SAND to silty SAND	125	5.0	21	24	20	68	40	-	-	11	1.91	16
20.18	125.7	109.9	129.0	125.8	1.3	2.0	1.0	clean SAND to silty SAND	125	5.0	22	25	21	70	41	-	-	10	1.88	16
20.34	133.0	115.8	133.6	133.1	1.3	1.9	1.0	clean SAND to silty SAND	125	5.0	23	27	22	72	41	-	-	9	1.86	16
20.51	138.8	120.3	137.6	138.8	1.4	2.2	1.0	clean SAND to silty SAND	125	5.0	24	28	22	73	41	-	-	9	1.85	16
20.67	142.4	123.0	140.1	142.5	1.4	2.2	1.0	clean SAND to silty SAND	125	5.0	25	28	23	74	41	-	-	9	1.84	16
20.83	144.0	123.8	140.7	144.0	1.4	2.3	1.0	clean SAND to silty SAND	125	5.0	25	29	23	74	41	-	-	9	1.84	16
21.00	145.5	124.6	141.1	145.5	1.4	2.2	1.0	clean SAND to silty SAND	125	5.0	25	29	23	74	41	-	-	9	1.83	16
21.16	138.5	118.2	134.0	138.6	1.3	2.2	0.9	clean SAND to silty SAND	125	5.0	24	28	22	73	41	-	-	9	1.84	16
21.33	131.1	111.5	128.3	131.2	1.2	2.2	0.9	clean SAND to silty SAND	125	5.0	22	26	21	71	41	-	-	9	1.86	16
21.49	128.8	109.1	125.6	128.8	1.2	2.2	0.9	clean SAND to silty SAND	125	5.0	22	26	20	70	40	-	-	9	1.86	16
21.65	127.1	107.2	124.1	127.2	1.1	1.9	0.9	clean SAND to silty SAND	125	5.0	21	25	20	69	40	-	-	10	1.87	16
21.82	127.0	106.7	123.8	127.1	1.2	2.0	0.9	clean SAND to silty SAND	125	5.0	21	25	20	69	40	-	-	10	1.87	16
21.98	129.5	108.4	124.6	129.6	1.1	2.0	0.9	clean SAND to silty SAND	125	5.0	22	26	20	70	40	-	-	9	1.86	16
22.15	128.1	106.8	123.9	128.1	1.2	2.0	0.9	clean SAND to silty SAND	125	5.0	21	26	20	69	40	-	-	10	1.87	16
22.31	124.8	103.7	122.2	124.8	1.2	2.0	1.0	clean SAND to silty SAND	125	5.0	21	25	20	68	40	-	-	10	1.89	16
22.47	124.2	102.8	121.6	124.3	1.2	2.0	1.0	clean SAND to silty SAND	125	5.0	21	25	19	68	40	-	-	10	1.89	16
22.64	127.9	105.5	123.1	128.0	1.2	2.0	0.9	clean SAND to silty SAND	125	5.0	21	26	20	69	40	-	-	10	1.88	16
22.80	127.0	104.3	121.5	127.0	1.1	2.1	0.9	clean SAND to silty SAND	125	5.0	21	25	20	68	40	-	-	10	1.87	16
22.97	121.3	99.3	118.0	121.3	1.1	2.0	0.9	clean SAND to silty SAND	125	5.0	20	24	19	67	40	-	-	10	1.90	16
23.13	115.7	94.3	114.8	115.7	1.1	2.0	1.0	clean SAND to silty SAND	125	5.0	19	23	18	65	39	-	-	11	1.93	16
23.30	111.0	90.2	112.2	111.1	1.1	2.1	1.0	clean SAND to silty SAND	125	5.0	18	22	17	64	39	-	-	12	1.95	16
23.46	106.1	85.9	109.4	106.2	1.1	2.0	1.0	clean SAND to silty SAND	125	5.0	17	21	17	62	39	-	-	12	1.98	16
23.62	106.4	85.9	109.0	106.5	1.1	2.1	1.0	clean SAND to silty SAND	125	5.0	17	21	17	62	39	-	-	12	1.98	16
23.79	109.5	88.0	110.6	109.5	1.1	2.0	1.0	clean SAND to silty SAND	125	5.0	18	22	17	63	39	-	-	12	1.97	16
23.95	113.1	90.6	112.3	113.2	1.1	2.0	1.0	clean SAND to silty SAND	125	5.0	18	23	17	64	39	-	-	12	1.95	16
24.12	116.6	93.1	112.9	116.7	1.1	2.2	0.9	clean SAND to silty SAND	125	5.0	19	23	18	65	39	-	-	11	1.92	16
24.28	116.9	93.0	112.7	116.9	1.1	2.1	0.9	clean SAND to silty SAND	125	5.0	19	23	18	65	39	-	-	11	1.92	16
24.44	115.6	91.6	111.2	115.6	1.1	2.2	0.9	clean SAND to silty SAND	125	5.0	18	23	17	64	39	-	-	11	1.93	16
24.61	112.6	88.9	108.3	112.6	1.0	1.9	0.9	clean SAND to silty SAND	125	5.0	18	23	17	63	39	-	-	11	1.93	16
24.77	116.5	91.8	108.4	116.6	0.9	1.8	0.8	clean SAND to silty SAND	125	5.0	18	23	17	64	39	-	-	10	1.89	16
24.94	120.6	94.6	110.5	120.6	1.0	1.9	0.8	clean SAND to silty SAND	125	5.0	19	24	18	65	39	-	-	10	1.88	16
25.10	126.3	99.0	116.6	126.3	1.1	2.0	0.9	clean SAND to silty SAND	125	5.0	20	25	19	67	39	-	-	10	1.89	16
25.26	143.9	112.6	138.5	144.0	1.8	2.0	1.3	clean SAND to silty SAND	125	5.0	23	29	22	71	40	-	-	11	1.94	16
25.43	175.8	137.3	166.6	175.9	2.6	2.3	1.5	clean SAND to silty SAND	125	5.0	27	35	26	77	41	-	-	11	1.93	16
25.59	157.3	122.6	153.1	157.3	2.3	2.4	1.5	clean SAND to silty SAND	125	5.0	25	31	24	74	41	-	-	12	1.96	16
25.76	101.7	79.1	129.3	101.7	2.0	2.5	2.0	silty SAND to sandy SILT	120	3.0	26	34	17	59	38	-	-	19	2.19	16
25.92	68.1	52.9	120.4	68.1	1.7	3.2	2.5	silty SAND to sandy SILT	120	3.0	18	23	12	46	36	-	-	26	2.39	16
26.08	75.2	58.4	144.9	75.3	2.4	3.6	3.3	clayy SILT to silty CLAY	115	2.0	29	38	14	-	-	5.2	9.9	28	2.44	15
26.25	137.8	106.8	180.3	137.9	3.8	3.2	2.8	silty SAND to sandy SILT	120	3.0	36	46	23	69	40	-	-	19	2.21	16
26.41	182.1	140.9	210.6	182.2	4.9	3.4	2.7	silty SAND to sandy SILT	120	3.0	47	61	29	78	41	-	-	16	2.12	16
26.58	189.0	146.1	220.6	189.1	5.4	4.5	2.9	silty SAND to sandy SILT	120	3.0	49	63	30	80	41	-	-	17	2.13	16
26.74	183.5	141.5	213.6	183.6	5.1	4.4	2.8	silty SAND to sandy SILT	120	3.0	47	61	29	78	41	-	-	17	2.13	16
26.90	167.6	129.1	208.0	167.6	5.0	4.1	3.0	silty SAND to sandy SILT	120	3.0	43	56	27	75	41	-	-	18	2.18	16
27.07	138.6	106.6	201.5	138.7	4.8	3.7	3.5	silty SAND to sandy SILT	120	3.0	36	46	23	69	40	-	-	22	2.28	16
27.23	107.2	82.3	215.7	107.3	5.2	4.4	4.9	clayy SILT to silty CLAY	115	2.0	41	54	20	-	-	7.5	9.9	29	2.47	15
27.40	143.0	109.7	196.2	143.1	4.6	4.1	3.2	silty SAND to sandy SILT	120	3.0	37	48	24	70	40	-	-	21	2.25	16
27.56	138.5	106.1	184.4	138.6	4.1	3.8	3.0	silty SAND to sandy SILT	120	3.0	35	46	23	69	40	-	-	20	2.23	16
27.72	121.1	92.6	193.5	121.1	4.4	3.4	3.7	clayy SILT to silty CLAY	115	2.0	46	61	21	-	-	8.4	9.9	24	2.34	15
27.89	166.1	126.9	219.9	166.2	5.6	3.3	3.4	silty SAND to sandy SILT	120	3.0	42	55	27	75	41	-	-	20	2.23	16
28.05	208.3	158.9	251.3	208.4	7.0	4.1	3.4	stiff SAND to clayy SAND	115	5.0	32	42	33	82	42	-	-	18	2.16	16
28.22	237.9	181.2	279.5	238.0	8.3	4.6	3.5	stiff SAND to clayy SAND	115	5.0	36	48	38	87	42	-	-	17	2.15	16
28.38	246.0	187.1	285.2	246.1	8.6	4.4	3.5	stiff SAND to clayy SAND	115	5.0	37	49	39	88	43	-	-	17	2.14	16
28.54	206.6	157.0	252.4	206.7	7.1	4.0	3.5	stiff SAND to clayy SAND	115	5.0	31	41	33	82	42	-	-	18	2.18	16
28.71	136.5	103.6	231.4	136.6	6.2	3.7	4.6	very stiff fine SOIL	120	1.0	100	100	24	-	-	4.8	9.9	26	2.38	30
28.87	132.2	100.1	258.8	132.3	7.4	4.9	5.6	very stiff fine SOIL	120	1.0	100	100	24	-	-	4.6	9.9	29	2.46	30
29.04	174.7	132.1	276.3	174.8	8.5	6.6	4.9	very stiff fine SOIL	120	1.0	100	100	30	-	-	6.1	9.9	24	2.34	30
29.20	223.8	169.0	266.8	223.9	7.8	6.9	3.5	stiff SAND to clayy SAND	115	5.0	34	45	35	84	42	-	-	18	2.16	16
29.36	156.5	118.0	234.7	156.6	6.4	5.7	4.1	very stiff fine SOIL	120	1.0	100	100	26	-	-	5.5	9.9	23	2.31	30
29.53	114.2	86.0	225.3	114.3	5.7	5.3	5.1	very stiff fine SOIL	120	1.0	86	100	21	-	-	4.0	9.9	29	2.47	30
29.69	180.9	136.1	220.1	181.0	5.6	7.6	3.1	silty SAND to sandy SILT	120	3.0	45	60	29	77	41	-	-	18	2.18	16
29.86	230.7	173.3	236.7	230.9	5.9	6.6	2.6	silty SAND to sandy SILT	120	3.0	58	77	35	85	42	-	-	14	2.05	16
30.02	239.7	179.8	238.3	239.9	5.8	6.4	2.5	silty SAND to sandy SILT	120	3.0	60	80	36	86	42	-	-	13	2.02	16
30.19	242.9	181.9	241.7	243.0	6.0	6.2	2.5	silty SAND to sandy SILT	120	3.0	61	81	36	87	42	-	-	14	2.02	16
30.35	247.7	185.3	233.4	247.8	5.3	6.0	2.2	clean SAND to silty SAND	125	5.0	37	50	36	87	43	-	-	12	1.97	16
30.51	252.3	188.5	224.8	252.5	4.6	6.5	1.8	clean SAND to silty SAND	125	5.0	38	50	36	88	43	-	-	10	1.90	16
30.68	237.5	177.1	216.5	237.6	4.5	6.3	1.9	clean SAND to silty SAND	125	5.0	35	47	34	86	42	-	-	11	1.93	16
30.84	223.0	166.1	212.3	223.1	4.6	6.0	2.1	silty SAND to sandy SILT	120	3.0	55	74	32	84	42	-	-	12	1.98	16

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Kaiser Fresno MOB

Project ID: Geosphere Consultants, Inc. Page: 3
Data File: SDF(157).cpt Sounding ID: CPT-02
CPT Date: 6/2/2020 12:47:11 PM Project No: 91-04769
GW During Test: 25 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -
31.01	222.9	165.8	208.7	223.0	4.4	5.7	2.0	clean SAND to silty SAND	125	5.0	33	45	32	84	42	-	-	12	1.97	16
31.17	216.2	160.5	200.6	216.3	4.0	5.9	1.9	clean SAND to silty SAND	125	5.0	32	43	31	83	42	-	-	12	1.96	16
31.33	201.2	149.2	201.5	201.3	4.4	5.7	2.2	silty SAND to sandy SILT	120	3.0	50	67	30	80	41	-	-	14	2.04	16
31.50	173.5	128.4	199.1	173.6	4.7	5.6	2.7	silty SAND to sandy SILT	120	3.0	43	58	27	75	41	-	-	17	2.15	16
31.66	161.4	119.4	196.3	161.5	4.7	5.2	2.9	silty SAND to sandy SILT	120	3.0	40	54	25	73	40	-	-	19	2.19	16
31.83	135.9	100.3	182.7	136.0	4.1	5.3	3.1	silty SAND to sandy SILT	120	3.0	33	45	22	67	39	-	-	21	2.26	16
31.99	131.9	97.3	179.4	132.0	4.0	5.0	3.1	silty SAND to sandy SILT	120	3.0	32	44	21	66	39	-	-	21	2.27	16
32.15	130.7	96.2	187.2	130.8	4.3	5.4	3.4	silty SAND to sandy SILT	120	3.0	32	44	21	66	39	-	-	22	2.30	16
32.32	145.9	107.3	205.8	146.0	5.2	5.4	3.6	silty SAND to sandy SILT	120	3.0	36	49	24	69	40	-	-	22	2.29	16
32.48	143.2	105.1	217.3	143.3	5.7	5.7	4.0	very stiff fine SOIL	120	1.0	100	100	24	-	-	5.0	9.9	24	2.34	30
32.65	139.9	102.6	215.2	140.0	5.6	5.9	4.1	very stiff fine SOIL	120	1.0	100	100	23	-	-	4.9	9.9	24	2.34	30
32.81	118.9	87.1	214.4	119.0	5.5	5.9	4.7	clayy SILT to silty CLAY	115	2.0	44	59	21	-	-	8.3	9.9	28	2.44	15
32.97	145.4	106.3	214.2	145.5	5.6	9.2	3.9	stiff SAND to clayy SAND	115	5.0	21	29	24	69	39	-	-	23	2.32	16
33.14	220.3	160.9	226.0	220.4	5.7	8.1	2.6	silty SAND to sandy SILT	120	3.0	54	73	32	83	42	-	-	15	2.07	16
33.30	243.3	177.5	232.0	243.4	5.6	7.0	2.3	silty SAND to sandy SILT	120	3.0	59	81	35	86	42	-	-	13	2.01	16
33.47	256.8	187.1	242.1	256.9	6.0	6.9	2.4	silty SAND to sandy SILT	120	3.0	62	86	37	88	42	-	-	13	2.00	16
33.63	249.4	181.5	233.0	249.5	5.6	6.2	2.3	silty SAND to sandy SILT	120	3.0	60	83	35	87	42	-	-	13	1.99	16
33.79	238.3	173.1	220.6	238.4	5.0	6.6	2.1	silty SAND to sandy SILT	120	3.0	58	79	34	85	42	-	-	12	1.98	16
33.96	228.8	166.0	211.9	228.9	4.7	6.5	2.1	silty SAND to sandy SILT	120	3.0	55	76	32	84	42	-	-	12	1.98	16
34.12	197.7	143.3	206.5	197.8	5.0	5.5	2.5	silty SAND to sandy SILT	120	3.0	48	66	29	79	41	-	-	16	2.09	16
34.29	124.2	89.9	171.9	124.3	3.8	5.3	3.1	silty SAND to sandy SILT	120	3.0	30	41	20	63	38	-	-	22	2.29	16
34.45	80.2	57.9	146.1	80.3	2.6	5.0	3.3	clayy SILT to silty CLAY	115	2.0	29	40	14	-	-	5.5	9.9	28	2.45	15
34.61	55.8	30.8	-	55.9	2.7	6.8	5.0	silty CLAY to CLAY	115	1.5	21	37	9	-	-	3.8	9.8	44	2.77	15
34.78	67.4	37.1	-	67.5	3.1	6.5	4.7	silty CLAY to CLAY	115	1.5	25	45	10	-	-	4.6	9.9	40	2.69	15
34.94	111.4	80.3	158.4	111.6	3.2	6.7	2.9	silty SAND to sandy SILT	120	3.0	27	37	18	60	38	-	-	23	2.31	16
35.11	166.9	120.0	171.9	167.0	3.5	5.9	2.1	silty SAND to sandy SILT	120	3.0	40	56	24	73	40	-	-	15	2.09	16
35.27	191.9	137.9	186.2	192.0	3.9	6.1	2.1	silty SAND to sandy SILT	120	3.0	46	64	27	78	41	-	-	14	2.04	16
35.43	204.7	146.9	195.5	204.8	4.3	6.5	2.1	silty SAND to sandy SILT	120	3.0	49	68	29	80	41	-	-	14	2.02	16
35.60	208.8	149.6	195.2	208.9	4.2	6.4	2.0	silty SAND to sandy SILT	120	3.0	50	70	29	80	41	-	-	13	2.00	16
35.76	198.6	142.1	188.1	198.7	4.0	6.1	2.0	silty SAND to sandy SILT	120	3.0	47	66	28	79	41	-	-	13	2.02	16
35.93	175.2	125.2	173.7	175.3	3.5	5.8	2.1	silty SAND to sandy SILT	120	3.0	42	58	25	74	40	-	-	15	2.06	16
36.09	152.9	109.1	158.6	153.0	3.1	5.5	2.0	silty SAND to sandy SILT	120	3.0	36	51	22	70	39	-	-	16	2.10	16
36.26	134.3	95.7	146.2	134.4	2.7	5.2	2.0	silty SAND to sandy SILT	120	3.0	32	45	20	66	39	-	-	17	2.14	16
36.42	126.5	90.1	141.2	126.7	2.5	5.2	2.0	silty SAND to sandy SILT	120	3.0	30	42	19	64	38	-	-	18	2.16	16
36.58	124.0	88.2	137.6	124.1	2.4	5.0	2.0	silty SAND to sandy SILT	120	3.0	29	41	18	63	38	-	-	17	2.15	16
36.75	124.8	88.6	125.7	124.9	1.9	4.9	1.5	silty SAND to sandy SILT	120	3.0	30	42	18	63	38	-	-	15	2.08	16
36.91	119.3	84.6	128.2	119.4	2.0	4.8	1.7	silty SAND to sandy SILT	120	3.0	28	40	18	61	38	-	-	17	2.13	16
37.08	113.4	80.3	133.1	113.4	2.3	4.6	2.0	silty SAND to sandy SILT	120	3.0	27	38	17	60	38	-	-	19	2.20	16
37.24	125.5	88.8	139.9	125.5	2.5	4.1	2.0	silty SAND to sandy SILT	120	3.0	30	42	19	63	38	-	-	18	2.16	16
37.40	136.6	96.5	146.7	136.7	2.7	4.5	2.0	silty SAND to sandy SILT	120	3.0	32	46	20	66	39	-	-	17	2.13	16
37.57	144.5	102.0	152.0	144.6	2.9	4.8	2.0	silty SAND to sandy SILT	120	3.0	34	48	21	68	39	-	-	16	2.12	16
37.73	139.0	98.0	154.2	139.1	3.0	4.6	2.2	silty SAND to sandy SILT	120	3.0	33	46	21	66	39	-	-	18	2.16	16
37.90	131.8	92.8	154.7	131.9	3.1	4.5	2.4	silty SAND to sandy SILT	120	3.0	31	44	20	65	38	-	-	19	2.20	16
38.06	133.7	94.0	157.3	133.8	3.2	4.5	2.4	silty SAND to sandy SILT	120	3.0	31	45	20	65	39	-	-	19	2.20	16
38.22	135.5	95.1	161.2	135.6	3.4	4.4	2.5	silty SAND to sandy SILT	120	3.0	32	45	20	65	39	-	-	19	2.21	16
38.39	136.9	96.0	156.0	137.0	3.2	4.4	2.3	silty SAND to sandy SILT	120	3.0	32	46	20	66	39	-	-	18	2.18	16
38.55	124.6	87.3	146.2	124.7	2.8	4.5	2.3	silty SAND to sandy SILT	120	3.0	29	42	19	63	38	-	-	19	2.20	16
38.72	133.6	93.5	147.4	133.7	2.8	4.5	2.1	silty SAND to sandy SILT	120	3.0	31	45	20	65	38	-	-	18	2.16	16
38.88	156.7	109.5	153.2	156.8	2.9	4.6	1.8	silty SAND to sandy SILT	120	3.0	36	52	22	70	39	-	-	15	2.07	16
39.04	197.3	137.7	171.2	197.4	3.1	4.6	1.6	clean SAND to silty SAND	125	5.0	28	39	27	78	41	-	-	12	1.95	16
39.21	245.7	171.3	198.0	245.8	3.6	5.2	1.5	clean SAND to silty SAND	125	5.0	34	49	32	85	42	-	-	10	1.86	16
39.37	327.7	228.1	237.8	327.8	3.8	5.6	1.2	clean SAND to silty SAND	125	5.0	46	66	40	94	43	-	-	6	1.71	16
39.54	380.3	264.4	264.9	380.4	4.2	6.3	1.1	clean SAND to silty SAND	125	5.0	53	76	46	95	44	-	-	5	1.65	16
39.70	396.2	275.1	275.1	396.4	4.2	6.5	1.1	clean SAND to silty SAND	125	5.0	55	79	47	95	44	-	-	5	1.62	16
39.86	387.2	268.5	268.5	387.3	4.0	6.6	1.0	clean SAND to silty SAND	125	5.0	54	77	46	95	44	-	-	5	1.62	16
40.03	361.2	250.1	250.1	361.4	2.8	6.4	0.8	clean SAND to silty SAND	125	5.0	50	72	42	95	44	-	-	5	1.54	16
40.19	354.3	245.0	245.0	354.4	2.5	6.5	0.7	clean SAND to silty SAND	125	5.0	49	71	41	95	44	-	-	5	1.52	16
40.36	332.5	229.7	229.7	332.6	2.0	6.4	0.6	clean SAND to silty SAND	125	5.0	46	67	38	94	43	-	-	5	1.50	16
40.52	263.8	182.0	182.0	264.0	1.7	5.8	0.6	clean SAND to silty SAND	125	5.0	36	53	31	87	42	-	-	5	1.59	16
40.68	262.1	180.5	180.5	262.2	1.6	5.7	0.6	clean SAND to silty SAND	125	5.0	36	52	31	86	42	-	-	5	1.58	16
40.85	251.2	172.8	172.8	251.3	1.6	5.8	0.6	clean SAND to silty SAND	125	5.0	35	50	29	85	42	-	-	5	1.60	16
41.01	233.4	160.3	160.3	233.5	1.5	5.7	0.6	clean SAND to silty SAND	125	5.0	32	47	28	83	41	-	-	5	1.63	16
41.18	219.6	150.7	150.7	219.7	1.3	5.7	0.6	clean SAND to silty SAND	125	5.0	30	44	26	81	41	-	-	5	1.63	16
41.34	199.3	136.6	138.6	199.4	1.2	5.5	0.6	clean SAND to silty SAND	125	5.0	27	40	24	77	40	-	-	5	1.67	16
41.50	179.8	123.1	130.0	179.9	1.2	5.3	0.6	clean SAND to silty SAND	125	5.0	25	36	22	74	40	-	-	7	1.73	16
41.67	166.4	113.8	122.6	166.5	1.1	5.3	0.7	clean SAND to silty SAND	125	5.0	23	33	20	71	39	-	-	7	1.76	16
41.83	163.5	111.6	123.0	163.6	1.2	5.1	0.7	clean SAND to silty SAND	125	5.0	22	33	20	71	39	-	-	8	1.79	16
42.00	175.8	119.9	129.9	175.9	1.3	5.2	0.7	clean SAND to silty SAND	125	5.0	24	35	22	73	40	-	-	7	1.77	16
42.16	199.0	135.5	140.5	199.1	1.3	5.3	0.7	clean SAND to silty SAND	125	5.0	27	40	24	77	40	-	-	6	1.70	16
42.32	227.4	154.7	154.7	227.6	1.3	5.4	0.6	clean SAND to silty SAND	125	5.0	31	45	26	81	41	-	-	5	1.61	16
42.49	241.2	163.8	163.8	241.3	1.2	5.4	0.5	clean SAND to silty SAND	125	5.0	33	48	28	83	41	-	-	5	1.57	16
42.65	236.3	160.3	160.3	236.4	1.4	5.4	0.6	clean SAND to silty SAND	125	5.0	32	47	27	83	41	-	-	5	1.62	16
42.82	212.4	143.9	157.1	212.5	2.0	5.4	0.9	clean SAND to silty SAND	125	5.0	29	42	26	79	41	-	-	8	1.78	16
42.98	195.1	132.1	155.2	195.2	2.4	5.0	1.2	clean SAND to silty SAND	125	5.0	26	39	25	76	40	-	-	10	1.89	16
43.15	189.7	128.2	160.0	189.8	2.8	5.6	1.5	clean SAND to silty SAND	125	5.0	26	38	25	75	40	-	-	12	1.96	16
43.31	181.2	122.3	168.3	181.3	3.5	5.8	2.0	silty SAND to sandy SILT	120	3.0	41	60	25	74	40	-	-	14	2.05	16
43.47	180.0	121.4	177.4	180.1	4.0	5.9	2.3	silty SAND to sandy SILT	120	3.0	40	60	25	73	40	-	-	16	2.10	16
43.64	178.9	120.5	184.9	179.0	4.5	5.8	2.5	silty SAND to sandy SILT	120	3.0	40	60	25	73	40	-	-	17	2.14	16
43.80	177.3	119.3	196.0	177.4	5.1	5.8	2.9	silty SAND to sandy SILT	120	3.0	40	59	25	73	40	-	-	19	2.19	16
43.97	169.1	113.6	201.7	169.2	5.4	6.0	3.3	silty SAND to sandy SILT	120	3.0	38	56	25	71	39	-	-	20	2.24	16
44.13	128.8	86.5	189.3	129.0	4.8	5.9	3.8	clayy SILT to silty CLAY	115	2.0	43	64	20	-	-	9.0	9.9	25	2.37	15
44.29	97.1	46.3	-	97.2	4.5	6.1	4.7	clayy SILT to silty CLAY	115	2.0	23	49	12	-	-	6.7	9.9	37	2.63	15
44.46	87.5	41.6	-	87.7	4.4	8.6	5.2	silty CLAY to CLAY	115	1.5	28	58	11	-	-	6.0	9.9	40	2.69	15
44.62	81.8	38.8	-	81.9	3.9	9.9	5.0	silty CLAY to CLAY	115	1.5	26	55	10	-	-	5.6	9.9	40	2.70	15
44.79	82.5	39.1	-	82.7	3.4	9.4	4.3	clayy SILT to silty CLAY	115	2.0	20	41	10	-	-	5.7	9.9	38	2.65	15
44.95	64.1	30.3	-	64.3	2.6	8.1	4.3	silty CLAY to CLAY	115	1.5	20	43	8	-	-	4.4	9.6	42	2.73	15
45.11	52.3	24.7	-	52.5	2.0	10.8	4.0	silty CLAY to CLAY	115	1.5	16	35	7	-	-	3.5	7.7	45	2.78	15
45.28	52.8	24.9	-	53.2	2.3	16.5	4.5	silty CLAY to CLAY	115	1.5	17	35	7	-	-	3.6	7.8	47	2.81	15
45.44	49.6	23.3	-	50.0	4.3	19.5	9.1	silty CLAY to CLAY	115	1.5	16	33	8	-	-	3.4	7.3	62	3.05	15
45.61	65.3	30.6	-	65.9	6.1	29.8	9.7	silty CLAY to CLAY	115	1.5	20	44	10	-	-	4.5	9.7	57	2.98	15
45.77	118.8	55.6	-	119.7	8.4	42.5	7.2	silty CLAY to CLAY	115	1.5	37	79	15	-	-	8.2	9.9	41	2.71	15
45.93	246.3	163.5	276.4	249.4	9.6	155.9	3.9	stiff SAND to clayy SAND	115	5.0	33	49	35	83	41	-	-	19	2.21	16
46.10	349.3	231.6	310.9	349.9	10.5	31.5	3.0	stiff SAND to clayy SAND	115	5.0	46	70	46	95	43	-	-	14	2.03	16
46.26	330.0	218.6	305.1	330.4	10.5	22.4	3.2	stiff SAND to clayy SAND	115	5.0	44	66	44	93	43	-	-	15	2.07	16

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Geosphere Consultants, Inc. Page: 4
Data File: SDF(157).cpt Sounding ID: CPT-02
CPT Date: 6/2/2020 12:47:11 PM Project No: 91-04769
GW During Test: 25 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -
46.43	334.6	221.5	310.5	335.0	10.9	18.8	3.3	stiff SAND to clayy SAND	115	5.0	44	67	45	93	43	-	-	15	2.07	16
46.59	366.7	242.4	320.1	367.1	10.9	20.8	3.0	stiff SAND to clayy SAND	115	5.0	48	73	48	95	43	-	-	13	2.02	16
46.75	357.9	236.4	328.9	358.4	11.9	21.7	3.4	stiff SAND to clayy SAND	115	5.0	47	72	48	95	43	-	-	15	2.06	16
46.92	361.0	238.2	333.2	361.4	12.2	20.5	3.4	stiff SAND to clayy SAND	115	5.0	48	72	48	95	43	-	-	15	2.07	16
47.08	366.8	241.8	322.6	367.2	11.2	22.7	3.1	stiff SAND to clayy SAND	115	5.0	48	73	48	95	43	-	-	14	2.03	16
47.25	377.0	248.2	319.7	377.7	10.6	35.4	2.8	stiff SAND to clayy SAND	115	5.0	50	75	49	95	43	-	-	13	1.99	16
47.41	318.7	209.6	307.9	319.2	11.1	26.3	3.5	stiff SAND to clayy SAND	115	5.0	42	64	43	91	42	-	-	16	2.11	16
47.57	267.4	175.7	303.9	267.9	11.4	24.6	4.3	very stiff fine SOIL	120	1.0	100	100	38	-	-	9.4	9.9	20	2.22	30
47.74	267.5	175.6	301.9	268.2	11.3	35.5	4.3	very stiff fine SOIL	120	1.0	100	100	38	-	-	9.4	9.9	20	2.22	30
47.90	316.1	207.3	310.2	316.8	11.3	38.1	3.6	stiff SAND to clayy SAND	115	5.0	41	63	43	91	42	-	-	16	2.12	16
48.07	378.9	248.2	319.5	380.0	10.7	57.2	2.8	stiff SAND to clayy SAND	115	5.0	50	76	49	95	43	-	-	13	1.99	16
48.23	320.4	209.7	299.9	320.9	10.5	25.4	3.3	stiff SAND to clayy SAND	115	5.0	42	64	43	91	42	-	-	15	2.09	16
48.39	240.2	157.1	266.7	240.6	9.1	18.9	3.8	stiff SAND to clayy SAND	115	5.0	31	48	34	82	41	-	-	19	2.21	16
48.56	162.1	105.9	206.7	162.4	5.8	18.7	3.7	silty SAND to sandy SILT	120	3.0	35	54	24	69	39	-	-	23	2.30	16
48.72	87.5	39.5	-	88.0	5.5	25.1	6.5	silty CLAY to CLAY	115	1.5	26	58	11	-	-	6.0	9.9	44	2.77	15
48.89	71.4	32.2	-	72.1	6.5	37.5	9.5	silty CLAY to CLAY	115	1.5	21	48	10	-	-	4.9	9.9	56	2.96	15
49.05	140.8	63.3	-	142.5	8.4	88.1	6.1	clayy SILT to silty CLAY	115	2.0	32	70	16	-	-	9.8	9.9	36	2.61	15
49.22	299.6	194.9	286.8	301.8	9.9	112.1	3.3	stiff SAND to clayy SAND	115	5.0	39	60	40	89	42	-	-	16	2.11	16
49.38	355.9	231.3	291.9	356.6	9.0	37.3	2.6	silty SAND to sandy SILT	120	3.0	77	100	45	95	43	-	-	12	1.97	16
49.54	371.6	241.3	303.5	372.1	9.6	28.2	2.6	stiff SAND to clayy SAND	115	5.0	48	74	47	95	43	-	-	12	1.97	16
49.71	381.8	247.6	300.8	382.3	9.0	26.1	2.4	clean SAND to silty SAND	125	5.0	50	76	47	95	43	-	-	11	1.93	16
49.87	376.9	244.2	283.6	377.2	7.5	19.0	2.0	clean SAND to silty SAND	125	5.0	49	75	46	95	43	-	-	10	1.87	16
50.04	367.4	237.8	258.8	367.8	5.4	21.2	1.5	clean SAND to silty SAND	125	5.0	48	73	43	95	43	-	-	8	1.77	16

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

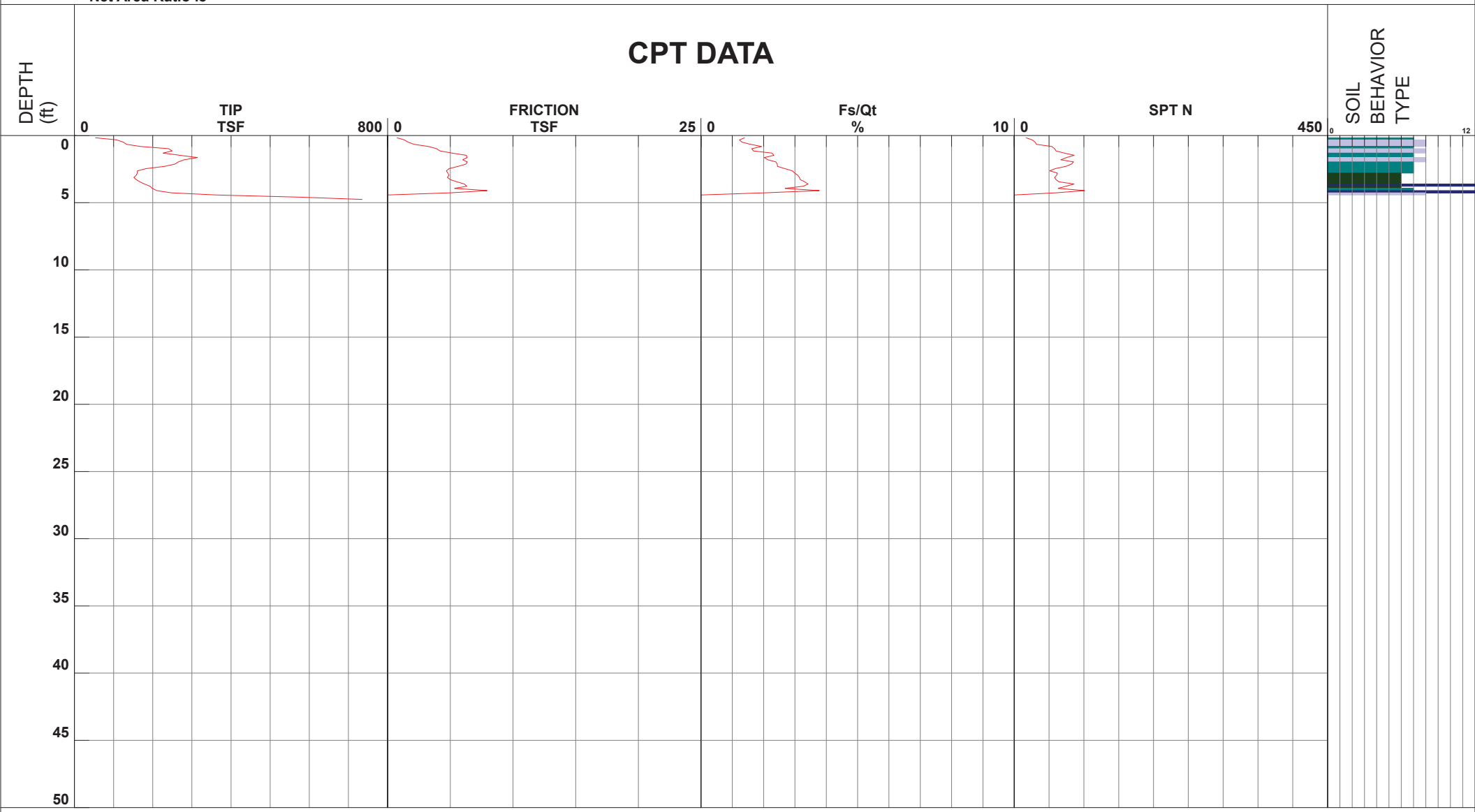
Middle Earth Geo Testing

Geosphere Consultants, Inc.

Project	Kaiser Fresno MOB	Operator	BH-GH	Filename	SDF(158).cpt
Job Number	91-04769	Cone Number	DDG1496	GPS	
Hole Number	CPT-03	Date and Time	6/2/2020 1:35:27 PM	Maximum Depth	4.76 ft
EST GW Depth During Test		25.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

S*Soil behavior type and SPT based on data from UBC-1983

Kaiser Fresno MOB

Project ID: Geosphere Consultants, Inc. Page: 1
Data File: SDF(158).cpt Sounding ID: CPT-03
CPT Date: 6/2/2020 1:35:27 PM Project No: 91-04769
GW During Test: 25 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n * PS -	q1ncs PS -	qt * PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR - -	Fin Ic %	Ic * SBT Indx	Nk -
0.33	107.9	173.1	191.3	107.9	1.3	0.2	1.2	clean SAND to silty SAND	125	5.0	35	22	32	85	48	-	-	8	1.80	16
0.49	124.6	199.9	217.8	124.6	1.6	0.3	1.3	clean SAND to silty SAND	125	5.0	40	25	36	90	48	-	-	8	1.78	16
0.66	133.2	213.7	239.8	133.2	2.1	0.6	1.6	clean SAND to silty SAND	125	5.0	43	27	39	92	48	-	-	9	1.82	16
0.82	169.4	271.6	306.3	169.4	3.3	0.9	1.9	clean SAND to silty SAND	125	5.0	54	34	50	95	48	-	-	9	1.83	16
0.98	241.1	386.7	396.4	241.1	3.9	1.1	1.6	clean SAND to silty SAND	125	5.0	77	48	68	95	48	-	-	6	1.68	16
1.15	249.4	400.0	411.0	249.4	4.2	1.3	1.7	clean SAND to silty SAND	125	5.0	80	50	70	95	48	-	-	6	1.69	16
1.31	226.5	363.3	407.3	226.6	5.1	1.1	2.3	stiff SAND to clayy SAND	115	5.0	73	45	67	95	48	-	-	9	1.82	16
1.48	269.4	432.1	476.1	269.5	6.3	1.3	2.3	stiff SAND to clayy SAND	115	5.0	86	54	79	95	48	-	-	8	1.79	16
1.64	314.2	503.9	525.7	314.3	6.3	1.6	2.0	stiff SAND to clayy SAND	115	5.0	100	63	89	95	48	-	-	6	1.71	16
1.80	280.4	449.8	482.5	280.5	6.0	1.3	2.1	stiff SAND to clayy SAND	115	5.0	90	56	81	95	48	-	-	7	1.75	16
1.97	265.6	425.9	473.4	265.6	6.4	1.2	2.4	stiff SAND to clayy SAND	115	5.0	85	53	78	95	48	-	-	8	1.81	16
2.13	256.5	411.3	461.4	256.5	6.2	1.7	2.4	stiff SAND to clayy SAND	115	5.0	82	51	76	95	48	-	-	9	1.82	16
2.30	230.5	369.7	421.4	230.5	5.6	1.6	2.4	stiff SAND to clayy SAND	115	5.0	74	46	68	95	48	-	-	9	1.84	16
2.46	183.2	293.8	357.7	183.2	4.9	0.9	2.7	stiff SAND to clayy SAND	115	5.0	59	37	56	95	48	-	-	11	1.93	16
2.62	160.9	258.1	332.2	160.9	4.7	0.6	2.9	stiff SAND to clayy SAND	115	5.0	52	32	50	95	48	-	-	13	1.99	16
2.79	160.5	257.4	334.7	160.5	4.8	0.6	3.0	stiff SAND to clayy SAND	115	5.0	51	32	51	95	48	-	-	13	2.00	16
2.95	158.1	253.6	334.9	158.1	4.9	0.7	3.1	stiff SAND to clayy SAND	115	5.0	51	32	50	95	48	-	-	13	2.02	16
3.12	151.9	243.6	327.1	151.9	4.8	0.6	3.1	stiff SAND to clayy SAND	115	5.0	49	30	48	95	48	-	-	14	2.03	16
3.28	157.8	253.2	337.8	157.9	5.0	0.6	3.2	stiff SAND to clayy SAND	115	5.0	51	32	50	95	48	-	-	14	2.03	16
3.45	167.0	267.9	358.8	167.1	5.5	0.7	3.3	stiff SAND to clayy SAND	115	5.0	54	33	53	95	48	-	-	14	2.03	16
3.61	179.1	287.2	383.3	179.1	6.1	0.6	3.4	stiff SAND to clayy SAND	115	5.0	57	36	57	95	48	-	-	14	2.03	16
3.77	193.3	310.0	399.6	193.3	6.3	0.6	3.3	stiff SAND to clayy SAND	115	5.0	62	39	61	95	48	-	-	13	1.99	16
3.94	198.8	318.9	382.7	198.9	5.3	0.5	2.7	stiff SAND to clayy SAND	115	5.0	64	40	61	95	48	-	-	11	1.91	16
4.10	210.2	337.1	452.0	210.2	7.9	0.5	3.8	stiff SAND to clayy SAND	115	5.0	67	42	67	95	48	-	-	14	2.03	16
4.27	248.3	398.1	428.2	248.3	5.0	0.6	2.0	clean SAND to silty SAND	125	5.0	80	50	71	95	48	-	-	7	1.76	16

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

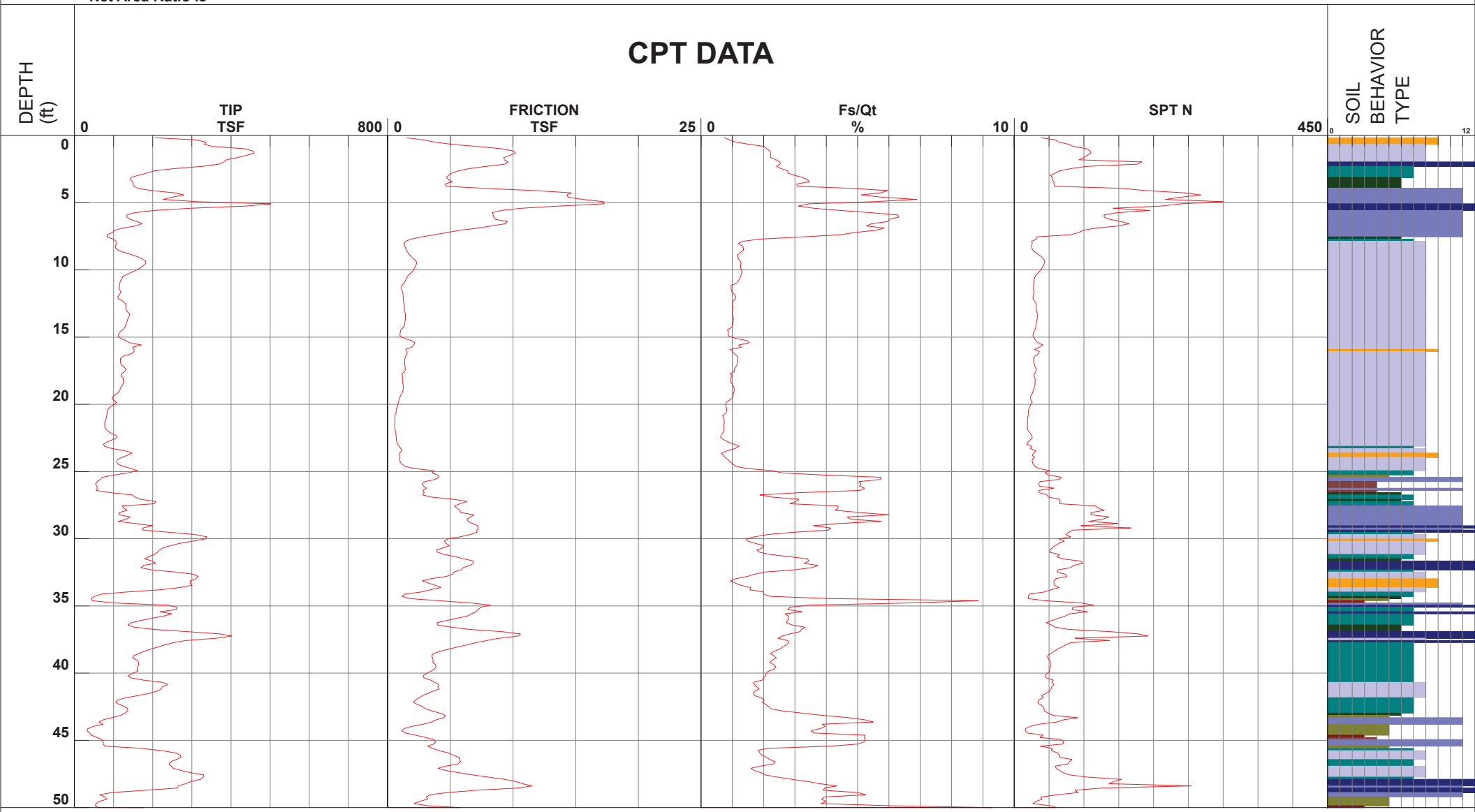
Middle Earth Geo Testing

Geosphere Consultants, Inc.

Project	Kaiser Fresno MOB	Operator	BH-GH	Filename	SDF(156).cpt
Job Number	91-04769	Cone Number	DDG1496	GPS	
Hole Number	CPT-04	Date and Time	6/2/2020 12:03:34 PM	Maximum Depth	50.52 ft
EST GW Depth During Test		28.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

S*Soil behavior type and SPT based on data from UBC-1983

Kaiser Fresno MOB

Project ID: Geosphere Consultants, Inc. Page: 1
Data File: SDF(156).cpt Sounding ID: CPT-04
CPT Date: 6/2/2020 12:03:34 PM Project No: 91-04769
GW During Test: 28 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -
0.33	310.1	497.4	497.4	310.1	2.8	0.0	0.9	clean SAND to silty SAND	125	5.0	99	62	80	95	48	-	-	5	1.41	16
0.49	336.5	539.7	539.7	336.5	3.7	-0.1	1.1	clean SAND to silty SAND	125	5.0	100	67	88	95	48	-	-	5	1.47	16
0.66	331.6	531.8	531.8	331.6	5.1	0.1	1.6	clean SAND to silty SAND	125	5.0	100	66	90	95	48	-	-	5	1.59	16
0.82	353.4	566.8	582.7	353.4	7.1	0.0	2.0	stiff SAND to clayy SAND	115	5.0	100	71	99	95	48	-	-	6	1.69	16
0.98	433.8	695.7	704.7	433.8	9.1	-0.3	2.1	stiff SAND to clayy SAND	115	5.0	100	87	100	95	48	-	-	5	1.66	16
1.15	455.7	730.9	746.4	455.7	10.0	-0.3	2.2	stiff SAND to clayy SAND	115	5.0	100	91	100	95	48	-	-	6	1.68	16
1.31	459.4	736.7	753.9	459.4	10.2	0.0	2.2	stiff SAND to clayy SAND	115	5.0	100	92	100	95	48	-	-	6	1.68	16
1.48	440.5	706.5	725.9	440.5	9.8	-0.1	2.2	stiff SAND to clayy SAND	115	5.0	100	88	100	95	48	-	-	6	1.68	16
1.64	416.2	667.5	690.6	416.2	9.3	0.0	2.2	stiff SAND to clayy SAND	115	5.0	100	83	100	95	48	-	-	6	1.70	16
1.80	388.9	623.7	662.6	388.9	9.3	0.1	2.4	stiff SAND to clayy SAND	115	5.0	100	78	100	95	48	-	-	7	1.74	16
1.97	381.7	612.1	659.6	381.7	9.6	0.9	2.5	stiff SAND to clayy SAND	115	5.0	100	76	100	95	48	-	-	7	1.76	16
2.13	370.1	593.5	642.4	370.1	9.3	0.2	2.5	stiff SAND to clayy SAND	115	5.0	100	74	100	95	48	-	-	7	1.77	16
2.30	325.7	522.4	567.0	325.7	7.9	-0.3	2.4	stiff SAND to clayy SAND	115	5.0	100	65	94	95	48	-	-	7	1.77	16
2.46	254.1	407.6	463.9	254.1	6.5	-1.1	2.6	stiff SAND to clayy SAND	115	5.0	82	51	75	95	48	-	-	9	1.84	16
2.62	204.5	328.0	395.0	204.5	5.6	-0.9	2.8	stiff SAND to clayy SAND	115	5.0	66	41	62	95	48	-	-	11	1.92	16
2.79	184.6	296.1	364.0	184.6	5.1	-0.1	2.8	stiff SAND to clayy SAND	115	5.0	59	37	57	95	48	-	-	11	1.94	16
2.95	164.1	263.2	339.5	164.1	4.9	0.1	3.0	stiff SAND to clayy SAND	115	5.0	53	33	52	95	48	-	-	13	1.99	16
3.12	144.4	231.6	319.2	144.4	4.7	0.1	3.2	stiff SAND to clayy SAND	115	5.0	46	29	46	95	48	-	-	14	2.05	16
3.28	142.8	229.0	322.9	142.8	4.9	-0.1	3.4	stiff SAND to clayy SAND	115	5.0	46	29	46	94	48	-	-	15	2.07	16
3.45	149.2	239.3	335.7	149.2	5.2	-0.2	3.5	stiff SAND to clayy SAND	115	5.0	48	30	48	95	48	-	-	15	2.07	16
3.61	149.4	239.6	319.6	149.4	4.6	-0.3	3.1	stiff SAND to clayy SAND	115	5.0	48	30	48	95	48	-	-	14	2.02	16
3.77	151.7	243.3	324.5	151.7	4.7	-0.2	3.1	stiff SAND to clayy SAND	115	5.0	49	30	48	95	48	-	-	14	2.02	16
3.94	161.9	259.7	419.1	161.9	7.8	-0.1	4.8	very stiff fine SOIL	120	1.0	100	100	55	-	-	5.7	9.9	18	2.18	30
4.10	197.5	316.7	543.4	197.5	11.8	0.0	6.0	very stiff fine SOIL	120	1.0	100	100	68	-	-	7.0	9.9	20	2.22	30
4.27	255.9	410.5	642.9	255.9	14.7	-0.4	5.7	very stiff fine SOIL	120	1.0	100	100	86	-	-	9.0	9.9	18	2.16	30
4.43	279.5	448.2	648.7	279.4	14.3	-1.6	5.1	very stiff fine SOIL	120	1.0	100	100	91	-	-	9.9	9.9	16	2.10	30
4.59	249.2	399.6	632.7	249.1	14.4	-2.1	5.8	very stiff fine SOIL	120	1.0	100	100	84	-	-	8.8	9.9	18	2.16	30
4.76	226.5	363.2	654.1	226.4	15.6	-2.3	6.9	very stiff fine SOIL	120	1.0	100	100	79	-	-	8.0	9.9	21	2.25	30
4.92	313.1	502.1	736.4	313.1	17.2	-2.0	5.5	very stiff fine SOIL	120	1.0	100	100	100	-	-	11.1	9.9	16	2.11	30
5.09	501.4	804.1	918.2	501.4	17.3	0.2	3.4	stiff SAND to clayy SAND	115	5.0	100	100	100	95	48	-	-	9	1.85	16
5.25	440.9	707.0	794.5	441.1	13.7	13.7	3.1	stiff SAND to clayy SAND	115	5.0	100	88	100	95	48	-	-	9	1.82	16
5.41	296.1	474.9	586.9	296.4	10.7	17.2	3.6	stiff SAND to clayy SAND	115	5.0	95	59	91	95	48	-	-	12	1.95	16
5.58	203.0	325.6	474.6	203.4	9.1	19.7	4.5	very stiff fine SOIL	120	1.0	100	100	67	-	-	7.2	9.9	16	2.10	30
5.74	153.2	245.6	432.0	154.3	8.3	57.8	5.5	very stiff fine SOIL	120	1.0	100	100	53	-	-	5.4	9.9	20	2.24	30
5.91	133.9	214.7	431.5	134.5	8.4	32.5	6.3	very stiff fine SOIL	120	1.0	100	100	48	-	-	4.7	9.9	23	2.32	30
6.07	134.2	215.2	433.4	134.3	8.5	8.6	6.3	very stiff fine SOIL	120	1.0	100	100	48	-	-	4.7	9.9	23	2.32	30
6.23	143.0	229.3	437.8	143.0	8.6	-0.2	6.0	very stiff fine SOIL	120	1.0	100	100	51	-	-	5.0	9.9	22	2.29	30
6.40	159.8	253.1	466.0	159.8	9.6	-1.4	6.0	very stiff fine SOIL	120	1.0	100	100	55	-	-	5.6	9.9	21	2.26	30
6.56	172.6	269.8	460.8	172.5	9.4	-1.5	5.5	very stiff fine SOIL	120	1.0	100	100	58	-	-	6.1	9.9	20	2.22	30
6.73	157.0	242.3	420.6	156.9	8.3	-1.9	5.3	very stiff fine SOIL	120	1.0	100	100	52	-	-	5.5	9.9	20	2.23	30
6.89	122.5	186.8	377.8	122.5	7.2	-1.8	5.9	very stiff fine SOIL	120	1.0	100	100	42	-	-	4.3	9.9	23	2.32	30
7.05	103.5	156.0	329.0	103.5	5.8	1.2	5.6	very stiff fine SOIL	120	1.0	100	100	35	-	-	3.6	9.9	24	2.35	30
7.22	96.8	144.1	290.8	96.8	4.8	1.4	4.9	very stiff fine SOIL	120	1.0	100	97	32	-	-	3.4	9.9	23	2.32	30
7.38	84.1	123.8	251.2	84.1	3.7	-1.3	4.5	very stiff fine SOIL	120	1.0	100	84	28	-	-	3.0	9.9	23	2.32	30
7.55	83.2	121.2	209.3	83.2	2.7	-2.2	3.3	silty SAND to sandy SILT	120	3.0	40	28	26	73	44	-	-	20	2.22	16
7.71	99.4	143.1	185.0	99.3	1.9	-2.3	1.9	silty SAND to sandy SILT	120	3.0	48	33	28	79	44	-	-	13	1.99	16
7.87	106.3	151.4	175.3	106.3	1.4	-1.4	1.3	clean SAND to silty SAND	125	5.0	30	21	28	81	45	-	-	10	1.87	16
8.04	108.9	153.5	173.0	108.9	1.3	-1.3	1.2	clean SAND to silty SAND	125	5.0	31	22	28	81	45	-	-	9	1.83	16
8.20	104.9	146.2	170.0	104.9	1.4	-1.1	1.3	clean SAND to silty SAND	125	5.0	29	21	27	80	44	-	-	10	1.87	16
8.37	104.9	144.8	170.1	104.9	1.4	-1.1	1.4	clean SAND to silty SAND	125	5.0	29	21	27	79	44	-	-	10	1.88	16
8.53	111.7	152.5	177.0	111.6	1.5	-1.4	1.4	clean SAND to silty SAND	125	5.0	31	22	29	81	44	-	-	10	1.87	16
8.69	126.6	171.2	191.1	126.6	1.6	-1.3	1.3	clean SAND to silty SAND	125	5.0	34	25	31	85	45	-	-	8	1.81	16
8.86	146.2	195.8	209.4	146.2	1.7	-1.2	1.2	clean SAND to silty SAND	125	5.0	39	29	35	89	46	-	-	7	1.75	16
9.02	162.7	215.7	226.6	162.6	1.9	-1.1	1.2	clean SAND to silty SAND	125	5.0	43	33	38	92	46	-	-	6	1.72	16
9.19	173.4	227.8	238.2	173.4	2.1	-1.2	1.2	clean SAND to silty SAND	125	5.0	46	35	40	94	46	-	-	6	1.71	16
9.35	181.8	236.7	248.1	181.8	2.3	-1.2	1.3	clean SAND to silty SAND	125	5.0	47	36	42	95	46	-	-	6	1.72	16
9.51	181.4	234.0	246.8	181.4	2.3	-0.9	1.3	clean SAND to silty SAND	125	5.0	47	36	42	95	46	-	-	7	1.73	16
9.68	176.8	226.0	239.4	176.8	2.2	-0.9	1.3	clean SAND to silty SAND	125	5.0	45	35	40	94	46	-	-	7	1.73	16
9.84	169.1	214.2	229.1	169.1	2.1	-1.1	1.3	clean SAND to silty SAND	125	5.0	43	34	38	92	46	-	-	7	1.75	16
10.01	159.2	199.9	217.9	159.1	2.1	-1.3	1.3	clean SAND to silty SAND	125	5.0	40	32	36	90	45	-	-	8	1.78	16
10.17	147.1	183.2	203.0	147.0	1.9	-1.4	1.3	clean SAND to silty SAND	125	5.0	37	29	33	87	45	-	-	8	1.80	16
10.34	133.9	165.4	186.4	133.9	1.7	-1.5	1.3	clean SAND to silty SAND	125	5.0	33	27	30	84	44	-	-	9	1.83	16
10.50	123.7	151.5	173.6	123.6	1.6	-1.5	1.3	clean SAND to silty SAND	125	5.0	30	25	28	81	44	-	-	9	1.85	16
10.66	121.3	147.4	168.8	121.3	1.5	-1.5	1.2	clean SAND to silty SAND	125	5.0	29	24	27	80	44	-	-	9	1.85	16
10.83	117.6	141.8	162.5	117.6	1.4	-1.5	1.2	clean SAND to silty SAND	125	5.0	28	24	26	79	44	-	-	9	1.85	16
10.99	115.7	138.4	158.1	115.7	1.3	-1.5	1.1	clean SAND to silty SAND	125	5.0	28	23	26	78	43	-	-	9	1.85	16
11.16	115.6	137.2	151.7	115.6	1.1	-1.4	1.0	clean SAND to silty SAND	125	5.0	27	23	25	77	43	-	-	8	1.80	16
11.32	114.0	134.3	149.2	113.9	1.1	-1.5	1.0	clean SAND to silty SAND	125	5.0	27	23	25	77	43	-	-	8	1.81	16
11.48	115.5	135.0	150.1	115.5	1.1	-1.5	1.0	clean SAND to silty SAND	125	5.0	27	23	25	77	43	-	-	8	1.81	16
11.65	119.0	138.1	153.3	118.9	1.2	-1.4	1.0	clean SAND to silty SAND	125	5.0	28	24	25	78	43	-	-	8	1.80	16
11.81	115.6	133.2	151.2	115.6	1.2	-1.2	1.1	clean SAND to silty SAND	125	5.0	27	23	25	76	43	-	-	9	1.84	16
11.98	111.1	127.1	147.3	111.1	1.2	-1.3	1.1	clean SAND to silty SAND	125	5.0	25	22	24	75	43	-	-	10	1.87	16
12.14	111.7	126.9	146.8	111.7	1.2	-1.3	1.1	clean SAND to silty SAND	125	5.0	25	22	24	75	43	-	-	10	1.86	16
12.30	122.6	138.3	155.0	122.6	1.3	-1.5	1.0	clean SAND to silty SAND	125	5.0	28	25	25	78	43	-	-	9	1.82	16
12.47	129.3	144.9	159.4	129.3	1.3	-1.2	1.0	clean SAND to silty SAND	125	5.0	29	26	26	79	43	-	-	8	1.79	16
12.63	131.6	146.4	161.2	131.6	1.3	-0.7	1.0	clean SAND to silty SAND	125	5.0	29	26	27	80	43	-	-	8	1.79	16
12.80	130.9	144.7	160.3	130.9	1.3	-1.4	1.0	clean SAND to silty SAND	125	5.0	29	26	26	79	43	-	-	8	1.80	16
12.96	131.8	144.7	159.4	131.8	1.3	-1.2	1.0	clean SAND to silty SAND	125	5.0	29	26	26	79	43	-	-	8	1.79	16
13.12	135.7	148.1	162.8	135.7	1.4	-1.2	1.0	clean SAND to silty SAND	125	5.0	30	27	27	80	43	-	-	8	1.79	16
13.29	141.6	153.5	167.1	141.6	1.4	-1.0	1.0	clean SAND to silty SAND	125	5.0	31	28	28	81	43	-	-	8	1.77	16
13.45	139.7	150.5	165.2	139.7	1.4	-1.0	1.0	clean SAND to silty SAND	125	5.0	30	28	27	80	43	-	-	8	1.79	16
13.62	136.7	146.3	162.1	136.7	1.4	-1.1	1.0	clean SAND to silty SAND	125	5.0	29	27	27	80	43	-	-	8	1.80	16
13.78	135.7	144.3	160.0	135.6	1.4	-1.0	1.0	clean SAND to silty SAND	125	5.0	29	27	26	79	43	-	-	8	1.80	16
13.94	132.7	140.3	156.4	132.7	1.4	-1.2	1.0	clean SAND to silty SAND	125	5.0	28	27	26	78	43	-	-	8	1.81	16
14.11	131.1	137.7	153.6	131.0	1.3	-1.2	1.0	clean SAND to silty SAND	125	5.0	28	26	25	78	43	-	-	8	1.81	16
14.27	129.0	134.8	150.4	129.0	1.3	-1.2	1.0	clean SAND to silty SAND	125	5.0	27	26	25	77	43	-	-	8	1.81	16
14.44	124.8	129.6	141.8	124.8	1.1	-1.1	0.9	clean SAND to silty SAND	125	5.0	26	25	23	76	42	-	-	8	1.78	16
14.60	116.8	120.6	134.6	116.8	1.0	-1.2	0.9	clean SAND to silty SAND	125	5.0	24	23	22	73	42	-	-	8	1.81	16
14.76	113.2	116.2	130.9	113.2	1.0	-1.3	0.9	clean SAND to silty SAND	125	5.0	23	23	21	72	42	-	-	9	1.83	16
14.93	111.5	113.8	129.2	111.5	1.0	-0.7	0.9	clean SAND to silty SAND	125	5.0	23	22	21	71	42	-	-	9	1.84	16
15.09	119.0	120.8	141.7	119.0	1.3	-0.7	1.1	clean SAND to silty SAND	125	5.0	24	24	23	73	42	-	-	10	1.88	16
15.26	131.5	132.7	162.5	131.5	1.9	-0.6	1.5	clean SAND to silty SAND	125	5.0	27	26	25	76	42	-	-	11	1.94	16
15.42	141.0	141.5	172.9	141.0	2.2	-0.5	1.6	clean SAND to silty SAND	125	5.0	28	28	27	78	43	-	-	11	1.93	16

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Geosphere Consultants, Inc. Page: 2
Data File: SDF(156).cpt Sounding ID: CPT-04
CPT Date: 6/2/2020 12:03:34 PM Project No: 91-04769
GW During Test: 28 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -
15.58	170.9	170.6	188.7	170.9	2.1	-0.6	1.2	clean SAND to silty SAND	125	5.0	34	34	31	85	44	-	-	8	1.80	16
15.75	148.7	147.7	170.8	148.7	1.9	-0.6	1.3	clean SAND to silty SAND	125	5.0	30	30	28	80	43	-	-	10	1.86	16
15.91	152.5	150.7	162.7	152.5	1.4	-0.6	0.9	clean SAND to silty SAND	125	5.0	30	31	27	81	43	-	-	7	1.76	16
16.08	152.3	149.7	164.0	152.3	1.5	-0.3	1.0	clean SAND to silty SAND	125	5.0	30	30	27	80	43	-	-	8	1.78	16
16.24	144.5	141.3	158.5	144.5	1.5	-0.4	1.1	clean SAND to silty SAND	125	5.0	28	29	26	78	42	-	-	9	1.82	16
16.40	126.7	123.2	144.9	126.7	1.5	-0.3	1.2	clean SAND to silty SAND	125	5.0	25	25	23	74	42	-	-	10	1.89	16
16.57	117.9	114.0	137.5	117.9	1.4	-0.4	1.2	clean SAND to silty SAND	125	5.0	23	24	22	71	41	-	-	11	1.92	16
16.73	117.5	113.1	136.2	117.5	1.4	-0.4	1.2	clean SAND to silty SAND	125	5.0	23	24	22	71	41	-	-	11	1.92	16
16.90	118.2	113.2	136.2	118.2	1.4	-0.3	1.2	clean SAND to silty SAND	125	5.0	23	24	22	71	41	-	-	11	1.92	16
17.06	119.4	113.8	136.8	119.4	1.4	-0.4	1.2	clean SAND to silty SAND	125	5.0	23	24	22	71	41	-	-	11	1.91	16
17.23	127.3	120.7	141.4	127.3	1.4	-0.4	1.1	clean SAND to silty SAND	125	5.0	24	25	23	73	42	-	-	10	1.88	16
17.39	131.9	124.5	143.7	131.9	1.4	-0.2	1.1	clean SAND to silty SAND	125	5.0	25	26	23	74	42	-	-	9	1.86	16
17.55	128.7	120.8	140.5	128.7	1.4	-0.2	1.1	clean SAND to silty SAND	125	5.0	24	26	23	73	41	-	-	10	1.87	16
17.72	121.1	113.2	130.1	121.1	1.1	-0.3	0.9	clean SAND to silty SAND	125	5.0	23	24	21	71	41	-	-	9	1.86	16
17.88	118.6	110.3	129.3	118.6	1.2	-0.3	1.0	clean SAND to silty SAND	125	5.0	22	24	21	70	41	-	-	10	1.88	16
18.05	124.9	115.7	132.4	124.9	1.2	-0.3	0.9	clean SAND to silty SAND	125	5.0	23	25	21	72	41	-	-	9	1.85	16
18.21	125.1	115.3	132.5	125.1	1.2	-0.4	1.0	clean SAND to silty SAND	125	5.0	23	25	21	72	41	-	-	9	1.86	16
18.37	125.7	115.3	132.7	125.7	1.2	-0.3	1.0	clean SAND to silty SAND	125	5.0	23	25	21	72	41	-	-	9	1.86	16
18.54	123.6	112.9	131.7	123.6	1.2	-0.3	1.0	clean SAND to silty SAND	125	5.0	23	25	21	71	41	-	-	10	1.88	16
18.70	119.0	108.2	129.1	119.0	1.3	-0.3	1.1	clean SAND to silty SAND	125	5.0	22	24	20	70	41	-	-	10	1.90	16
18.87	116.9	105.8	127.2	116.9	1.2	-0.4	1.1	clean SAND to silty SAND	125	5.0	21	23	20	69	41	-	-	11	1.91	16
19.03	114.0	102.7	124.4	114.0	1.2	-0.3	1.1	clean SAND to silty SAND	125	5.0	21	23	20	68	40	-	-	11	1.92	16
19.19	109.7	98.4	120.1	109.7	1.1	-0.4	1.0	clean SAND to silty SAND	125	5.0	20	22	19	66	40	-	-	11	1.93	16
19.36	100.7	90.0	112.5	100.7	1.0	-0.5	1.0	clean SAND to silty SAND	125	5.0	18	20	17	64	40	-	-	12	1.96	16
19.52	95.6	85.0	107.4	95.6	0.9	-0.5	1.0	clean SAND to silty SAND	125	5.0	17	19	17	62	39	-	-	12	1.97	16
19.69	99.8	88.4	108.2	99.8	0.9	-0.4	0.9	clean SAND to silty SAND	125	5.0	18	20	17	63	39	-	-	11	1.94	16
19.85	107.3	94.6	110.6	107.2	0.9	-0.4	0.8	clean SAND to silty SAND	125	5.0	19	21	18	65	40	-	-	10	1.88	16
20.01	102.1	89.6	105.7	102.1	0.8	-0.4	0.8	clean SAND to silty SAND	125	5.0	18	20	17	63	40	-	-	10	1.89	16
20.18	93.4	81.7	99.4	93.4	0.7	-0.4	0.8	clean SAND to silty SAND	125	5.0	16	19	16	60	39	-	-	11	1.93	16
20.34	86.2	75.1	94.4	86.2	0.7	-0.3	0.8	clean SAND to silty SAND	125	5.0	15	17	15	58	38	-	-	12	1.97	16
20.51	83.7	72.6	92.1	83.7	0.7	-0.4	0.8	clean SAND to silty SAND	125	5.0	15	17	14	56	38	-	-	12	1.98	16
20.67	83.3	72.0	91.0	83.3	0.7	-0.4	0.8	clean SAND to silty SAND	125	5.0	14	17	14	56	38	-	-	12	1.97	16
20.83	82.9	71.3	87.7	82.8	0.6	-0.4	0.7	clean SAND to silty SAND	125	5.0	14	17	14	56	38	-	-	11	1.94	16
21.00	81.4	69.7	87.2	81.4	0.6	-0.4	0.7	clean SAND to silty SAND	125	5.0	14	16	13	55	38	-	-	12	1.96	16
21.16	80.4	68.7	86.6	80.4	0.6	-0.3	0.7	clean SAND to silty SAND	125	5.0	14	16	13	55	38	-	-	12	1.97	16
21.33	77.3	65.7	84.8	77.3	0.6	-0.4	0.8	clean SAND to silty SAND	125	5.0	13	15	13	53	38	-	-	13	1.99	16
21.49	77.8	65.9	84.4	77.8	0.6	-0.3	0.7	clean SAND to silty SAND	125	5.0	13	16	13	53	38	-	-	13	1.98	16
21.65	77.8	65.7	84.4	77.8	0.6	-0.4	0.7	clean SAND to silty SAND	125	5.0	13	16	13	53	38	-	-	13	1.99	16
21.82	79.8	67.1	85.6	79.8	0.6	-0.3	0.8	clean SAND to silty SAND	125	5.0	13	16	13	54	38	-	-	12	1.98	16
21.98	84.7	70.9	88.4	84.7	0.6	-0.2	0.7	clean SAND to silty SAND	125	5.0	14	17	14	56	38	-	-	12	1.96	16
22.15	94.0	78.4	93.7	94.0	0.6	-0.2	0.7	clean SAND to silty SAND	125	5.0	16	19	15	59	38	-	-	11	1.91	16
22.31	106.2	88.2	100.6	106.2	0.7	-0.2	0.6	clean SAND to silty SAND	125	5.0	18	21	16	63	39	-	-	9	1.84	16
22.47	109.0	90.2	101.9	109.0	0.7	-0.2	0.6	clean SAND to silty SAND	125	5.0	18	22	17	64	39	-	-	9	1.83	16
22.64	97.8	80.7	96.6	97.8	0.7	0.0	0.7	clean SAND to silty SAND	125	5.0	16	20	15	60	39	-	-	11	1.91	16
22.80	83.4	68.5	90.2	83.4	0.7	-0.2	0.9	clean SAND to silty SAND	125	5.0	14	17	14	55	38	-	-	13	2.01	16
22.97	74.5	61.0	89.3	74.5	0.8	-0.3	1.1	silty SAND to sandy SILT	120	3.0	20	25	12	51	37	-	-	16	2.10	16
23.13	76.8	62.6	95.0	76.8	0.9	-0.2	1.2	silty SAND to sandy SILT	120	3.0	21	26	13	52	37	-	-	17	2.13	16
23.30	96.1	78.2	104.3	96.1	1.0	-0.2	1.1	clean SAND to silty SAND	125	5.0	16	19	15	59	38	-	-	14	2.03	16
23.46	129.5	104.9	120.5	129.5	1.1	0.1	0.9	clean SAND to silty SAND	125	5.0	21	26	20	69	40	-	-	9	1.85	16
23.62	146.9	118.6	126.8	146.9	1.0	0.2	0.7	clean SAND to silty SAND	125	5.0	24	29	21	73	41	-	-	7	1.75	16
23.79	136.2	109.6	120.4	136.3	0.9	0.3	0.7	clean SAND to silty SAND	125	5.0	22	27	20	70	40	-	-	8	1.79	16
23.95	121.2	97.1	112.0	121.2	0.9	0.2	0.8	clean SAND to silty SAND	125	5.0	19	24	18	66	39	-	-	9	1.86	16
24.12	109.4	87.4	105.8	109.4	0.9	0.1	0.9	clean SAND to silty SAND	125	5.0	17	22	17	63	39	-	-	11	1.92	16
24.28	107.9	85.9	106.6	107.9	1.0	0.0	0.9	clean SAND to silty SAND	125	5.0	17	22	17	62	39	-	-	12	1.95	16
24.44	111.2	88.2	111.0	111.2	1.1	0.0	1.0	clean SAND to silty SAND	125	5.0	18	22	17	63	39	-	-	12	1.97	16
24.61	124.3	98.2	122.2	124.3	1.4	0.1	1.1	clean SAND to silty SAND	125	5.0	20	25	19	66	39	-	-	12	1.95	16
24.77	144.5	113.8	145.1	144.5	2.1	0.4	1.5	clean SAND to silty SAND	125	5.0	23	29	22	71	40	-	-	12	1.98	16
24.94	161.1	126.5	182.6	161.1	3.7	0.4	2.3	silty SAND to sandy SILT	120	3.0	42	54	26	75	41	-	-	16	2.09	16
25.10	136.8	107.1	174.4	136.8	3.5	0.3	2.6	silty SAND to sandy SILT	120	3.0	36	46	23	69	40	-	-	18	2.18	16
25.26	101.8	79.4	186.2	101.8	4.0	1.5	4.0	clayy SILT to silty CLAY	115	2.0	40	51	18	-	-	7.1	9.9	27	2.41	15
25.43	71.1	45.6	-	71.3	4.1	6.3	5.9	silty CLAY to CLAY	115	1.5	30	47	12	-	-	4.9	9.9	40	2.70	15
25.59	66.3	42.3	-	66.5	3.8	7.4	5.9	silty CLAY to CLAY	115	1.5	28	44	11	-	-	4.6	9.9	41	2.72	15
25.76	58.5	37.1	-	58.7	3.0	5.8	5.2	silty CLAY to CLAY	115	1.5	25	39	10	-	-	4.0	9.9	42	2.72	15
25.92	54.1	34.1	-	54.2	2.8	5.8	5.3	silty CLAY to CLAY	115	1.5	23	36	9	-	-	3.7	9.9	43	2.75	15
26.08	56.8	35.6	-	57.0	2.9	6.3	5.2	silty CLAY to CLAY	115	1.5	24	38	10	-	-	3.9	9.9	42	2.73	15
26.25	59.1	36.8	-	59.2	3.1	5.6	5.4	silty CLAY to CLAY	115	1.5	25	39	10	-	-	4.1	9.9	42	2.73	15
26.41	55.3	34.2	-	55.5	2.8	7.3	5.2	silty CLAY to CLAY	115	1.5	23	37	9	-	-	3.8	9.9	43	2.75	15
26.58	92.8	70.7	155.5	93.0	2.9	10.6	3.2	silty SAND to sandy SILT	120	3.0	24	31	16	56	37	-	-	25	2.37	16
26.74	147.7	112.2	157.1	147.8	2.8	3.9	1.9	silty SAND to sandy SILT	120	3.0	37	49	23	71	40	-	-	15	2.07	16
26.90	154.2	116.8	172.6	154.3	3.5	1.7	2.3	silty SAND to sandy SILT	120	3.0	39	51	24	72	40	-	-	16	2.11	16
27.07	168.6	127.3	211.6	168.6	5.3	2.2	3.2	silty SAND to sandy SILT	120	3.0	42	56	27	75	41	-	-	19	2.20	16
27.23	207.9	156.5	237.2	208.0	6.3	2.4	3.1	silty SAND to sandy SILT	120	3.0	52	69	32	82	42	-	-	17	2.13	16
27.40	204.3	153.3	227.0	204.3	5.8	2.4	2.9	silty SAND to sandy SILT	120	3.0	51	68	31	81	42	-	-	16	2.11	16
27.56	121.7	91.1	212.8	121.8	5.3	2.7	4.4	clayy SILT to silty CLAY	115	2.0	46	61	21	-	-	8.5	9.9	27	2.41	15
27.72	126.4	94.3	216.5	126.5	5.5	3.0	4.4	very stiff fine SOIL	120	1.0	94	100	22	-	-	4.4	9.9	26	2.40	30
27.89	134.6	100.2	220.3	134.7	5.8	3.6	4.3	very stiff fine SOIL	120	1.0	100	100	23	-	-	4.7	9.9	25	2.37	30
28.05	114.5	85.1	225.6	114.5	5.8	2.7	5.2	very stiff fine SOIL	120	1.0	85	100	20	-	-	4.0	9.9	30	2.48	30
28.22	114.8	85.2	249.8	114.9	6.9	4.2	6.1	very stiff fine SOIL	120	1.0	85	100	21	-	-	4.0	9.9	32	2.53	30
28.38	142.2	105.4	238.1	142.3	6.6	6.0	4.7	very stiff fine SOIL	120	1.0	100	100	24	-	-	5.0	9.9	26	2.39	30
28.54	132.8	98.3	232.9	132.9	6.3	2.5	4.8	very stiff fine SOIL	120	1.0	98	100	23	-	-	4.6	9.9	27	2.41	30
28.71	111.7	82.5	239.6	111.8	6.4	3.9	5.8	very stiff fine SOIL	120	1.0	83	100	20	-	-	3.9	9.9	32	2.53	30
28.87	155.0	114.4	239.7	155.2	6.8	8.7	4.4	very stiff fine SOIL	120	1.0	100	100	26	-	-	5.4	9.9	24	2.34	30
29.04	199.8	147.3	248.1	199.9	7.2	5.8	3.6	stiff SAND to clayy SAND	115	5.0	29	40	31	80	41	-	-	19	2.21	16
29.20	174.9	128.7	247.7	174.9	7.2	4.1	4.2	very stiff fine SOIL	120	1.0	100	100	28	-	-	6.1	9.9	22	2.29	30
29.36	174.8	128.5	244.9	174.9	7.1	5.4	4.1	very stiff fine SOIL	120	1.0	100	100	28	-	-	6.1	9.9	22	2.29	30
29.53	243.4	178.7	255.3	243.5	7.1	6.4	3.0	silty SAND to sandy SILT	120	3.0	60	81	36	86	42	-	-	15	2.09	16
29.69	308.5	226.2	271.6	308.7	6.6	6.4	2.1	clean SAND to silty SAND	125	5.0	45	62	43	94	43	-	-	11	1.91	16
29.86	338.3	247.6	276.2	338.4	5.8	6.1	1.7	clean SAND to silty SAND	125	5.0	50	68	45	95	44	-	-	8	1.81	16
30.02	334.5	244.5	262.9	334.6	4.8	5.0	1.4	clean SAND to silty SAND	125	5.0	49	67	44	95	44	-	-	7	1.75	16
30.19	301.8	220.3	243.3	301.9	4.5	4.3	1.5	clean SAND to silty SAND	125	5.0	44	60	40	93	43	-	-	8	1.80	16
30.35	269.0	196.1	229.5	269.1	4.7	3.6	1.7	clean SAND to silty SAND	125	5.0	39	54	37	89	43	-	-	10	1.88	16
30.51	245.5	178.7	222.3	245.6	4.9	3.2	2.0	clean SAND to silty SAND	125	5.0	36	49	34	86	42	-	-	12	1.95	16
30.68	226.3	164.5	207.7	226.4	4.4	3.4	2.0	clean SAND to silty SAND	125	5.0	33	45	32	83	42	-	-	12	1.97	16
30.84	216.8	157.4	195.5	216.9	3.9	3.6	1.8	clean SAND to silty SAND	125	5.0	31	43	30	82	42	-	-	12	1.95	16

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Kaiser Fresno MOB

Project ID: Geosphere Consultants, Inc. Page: 3
Data File: SDF(156).cpt Sounding ID: CPT-04
CPT Date: 6/2/2020 12:03:34 PM Project No: 91-04769
GW During Test: 28 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -
31.01	212.6	154.1	195.0	212.6	4.0	3.6	1.9	clean SAND to silty SAND	125	5.0	31	43	30	81	41	-	-	12	1.97	16
31.17	203.7	147.4	200.1	203.8	4.5	3.5	2.2	silty SAND to sandy SILT	120	3.0	49	68	29	80	41	-	-	14	2.04	16
31.33	190.0	137.3	211.4	190.1	5.4	3.5	2.9	silty SAND to sandy SILT	120	3.0	46	63	29	77	41	-	-	17	2.14	16
31.50	179.5	129.6	223.3	179.6	6.1	3.8	3.4	silty SAND to sandy SILT	120	3.0	43	60	28	76	40	-	-	20	2.22	16
31.66	198.7	143.3	238.7	198.8	6.8	3.7	3.5	silty SAND to sandy SILT	120	3.0	48	66	30	79	41	-	-	19	2.20	16
31.83	207.4	149.3	239.3	207.5	6.8	5.3	3.3	silty SAND to sandy SILT	120	3.0	50	69	31	80	41	-	-	18	2.17	16
31.99	177.0	127.3	231.8	177.1	6.6	4.6	3.8	stiff SAND to clayy SAND	115	5.0	25	35	28	75	40	-	-	21	2.26	16
32.15	169.9	122.0	220.6	170.0	6.0	5.3	3.6	silty SAND to sandy SILT	120	3.0	41	57	27	74	40	-	-	21	2.25	16
32.32	197.2	141.4	220.3	197.3	5.9	5.8	3.0	silty SAND to sandy SILT	120	3.0	47	66	29	78	41	-	-	17	2.15	16
32.48	257.0	184.1	229.3	257.1	5.3	6.4	2.1	clean SAND to silty SAND	125	5.0	37	51	36	87	42	-	-	12	1.96	16
32.65	304.1	217.5	248.2	304.2	5.2	5.5	1.7	clean SAND to silty SAND	125	5.0	44	61	40	93	43	-	-	9	1.85	16
32.81	315.9	225.7	247.6	316.1	4.7	6.0	1.5	clean SAND to silty SAND	125	5.0	45	63	41	94	43	-	-	8	1.79	16
32.97	310.8	221.7	229.5	310.9	3.4	5.6	1.1	clean SAND to silty SAND	125	5.0	44	62	39	93	43	-	-	6	1.70	16
33.14	296.1	210.9	212.8	296.2	2.8	4.7	0.9	clean SAND to silty SAND	125	5.0	42	59	37	92	43	-	-	5	1.66	16
33.30	295.2	210.0	219.2	295.3	3.2	4.5	1.1	clean SAND to silty SAND	125	5.0	42	59	37	91	43	-	-	6	1.71	16
33.47	300.5	213.5	228.8	300.6	3.8	4.5	1.3	clean SAND to silty SAND	125	5.0	43	60	38	92	43	-	-	7	1.75	16
33.63	268.8	190.7	219.4	268.9	4.3	4.5	1.6	clean SAND to silty SAND	125	5.0	38	54	35	88	42	-	-	9	1.86	16
33.79	220.0	155.9	186.9	220.1	3.4	4.1	1.6	clean SAND to silty SAND	125	5.0	31	44	30	82	41	-	-	11	1.91	16
33.96	133.6	94.5	145.1	133.7	2.7	3.2	2.0	silty SAND to sandy SILT	120	3.0	32	45	20	65	39	-	-	17	2.14	16
34.12	69.6	49.2	105.6	69.7	1.4	3.1	2.1	silty SAND to sandy SILT	120	3.0	16	23	11	44	35	-	-	25	2.36	16
34.29	51.8	36.6	99.7	51.9	1.1	3.8	2.3	clayy SILT to silty CLAY	115	2.0	18	26	9	-	-	3.5	8.7	30	2.49	15
34.45	42.6	22.4	-	42.7	1.8	7.8	4.3	silty CLAY to CLAY	115	1.5	15	28	6	-	-	2.9	7.0	48	2.84	15
34.61	46.1	24.2	-	46.3	4.1	12.0	9.3	silty CLAY to CLAY	115	1.5	16	31	8	-	-	3.1	7.6	61	3.04	15
34.78	99.9	52.4	-	100.4	6.7	27.3	6.8	silty CLAY to CLAY	115	1.5	35	67	14	-	-	6.9	9.9	41	2.70	15
34.94	238.2	167.3	263.2	238.4	8.2	11.2	3.5	stiff SAND to clayy SAND	115	5.0	33	48	35	84	42	-	-	18	2.16	16
35.11	262.6	184.2	257.4	262.7	7.4	8.6	2.9	silty SAND to sandy SILT	120	3.0	61	88	37	87	42	-	-	15	2.07	16
35.27	260.5	182.5	253.3	260.6	7.2	5.9	2.8	silty SAND to sandy SILT	120	3.0	61	87	37	87	42	-	-	15	2.06	16
35.43	219.0	153.3	241.1	219.1	7.1	4.6	3.3	silty SAND to sandy SILT	120	3.0	51	73	32	81	41	-	-	18	2.16	16
35.60	248.6	173.8	241.4	248.7	6.7	4.1	2.7	silty SAND to sandy SILT	120	3.0	58	83	35	85	42	-	-	15	2.06	16
35.76	227.8	159.1	231.2	227.9	6.4	3.8	2.8	silty SAND to sandy SILT	120	3.0	53	76	32	82	41	-	-	16	2.10	16
35.93	196.7	137.1	210.1	196.7	5.5	1.1	2.8	silty SAND to sandy SILT	120	3.0	46	66	28	77	41	-	-	17	2.14	16
36.09	168.7	117.5	190.5	168.7	4.7	0.8	2.8	silty SAND to sandy SILT	120	3.0	39	56	25	72	40	-	-	18	2.18	16
36.26	144.8	100.7	173.1	144.8	3.9	0.9	2.8	silty SAND to sandy SILT	120	3.0	34	48	22	67	39	-	-	20	2.22	16
36.42	137.1	95.2	173.7	137.1	4.0	0.7	3.0	silty SAND to sandy SILT	120	3.0	32	46	21	65	39	-	-	21	2.26	16
36.58	152.8	106.1	197.1	152.9	5.1	1.3	3.4	silty SAND to sandy SILT	120	3.0	35	51	23	69	39	-	-	21	2.27	16
36.75	203.7	141.2	228.6	203.7	6.5	1.5	3.2	silty SAND to sandy SILT	120	3.0	47	68	30	78	41	-	-	18	2.18	16
36.91	288.4	199.7	285.1	288.5	9.1	2.3	3.2	stiff SAND to clayy SAND	115	5.0	40	58	41	90	43	-	-	15	2.08	16
37.08	371.6	257.0	329.3	371.7	10.6	2.9	2.9	stiff SAND to clayy SAND	115	5.0	51	74	50	95	44	-	-	13	1.99	16
37.24	401.3	277.2	339.0	401.4	10.4	3.3	2.6	stiff SAND to clayy SAND	115	5.0	55	80	53	95	44	-	-	11	1.93	16
37.40	363.4	250.8	307.7	363.4	8.9	3.2	2.5	clean SAND to silty SAND	125	5.0	50	73	48	95	44	-	-	11	1.94	16
37.57	285.3	196.6	266.6	285.3	7.9	2.8	2.8	silty SAND to sandy SILT	120	3.0	66	95	39	89	42	-	-	14	2.04	16
37.73	253.7	174.7	247.1	253.8	7.1	2.8	2.8	silty SAND to sandy SILT	120	3.0	58	85	35	85	42	-	-	15	2.08	16
37.90	231.3	159.0	228.8	231.3	6.3	2.4	2.7	silty SAND to sandy SILT	120	3.0	53	77	32	82	41	-	-	16	2.09	16
38.06	212.4	145.9	212.2	212.5	5.5	2.2	2.6	silty SAND to sandy SILT	120	3.0	49	71	30	79	41	-	-	16	2.10	16
38.22	194.2	133.2	196.8	194.2	4.9	2.1	2.5	silty SAND to sandy SILT	120	3.0	44	65	27	76	40	-	-	16	2.11	16
38.39	178.3	122.1	180.5	178.3	4.1	1.9	2.4	silty SAND to sandy SILT	120	3.0	41	59	25	74	40	-	-	16	2.11	16
38.55	163.9	112.2	167.9	164.0	3.6	1.7	2.2	silty SAND to sandy SILT	120	3.0	37	55	23	71	39	-	-	16	2.12	16
38.72	151.0	103.2	163.5	151.0	3.5	1.5	2.4	silty SAND to sandy SILT	120	3.0	34	50	22	68	39	-	-	18	2.16	16
38.88	149.0	101.7	164.3	149.0	3.6	1.0	2.4	silty SAND to sandy SILT	120	3.0	34	50	21	68	39	-	-	18	2.18	16
39.04	160.5	109.5	166.8	160.6	3.6	1.8	2.3	silty SAND to sandy SILT	120	3.0	36	54	23	70	39	-	-	17	2.14	16
39.21	164.1	111.8	167.0	164.1	3.6	1.8	2.2	silty SAND to sandy SILT	120	3.0	37	55	23	71	39	-	-	16	2.12	16
39.37	164.1	111.6	170.8	164.1	3.8	1.6	2.4	silty SAND to sandy SILT	120	3.0	37	55	23	71	39	-	-	17	2.14	16
39.54	161.5	109.8	171.2	161.6	3.9	2.0	2.4	silty SAND to sandy SILT	120	3.0	37	54	23	70	39	-	-	17	2.15	16
39.70	160.7	109.1	168.8	160.7	3.7	2.0	2.4	silty SAND to sandy SILT	120	3.0	36	54	23	70	39	-	-	17	2.15	16
39.86	160.3	108.7	162.5	160.3	3.4	1.8	2.2	silty SAND to sandy SILT	120	3.0	36	53	22	70	39	-	-	16	2.12	16
40.03	148.1	100.3	153.0	148.1	3.1	1.6	2.1	silty SAND to sandy SILT	120	3.0	33	49	21	67	39	-	-	17	2.14	16
40.19	136.8	92.6	145.5	136.8	2.8	1.0	2.1	silty SAND to sandy SILT	120	3.0	31	46	19	64	38	-	-	18	2.16	16
40.36	144.8	97.8	148.6	144.8	2.9	1.0	2.0	silty SAND to sandy SILT	120	3.0	33	48	20	66	39	-	-	17	2.13	16
40.52	176.7	119.3	166.0	176.7	3.4	0.9	2.0	silty SAND to sandy SILT	120	3.0	40	59	24	73	40	-	-	15	2.06	16
40.68	225.5	152.0	186.9	225.5	3.8	1.3	1.7	clean SAND to silty SAND	125	5.0	30	45	29	81	41	-	-	11	1.94	16
40.85	238.3	160.4	195.8	238.3	4.1	1.0	1.7	clean SAND to silty SAND	125	5.0	32	48	31	83	41	-	-	11	1.93	16
41.01	225.0	151.3	189.8	225.0	4.0	0.5	1.8	clean SAND to silty SAND	125	5.0	30	45	29	81	41	-	-	12	1.96	16
41.18	221.4	148.7	190.0	221.4	4.1	0.2	1.9	clean SAND to silty SAND	125	5.0	30	44	29	80	41	-	-	12	1.98	16
41.34	211.4	141.8	179.4	211.5	3.6	0.4	1.7	clean SAND to silty SAND	125	5.0	28	42	28	79	41	-	-	12	1.97	16
41.50	192.0	128.6	166.1	192.0	3.2	0.2	1.7	clean SAND to silty SAND	125	5.0	26	38	25	75	40	-	-	13	1.99	16
41.67	162.9	109.0	149.4	162.9	2.8	0.1	1.7	silty SAND to sandy SILT	120	3.0	36	54	22	70	39	-	-	14	2.05	16
41.83	132.4	88.5	137.5	132.4	2.5	-0.2	1.9	silty SAND to sandy SILT	120	3.0	29	44	18	63	38	-	-	17	2.15	16
42.00	110.3	73.7	127.8	110.3	2.2	0.6	2.1	silty SAND to sandy SILT	120	3.0	25	37	16	57	37	-	-	20	2.23	16
42.16	105.3	70.3	123.1	105.4	2.1	0.9	2.0	silty SAND to sandy SILT	120	3.0	23	35	15	55	37	-	-	20	2.23	16
42.32	113.3	75.5	130.5	113.4	2.3	1.2	2.1	silty SAND to sandy SILT	120	3.0	25	38	16	58	37	-	-	20	2.22	16
42.49	127.8	85.0	141.9	127.8	2.8	3.2	2.2	silty SAND to sandy SILT	120	3.0	28	43	18	62	38	-	-	19	2.20	16
42.65	136.2	90.5	149.0	136.2	3.0	3.2	2.3	silty SAND to sandy SILT	120	3.0	30	45	19	64	38	-	-	19	2.19	16
42.82	135.9	90.3	159.9	136.0	3.5	3.5	2.6	silty SAND to sandy SILT	120	3.0	30	45	20	64	38	-	-	20	2.24	16
42.98	128.9	85.5	175.0	129.0	4.2	1.7	3.3	silty SAND to sandy SILT	120	3.0	29	43	19	62	38	-	-	24	2.33	16
43.15	117.9	78.1	185.6	118.0	4.6	1.5	4.0	clayy SILT to silty CLAY	115	2.0	39	59	18	-	-	8.2	9.9	27	2.42	15
43.31	95.4	44.3	-	95.4	4.5	1.1	4.8	clayy SILT to silty CLAY	115	2.0	22	48	12	-	-	6.6	9.9	38	2.65	15
43.47	74.0	34.3	-	74.1	3.9	2.1	5.4	silty CLAY to CLAY	115	1.5	23	49	10	-	-	5.1	9.9	44	2.76	15
43.64	63.4	29.3	-	63.5	3.5	3.9	5.7	silty CLAY to CLAY	115	1.5	20	42	8	-	-	4.3	9.3	48	2.83	15
43.80	72.9	33.6	-	72.9	2.8	4.4	4.0	clayy SILT to silty CLAY	115	2.0	17	36	9	-	-	5.0	9.9	39	2.68	15
43.97	48.3	22.3	-	48.4	1.9	3.6	4.2	silty CLAY to CLAY	115	1.5	15	32	6	-	-	3.3	6.9	48	2.83	15
44.13	34.3	15.8	-	34.4	1.3	4.8	4.1	silty CLAY to CLAY	115	1.5	11	23	5	-	-	2.3	4.8	55	2.95	15
44.29	32.6	15.0	-	32.8	1.1	7.3	3.8	silty CLAY to CLAY	115	1.5	10	22	5	-	-	2.2	4.5	55	2.95	15
44.46	39.2	18.0	-	39.5	1.4	10.5	3.9	silty CLAY to CLAY	115	1.5	12	26	5	-	-	2.6	5.5	51	2.88	15
44.62	43.1	19.7	-	43.4	2.3	14.5	5.6	silty CLAY to CLAY	115	1.5	13	29	6	-	-	2.9	6.1	55	2.95	15
44.79	57.8	26.4	-	58.2	3.0	22.6	5.5	silty CLAY to CLAY	115	1.5	18	39	8	-	-	3.9	8.3	49	2.85	15
44.95	69.8	31.8	-	70.2	3.7	21.6	5.5	silty CLAY to CLAY	115	1.5	21	47	9	-	-	4.8	9.9	45	2.79	15
45.11	73.7	33.5	-	74.3	3.8	33.3	5.4	silty CLAY to CLAY	115	1.5	22	49	9	-	-	5.1	9.9	44	2.77	15
45.28	73.3	33.2	-	73.6	3.7	16.9	5.2	silty CLAY to CLAY	115	1.5	22	49	9	-	-	5.0	9.9	44	2.76	15
45.44	77.3	35.0	-	78.0	3.2	38.9	4.3	clayy SILT to silty CLAY	115	2.0	17	39	9	-	-	5.3	9.9	40	2.68	15
45.61	172.8	112.8	164.6	173.1	3.6	15.3	2.1	silty SAND to sandy SILT	120	3.0	38	58	23	71	39	-	-	16	2.10	16
45.77	222.5	145.1	185.8	222.6	4.1	6.2	1.9	clean SAND to silty SAND	125	5.0	29	45	28	79	41	-	-	13	1.98	16
45.93	257.6	167.8	208.2	257.7	4.8	5.0	1.9	clean SAND to silty SAND	125	5.0	34	52	32	84	41	-	-	12	1.95	16
46.10	270.6	176.0	217.9	270.6	5.2	4.6	2.0	clean SAND to silty SAND	125	5.0	35	54	34	86	42	-	-	12	1.95	16
46.26	271.6	176.5	223.6	271.7	5.7	4.7	2.1	clean SAND to silty SAND	125	5.0	35	54	34	86	42	-	-	12	1.97	16

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Geosphere Consultants, Inc. Page: 4
Data File: SDF(156).cpt Sounding ID: CPT-04
CPT Date: 6/2/2020 12:03:34 PM Project No: 91-04769
GW During Test: 28 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n * PS -	q1ncs PS -	qt * PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT * R-N1 60%	SPT R-N 60%	SPT * IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic * SBT Indx	Nk -
46.43	260.2	168.9	220.2	260.3	5.7	3.8	2.2	silty SAND to sandy SILT	120	3.0	56	87	33	84	41	-	-	13	2.00	16
46.59	246.0	159.5	217.2	246.1	5.8	3.0	2.4	silty SAND to sandy SILT	120	3.0	53	82	32	82	41	-	-	14	2.04	16
46.75	241.7	156.6	212.8	241.7	5.6	2.5	2.4	silty SAND to sandy SILT	120	3.0	52	81	31	82	41	-	-	14	2.04	16
46.92	247.1	159.9	201.2	247.2	4.7	2.4	1.9	clean SAND to silty SAND	125	5.0	32	49	31	82	41	-	-	12	1.97	16
47.08	251.8	162.8	194.5	251.9	4.0	2.7	1.6	clean SAND to silty SAND	125	5.0	33	50	31	83	41	-	-	11	1.91	16
47.25	273.3	176.4	210.5	273.3	4.7	2.4	1.7	clean SAND to silty SAND	125	5.0	35	55	33	86	42	-	-	10	1.90	16
47.41	298.1	192.3	232.2	298.3	5.7	7.9	1.9	clean SAND to silty SAND	125	5.0	38	60	37	89	42	-	-	11	1.92	16
47.57	330.3	212.8	255.9	330.5	6.7	8.5	2.1	clean SAND to silty SAND	125	5.0	43	66	40	92	42	-	-	11	1.91	16
47.74	329.3	211.9	269.5	329.5	8.0	9.4	2.5	silty SAND to sandy SILT	120	3.0	71	100	41	92	42	-	-	12	1.98	16
47.90	321.7	206.8	282.1	321.8	9.3	5.9	2.9	stiff SAND to clayy SAND	115	5.0	41	64	41	91	42	-	-	14	2.05	16
48.07	298.4	191.6	287.3	298.5	10.2	6.0	3.4	stiff SAND to clayy SAND	115	5.0	38	60	40	88	42	-	-	17	2.12	16
48.23	284.1	182.3	292.3	284.2	10.8	6.1	3.8	stiff SAND to clayy SAND	115	5.0	36	57	38	87	42	-	-	18	2.17	16
48.39	265.3	170.0	301.1	265.4	11.5	7.5	4.4	very stiff fine SOIL	120	1.0	100	100	37	-	-	9.3	9.9	20	2.24	30
48.56	263.2	168.5	284.1	263.4	10.4	9.0	4.0	stiff SAND to clayy SAND	115	5.0	34	53	36	84	41	-	-	19	2.21	16
48.72	181.4	116.0	227.2	181.6	7.1	9.1	4.0	stiff SAND to clayy SAND	115	5.0	23	36	26	72	39	-	-	23	2.30	16
48.89	95.8	41.5	-	96.0	4.8	8.0	5.2	silty CLAY to CLAY	115	1.5	28	64	11	-	-	6.6	9.9	40	2.69	15
49.05	64.7	28.0	-	65.0	3.4	14.6	5.5	silty CLAY to CLAY	115	1.5	19	43	8	-	-	4.4	8.8	48	2.83	15
49.22	78.2	33.7	-	78.7	3.1	26.4	4.1	clayy SILT to silty CLAY	115	2.0	17	39	9	-	-	5.4	9.9	40	2.68	15
49.38	82.8	35.6	-	83.5	3.2	34.8	4.0	clayy SILT to silty CLAY	115	2.0	18	41	9	-	-	5.7	9.9	38	2.66	15
49.54	62.9	27.0	-	64.3	2.5	68.5	4.2	silty CLAY to CLAY	115	1.5	18	42	8	-	-	4.3	8.5	44	2.76	15
49.71	55.1	23.6	-	56.7	2.1	82.2	4.1	silty CLAY to CLAY	115	1.5	16	37	7	-	-	3.7	7.4	46	2.80	15
49.87	53.3	22.8	-	55.2	3.2	96.4	6.5	silty CLAY to CLAY	115	1.5	15	36	7	-	-	3.6	7.1	55	2.95	15
50.04	62.0	26.5	-	64.7	5.8	140.3	9.8	silty CLAY to CLAY	115	1.5	18	41	9	-	-	4.2	8.3	60	3.03	15

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

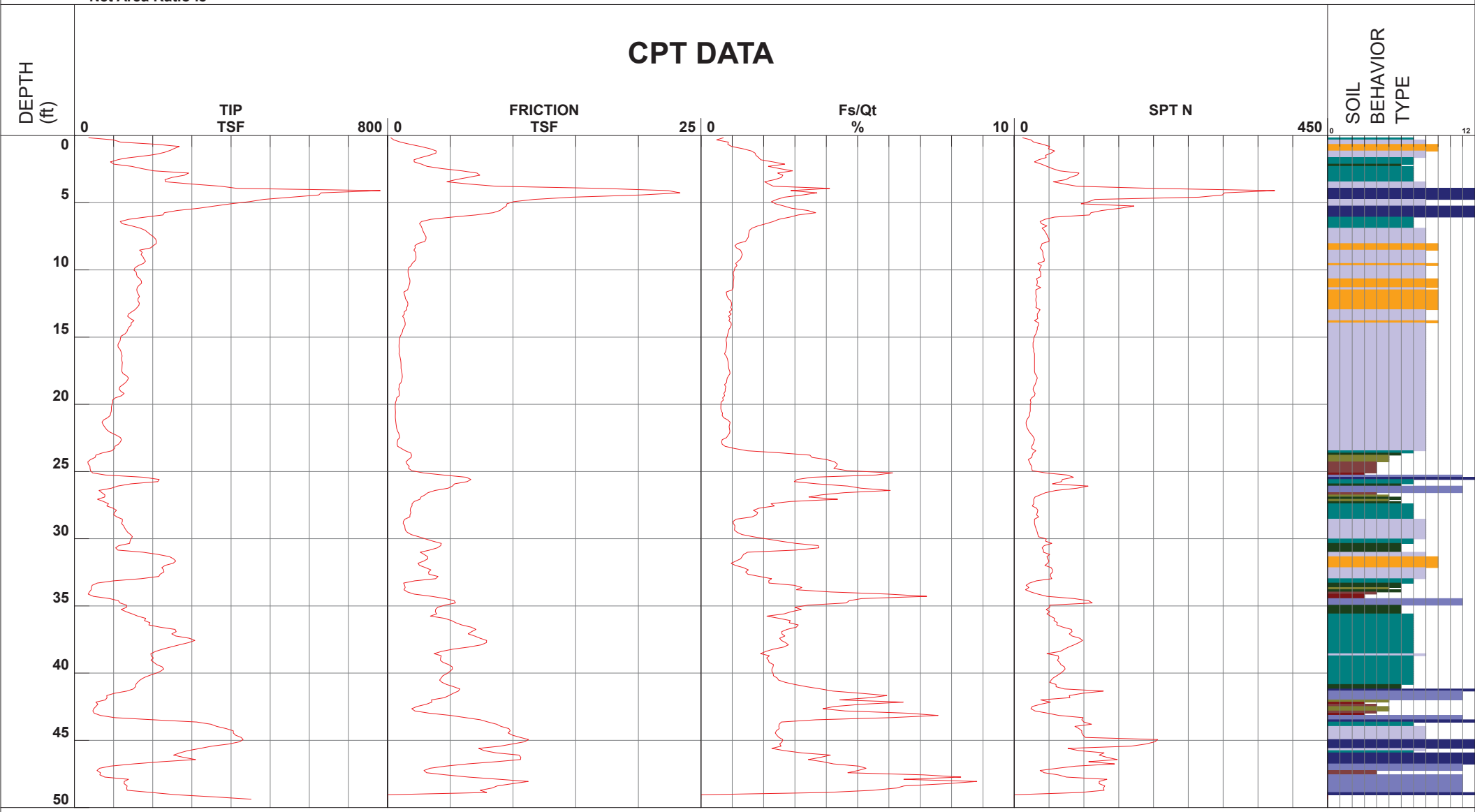
Middle Earth Geo Testing

Geosphere Consultants, Inc.

Project	Kaiser Fresno MOB	Operator	BH-GH	Filename	SDF(160).cpt
Job Number	91-04769	Cone Number	DDG1496	GPS	
Hole Number	CPT-05	Date and Time	6/2/2020 3:22:15 PM	Maximum Depth	49.38 ft
EST GW Depth During Test		25.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

S*Soil behavior type and SPT based on data from UBC-1983

Kaiser Fresno MOB

Project ID: Geosphere Consultants, Inc. Page: 1
Data File: SDF(160).cpt Sounding ID: CPT-05
CPT Date: 6/2/2020 3:22:15 PM Project No: 91-04769
GW During Test: 25 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -
0.33	99.5	159.5	159.5	99.5	0.5	0.2	0.5	clean SAND to silty SAND	125	5.0	32	20	27	82	48	-	-	5	1.56	16
0.49	118.2	189.5	192.1	118.2	1.0	0.5	0.9	clean SAND to silty SAND	125	5.0	38	24	33	88	48	-	-	5	1.66	16
0.66	211.6	339.4	339.4	211.6	1.8	0.7	0.9	clean SAND to silty SAND	125	5.0	68	42	56	95	48	-	-	5	1.49	16
0.82	267.9	429.6	429.6	267.9	2.6	1.0	1.0	clean SAND to silty SAND	125	5.0	86	54	70	95	48	-	-	5	1.47	16
0.98	253.8	407.1	407.1	253.9	3.4	1.2	1.3	clean SAND to silty SAND	125	5.0	81	51	69	95	48	-	-	5	1.60	16
1.15	241.1	386.6	395.3	241.1	3.9	1.2	1.6	clean SAND to silty SAND	125	5.0	77	48	68	95	48	-	-	6	1.68	16
1.31	223.2	358.0	376.6	223.2	3.8	1.1	1.7	clean SAND to silty SAND	125	5.0	72	45	63	95	48	-	-	7	1.72	16
1.48	189.7	304.3	329.3	189.7	3.3	0.9	1.8	clean SAND to silty SAND	125	5.0	61	38	55	95	48	-	-	7	1.77	16
1.64	144.3	231.5	265.3	144.3	2.7	0.7	1.8	clean SAND to silty SAND	125	5.0	46	29	43	95	48	-	-	9	1.85	16
1.80	110.6	177.3	216.9	110.6	2.1	0.6	1.9	clean SAND to silty SAND	125	5.0	35	22	34	86	48	-	-	11	1.93	16
1.97	92.3	148.0	202.3	92.3	2.1	0.6	2.3	silty SAND to sandy SILT	120	3.0	49	31	30	80	48	-	-	14	2.05	16
2.13	100.8	161.7	228.3	100.8	2.7	0.6	2.7	silty SAND to sandy SILT	120	3.0	54	34	33	83	48	-	-	15	2.08	16
2.30	146.3	234.7	279.6	146.4	3.1	0.8	2.2	clean SAND to silty SAND	125	5.0	47	29	44	95	48	-	-	10	1.90	16
2.46	172.5	276.6	333.9	172.5	4.3	0.8	2.5	stiff SAND to clayy SAND	115	5.0	55	34	53	95	48	-	-	11	1.92	16
2.62	202.6	324.9	399.0	202.6	5.9	0.9	2.9	stiff SAND to clayy SAND	115	5.0	65	41	62	95	48	-	-	11	1.94	16
2.79	291.3	467.2	516.1	291.3	7.1	1.1	2.5	stiff SAND to clayy SAND	115	5.0	93	58	85	95	48	-	-	8	1.80	16
2.95	281.4	451.2	509.4	281.4	7.4	1.1	2.6	stiff SAND to clayy SAND	115	5.0	90	56	83	95	48	-	-	9	1.83	16
3.12	249.4	400.0	457.0	249.4	6.4	1.2	2.6	stiff SAND to clayy SAND	115	5.0	80	50	74	95	48	-	-	9	1.85	16
3.28	231.3	370.9	418.4	231.3	5.4	1.2	2.3	stiff SAND to clayy SAND	115	5.0	74	46	68	95	48	-	-	9	1.83	16
3.45	232.7	373.2	405.8	232.8	4.7	1.1	2.0	clean SAND to silty SAND	125	5.0	75	47	67	95	48	-	-	8	1.77	16
3.61	298.8	479.2	511.6	298.8	6.5	1.5	2.2	stiff SAND to clayy SAND	115	5.0	96	60	86	95	48	-	-	7	1.74	16
3.77	374.3	600.3	634.5	374.4	8.6	1.4	2.3	stiff SAND to clayy SAND	115	5.0	100	75	100	95	48	-	-	7	1.73	16
3.94	415.3	666.1	821.8	415.4	17.1	1.4	4.1	stiff SAND to clayy SAND	115	5.0	100	83	100	95	48	-	-	11	1.94	16
4.10	781.1	1252.7	1315.6	781.2	22.4	4.0	2.9	stiff SAND to clayy SAND	115	5.0	100	100	100	95	48	-	-	6	1.72	16
4.27	630.0	1010.4	1155.6	630.0	23.3	0.5	3.7	stiff SAND to clayy SAND	115	5.0	100	100	100	95	48	-	-	9	1.85	16
4.43	624.1	1000.8	1102.7	624.1	20.2	1.6	3.2	stiff SAND to clayy SAND	115	5.0	100	100	100	95	48	-	-	8	1.79	16
4.59	553.8	888.2	936.8	553.9	14.7	3.2	2.7	stiff SAND to clayy SAND	115	5.0	100	100	100	95	48	-	-	7	1.73	16
4.76	482.9	774.4	806.7	483.0	11.7	5.9	2.4	stiff SAND to clayy SAND	115	5.0	100	97	100	95	48	-	-	6	1.71	16
4.92	446.8	716.6	738.1	447.0	10.0	8.9	2.3	stiff SAND to clayy SAND	115	5.0	100	89	100	95	48	-	-	6	1.69	16
5.09	399.4	640.6	677.7	399.6	9.5	9.6	2.4	stiff SAND to clayy SAND	115	5.0	100	80	100	95	48	-	-	7	1.73	16
5.25	358.0	574.2	631.3	358.2	9.5	9.1	2.6	stiff SAND to clayy SAND	115	5.0	100	72	100	95	48	-	-	8	1.79	16
5.41	317.6	509.4	582.0	317.8	9.2	8.3	2.9	stiff SAND to clayy SAND	115	5.0	100	64	94	95	48	-	-	9	1.85	16
5.58	263.0	421.8	521.2	263.1	9.0	6.1	3.4	stiff SAND to clayy SAND	115	5.0	84	53	81	95	48	-	-	12	1.95	16
5.74	229.8	368.6	479.3	229.8	8.4	0.0	3.7	stiff SAND to clayy SAND	115	5.0	74	46	72	95	48	-	-	13	2.00	16
5.91	226.3	362.9	445.8	226.3	7.0	-0.7	3.1	stiff SAND to clayy SAND	115	5.0	73	45	70	95	48	-	-	11	1.94	16
6.07	181.5	291.0	362.1	181.5	5.2	-1.0	2.8	stiff SAND to clayy SAND	115	5.0	58	36	56	95	48	-	-	12	1.95	16
6.23	138.7	221.6	279.7	138.7	3.4	-1.2	2.5	silty SAND to sandy SILT	120	3.0	74	46	43	93	47	-	-	12	1.97	16
6.40	117.0	184.3	237.4	116.9	2.7	-1.3	2.3	silty SAND to sandy SILT	120	3.0	61	39	36	87	46	-	-	13	1.99	16
6.56	122.2	190.1	235.0	122.1	2.5	-1.8	2.1	clean SAND to silty SAND	125	5.0	38	24	37	88	46	-	-	12	1.95	16
6.73	146.7	225.3	259.1	146.6	2.7	-1.6	1.8	clean SAND to silty SAND	125	5.0	45	29	42	94	47	-	-	9	1.86	16
6.89	167.9	254.7	279.3	167.9	2.7	-1.3	1.6	clean SAND to silty SAND	125	5.0	51	34	46	95	47	-	-	8	1.79	16
7.05	180.8	270.9	290.5	180.8	2.8	-1.0	1.6	clean SAND to silty SAND	125	5.0	54	36	49	95	47	-	-	7	1.75	16
7.22	187.5	277.5	295.9	187.5	2.9	-0.9	1.5	clean SAND to silty SAND	125	5.0	55	37	50	95	48	-	-	7	1.74	16
7.38	194.9	285.1	302.0	194.9	3.0	-0.9	1.5	clean SAND to silty SAND	125	5.0	57	39	51	95	48	-	-	7	1.73	16
7.55	202.2	292.4	308.3	202.2	3.1	-0.7	1.5	clean SAND to silty SAND	125	5.0	58	40	52	95	48	-	-	7	1.72	16
7.71	207.3	296.5	309.8	207.3	3.1	-0.7	1.5	clean SAND to silty SAND	125	5.0	59	41	52	95	48	-	-	6	1.71	16
7.87	209.4	296.1	307.1	209.4	3.0	-0.8	1.4	clean SAND to silty SAND	125	5.0	59	42	52	95	48	-	-	6	1.70	16
8.04	208.8	292.2	292.2	208.8	2.4	-0.6	1.2	clean SAND to silty SAND	125	5.0	58	42	50	95	48	-	-	5	1.63	16
8.20	201.5	278.9	278.9	201.5	2.2	-0.7	1.1	clean SAND to silty SAND	125	5.0	56	40	48	95	47	-	-	5	1.62	16
8.37	194.2	266.2	266.8	194.2	2.2	-0.7	1.1	clean SAND to silty SAND	125	5.0	53	39	46	95	47	-	-	5	1.65	16
8.53	166.6	226.0	239.2	166.6	2.1	-0.4	1.3	clean SAND to silty SAND	125	5.0	45	33	40	94	46	-	-	7	1.73	16
8.69	173.0	232.4	246.1	173.0	2.2	-0.7	1.3	clean SAND to silty SAND	125	5.0	46	35	41	95	46	-	-	7	1.73	16
8.86	170.4	226.7	242.1	170.4	2.2	-0.7	1.3	clean SAND to silty SAND	125	5.0	45	34	41	94	46	-	-	7	1.74	16
9.02	175.4	231.1	244.9	175.3	2.3	-1.0	1.3	clean SAND to silty SAND	125	5.0	46	35	41	95	46	-	-	7	1.73	16
9.19	177.8	232.1	244.6	177.8	2.2	-1.0	1.3	clean SAND to silty SAND	125	5.0	46	36	41	95	46	-	-	7	1.72	16
9.35	181.5	234.8	243.7	181.5	2.2	-1.0	1.2	clean SAND to silty SAND	125	5.0	47	36	41	95	46	-	-	6	1.70	16
9.51	176.2	225.8	232.7	176.2	2.0	-0.8	1.1	clean SAND to silty SAND	125	5.0	45	35	40	94	46	-	-	6	1.69	16
9.68	163.2	207.3	218.7	163.1	1.9	-0.6	1.2	clean SAND to silty SAND	125	5.0	41	33	37	91	46	-	-	7	1.73	16
9.84	154.5	194.6	205.1	154.5	1.7	-0.8	1.1	clean SAND to silty SAND	125	5.0	39	31	35	89	45	-	-	7	1.72	16
10.01	152.0	189.8	200.7	152.0	1.6	-0.9	1.1	clean SAND to silty SAND	125	5.0	38	30	34	88	45	-	-	7	1.73	16
10.17	157.8	195.4	204.1	157.8	1.6	-0.9	1.0	clean SAND to silty SAND	125	5.0	39	32	35	89	45	-	-	6	1.71	16
10.34	158.7	194.9	203.5	158.7	1.6	-0.8	1.0	clean SAND to silty SAND	125	5.0	39	32	34	89	45	-	-	6	1.71	16
10.50	160.3	195.3	204.8	160.3	1.7	-0.7	1.1	clean SAND to silty SAND	125	5.0	39	32	35	89	45	-	-	6	1.72	16
10.66	167.2	202.1	210.2	167.2	1.8	-0.6	1.1	clean SAND to silty SAND	125	5.0	40	33	36	90	45	-	-	6	1.70	16
10.83	171.0	205.0	212.3	171.0	1.8	-0.6	1.0	clean SAND to silty SAND	125	5.0	41	34	36	91	45	-	-	6	1.70	16
10.99	171.4	203.9	211.2	171.3	1.8	-0.6	1.0	clean SAND to silty SAND	125	5.0	41	34	36	91	45	-	-	6	1.70	16
11.16	164.9	194.7	203.5	164.9	1.7	-0.7	1.0	clean SAND to silty SAND	125	5.0	39	33	34	89	45	-	-	6	1.71	16
11.32	160.3	187.8	197.5	160.3	1.6	-0.7	1.0	clean SAND to silty SAND	125	5.0	38	32	33	88	45	-	-	7	1.72	16
11.48	159.3	185.3	194.3	159.3	1.6	-0.7	1.0	clean SAND to silty SAND	125	5.0	37	32	33	87	45	-	-	6	1.72	16
11.65	160.3	185.1	185.8	160.3	1.3	-0.7	0.8	clean SAND to silty SAND	125	5.0	37	32	32	87	45	-	-	5	1.65	16
11.81	163.0	186.9	187.9	163.0	1.3	-0.7	0.8	clean SAND to silty SAND	125	5.0	37	33	32	88	45	-	-	5	1.65	16
11.98	166.1	189.1	190.4	166.1	1.4	-0.7	0.8	clean SAND to silty SAND	125	5.0	38	33	33	88	45	-	-	5	1.65	16
12.14	162.5	183.7	188.0	162.5	1.4	-0.7	0.9	clean SAND to silty SAND	125	5.0	37	33	32	87	44	-	-	6	1.68	16
12.30	162.5	182.5	189.8	162.5	1.5	-0.7	1.0	clean SAND to silty SAND	125	5.0	36	33	32	87	44	-	-	6	1.70	16
12.47	165.9	184.9	192.9	165.8	1.6	-0.7	1.0	clean SAND to silty SAND	125	5.0	37	33	33	87	44	-	-	6	1.71	16
12.63	164.9	182.7	191.0	164.9	1.6	-0.5	1.0	clean SAND to silty SAND	125	5.0	37	33	32	87	44	-	-	6	1.71	16
12.80	160.0	176.1	184.6	160.0	1.5	-0.5	1.0	clean SAND to silty SAND	125	5.0	35	32	31	86	44	-	-	6	1.72	16
12.96	154.6	169.0	179.9	154.6	1.5	-0.5	1.0	clean SAND to silty SAND	125	5.0	34	31	30	84	44	-	-	7	1.74	16
13.12	146.3	158.8	168.3	146.2	1.3	-0.5	0.9	clean SAND to silty SAND	125	5.0	32	29	28	82	44	-	-	7	1.73	16
13.29	138.3	149.2	162.3	138.3	1.3	-0.6	1.0	clean SAND to silty SAND	125	5.0	30	28	27	80	43	-	-	8	1.77	16
13.45	135.9	145.7	156.6	135.9	1.2	-0.6	0.9	clean SAND to silty SAND	125	5.0	29	27	26	79	43	-	-	7	1.75	16
13.62	142.6	152.0	163.3	142.6	1.3	-0.7	0.9	clean SAND to silty SAND	125	5.0	30	29	27	81	43	-	-	7	1.75	16
13.78	152.1	161.1	169.8	152.1	1.4	-0.7	0.9	clean SAND to silty SAND	125	5.0	32	30	29	83	44	-	-	7	1.72	16
13.94	145.0	152.6	165.2	144.9	1.4	-0.9	1.0	clean SAND to silty SAND	125	5.0	31	29	27	81	43	-	-	7	1.77	16
14.11	145.1	151.8	164.5	145.0	1.4	-0.9	1.0	clean SAND to silty SAND	125	5.0	30	29	27	81	43	-	-	7	1.77	16
14.27	139.1	144.7	157.6	139.1	1.3	-0.9	0.9	clean SAND to silty SAND	125	5.0	29	28	26	79	43	-	-	8	1.78	16
14.44	136.0	140.7	152.6	136.0	1.2	-0.9	0.9	clean SAND to silty SAND	125	5.0	28	27	25	78	43	-	-	7	1.77	16
14.60	134.1	137.9	149.8	134.1	1.2	-0.8	0.9	clean SAND to silty SAND	125	5.0	28	27	25	78	43	-	-	8	1.77	16
14.76	128.9	131.8	143.8	128.8	1.1	-0.8	0.9	clean SAND to silty SAND	125	5.0	26	26	24	76	42	-	-	8	1.78	16
14.93	119.3	121.3	134.5	119.2	1.0	-0.8	0.8	clean SAND to silty SAND	125	5.0	24	24	22	73	42	-	-	8	1.80	16
15.09	117.5	118.8	131.4	117.5	1.0	-0.7	0.8	clean SAND to silty SAND	125	5.0	24	23	22	73	42	-	-	8	1.80	16
15.26	116.7	117.3	129.8	116.7	0.9	-0.7	0.8	clean SAND to silty SAND	125	5.0	23	23	21	72	42	-	-	8	1.80	16
15.42	113.4	113.4	126.9	113.4	0.9	-0.7	0.8	clean SAND to silty SAND	125	5.0	23	23	21	71	41	-	-	8	1.82	16

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Geosphere Consultants, Inc. Page: 2
Data File: SDF(160).cpt Sounding ID: CPT-05
CPT Date: 6/2/2020 3:22:15 PM Project No: 91-04769
GW During Test: 25 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -
15.58	110.9	110.4	124.4	110.9	0.9	-0.7	0.8	clean SAND to silty SAND	125	5.0	22	22	20	70	41	-	-	9	1.83	16
15.75	112.1	110.9	124.7	112.1	0.9	-0.7	0.8	clean SAND to silty SAND	125	5.0	22	22	20	70	41	-	-	9	1.82	16
15.91	116.5	114.7	127.7	116.5	0.9	-0.7	0.8	clean SAND to silty SAND	125	5.0	23	23	21	72	41	-	-	8	1.81	16
16.08	119.0	116.5	128.7	119.0	0.9	-0.7	0.8	clean SAND to silty SAND	125	5.0	23	24	21	72	42	-	-	8	1.80	16
16.24	120.0	116.9	128.1	120.0	0.9	-0.7	0.8	clean SAND to silty SAND	125	5.0	23	24	21	72	42	-	-	8	1.79	16
16.40	121.9	118.1	130.6	121.9	1.0	-0.6	0.8	clean SAND to silty SAND	125	5.0	24	24	22	73	42	-	-	8	1.80	16
16.57	120.6	116.2	129.9	120.6	1.0	-0.6	0.8	clean SAND to silty SAND	125	5.0	23	24	21	72	41	-	-	8	1.81	16
16.73	121.1	116.1	130.5	121.1	1.0	-0.6	0.9	clean SAND to silty SAND	125	5.0	23	24	21	72	41	-	-	9	1.82	16
16.90	122.4	116.8	131.3	122.3	1.1	-0.6	0.9	clean SAND to silty SAND	125	5.0	23	24	21	72	41	-	-	9	1.82	16
17.06	121.9	115.7	130.7	121.8	1.1	-0.4	0.9	clean SAND to silty SAND	125	5.0	23	24	21	72	41	-	-	9	1.83	16
17.23	121.4	114.8	130.0	121.4	1.1	-0.6	0.9	clean SAND to silty SAND	125	5.0	23	24	21	72	41	-	-	9	1.83	16
17.39	121.3	114.1	129.7	121.3	1.1	-0.4	0.9	clean SAND to silty SAND	125	5.0	23	24	21	71	41	-	-	9	1.84	16
17.55	121.0	113.3	129.8	121.0	1.1	-0.3	0.9	clean SAND to silty SAND	125	5.0	23	24	21	71	41	-	-	9	1.85	16
17.72	124.2	115.7	132.2	124.2	1.2	-0.3	0.9	clean SAND to silty SAND	125	5.0	23	25	21	72	41	-	-	9	1.85	16
17.88	133.1	123.4	137.4	133.1	1.2	-0.1	0.9	clean SAND to silty SAND	125	5.0	25	27	23	74	42	-	-	8	1.81	16
18.05	138.2	127.5	139.7	138.2	1.2	-0.2	0.8	clean SAND to silty SAND	125	5.0	26	28	23	75	42	-	-	8	1.78	16
18.21	135.4	124.4	136.6	135.4	1.1	-0.1	0.8	clean SAND to silty SAND	125	5.0	25	27	23	74	42	-	-	8	1.79	16
18.37	130.8	119.7	132.4	130.8	1.1	-0.2	0.8	clean SAND to silty SAND	125	5.0	24	26	22	73	41	-	-	8	1.80	16
18.54	123.9	112.8	124.7	123.9	0.9	-0.1	0.8	clean SAND to silty SAND	125	5.0	23	25	21	71	41	-	-	8	1.80	16
18.70	116.0	105.2	119.3	116.0	0.9	-0.4	0.8	clean SAND to silty SAND	125	5.0	21	23	19	69	41	-	-	9	1.84	16
18.87	114.2	103.1	116.9	114.2	0.9	-0.1	0.8	clean SAND to silty SAND	125	5.0	21	23	19	68	40	-	-	9	1.84	16
19.03	118.5	106.5	119.9	118.5	0.9	-0.1	0.8	clean SAND to silty SAND	125	5.0	21	24	20	69	41	-	-	9	1.83	16
19.19	127.0	113.6	124.7	127.0	0.9	-0.1	0.7	clean SAND to silty SAND	125	5.0	23	25	21	71	41	-	-	8	1.79	16
19.36	120.4	107.2	120.0	120.4	0.9	-0.2	0.8	clean SAND to silty SAND	125	5.0	21	24	20	69	41	-	-	8	1.82	16
19.52	104.7	92.8	105.9	104.7	0.7	-0.2	0.7	clean SAND to silty SAND	125	5.0	19	21	17	65	40	-	-	9	1.84	16
19.69	97.7	86.3	100.9	97.7	0.7	-0.2	0.7	clean SAND to silty SAND	125	5.0	17	20	16	62	39	-	-	10	1.88	16
19.85	98.3	86.4	99.2	98.3	0.6	-0.2	0.7	clean SAND to silty SAND	125	5.0	17	20	16	62	39	-	-	9	1.85	16
20.01	96.0	84.1	97.1	96.0	0.6	-0.1	0.6	clean SAND to silty SAND	125	5.0	17	19	16	61	39	-	-	9	1.86	16
20.18	94.4	82.3	95.5	94.4	0.6	-0.1	0.6	clean SAND to silty SAND	125	5.0	16	19	15	61	39	-	-	10	1.87	16
20.34	94.4	82.0	95.3	94.4	0.6	-0.1	0.6	clean SAND to silty SAND	125	5.0	16	19	15	60	39	-	-	10	1.87	16
20.51	94.1	81.4	95.3	94.1	0.6	-0.1	0.7	clean SAND to silty SAND	125	5.0	16	19	15	60	39	-	-	10	1.88	16
20.67	92.4	79.6	94.6	92.4	0.6	-0.1	0.7	clean SAND to silty SAND	125	5.0	16	18	15	59	39	-	-	10	1.90	16
20.83	91.4	78.4	93.4	91.4	0.6	-0.1	0.7	clean SAND to silty SAND	125	5.0	16	18	15	59	39	-	-	10	1.90	16
21.00	84.7	72.4	89.5	84.7	0.6	-0.2	0.7	clean SAND to silty SAND	125	5.0	14	17	14	56	38	-	-	12	1.95	16
21.16	74.4	63.3	85.6	74.4	0.6	-0.2	0.9	clean SAND to silty SAND	125	5.0	13	15	13	52	37	-	-	14	2.04	16
21.33	70.3	59.6	84.8	70.3	0.7	-0.2	0.9	silty SAND to sandy SILT	120	3.0	20	23	12	50	37	-	-	15	2.08	16
21.49	72.9	61.6	86.0	72.9	0.7	-0.1	0.9	silty SAND to sandy SILT	120	3.0	21	24	12	51	37	-	-	15	2.07	16
21.65	76.7	64.6	87.9	76.7	0.7	-0.1	0.9	clean SAND to silty SAND	125	5.0	13	15	13	53	37	-	-	14	2.04	16
21.82	80.6	67.6	90.5	80.6	0.7	0.0	0.9	clean SAND to silty SAND	125	5.0	14	16	13	54	38	-	-	14	2.03	16
21.98	86.7	72.4	94.9	86.7	0.8	0.0	0.9	clean SAND to silty SAND	125	5.0	14	17	14	56	38	-	-	13	2.01	16
22.15	95.7	79.7	100.8	95.7	0.9	0.1	0.9	clean SAND to silty SAND	125	5.0	16	19	15	59	39	-	-	12	1.97	16
22.31	107.9	89.4	107.7	107.9	0.9	0.1	0.9	clean SAND to silty SAND	125	5.0	18	22	17	63	39	-	-	11	1.92	16
22.47	117.5	97.0	112.9	117.5	1.0	0.1	0.8	clean SAND to silty SAND	125	5.0	19	23	18	66	40	-	-	10	1.87	16
22.64	120.0	98.8	110.6	120.0	0.8	0.2	0.7	clean SAND to silty SAND	125	5.0	20	24	18	67	40	-	-	8	1.82	16
22.80	117.3	96.2	108.0	117.3	0.8	0.2	0.7	clean SAND to silty SAND	125	5.0	19	23	18	66	40	-	-	9	1.82	16
22.97	112.6	92.0	104.8	112.6	0.8	0.1	0.7	clean SAND to silty SAND	125	5.0	18	23	17	64	39	-	-	9	1.84	16
23.13	103.8	84.5	101.0	103.8	0.8	0.4	0.8	clean SAND to silty SAND	125	5.0	17	21	16	61	39	-	-	11	1.91	16
23.30	102.6	83.2	108.4	102.6	1.1	0.5	1.1	clean SAND to silty SAND	125	5.0	17	21	16	61	39	-	-	13	2.00	16
23.46	95.7	77.3	114.7	95.7	1.4	0.4	1.5	silty SAND to sandy SILT	120	3.0	26	32	16	59	38	-	-	16	2.12	16
23.62	70.6	56.9	127.7	70.6	1.8	0.3	2.7	silty SAND to sandy SILT	120	3.0	19	24	13	48	36	-	-	26	2.38	16
23.79	54.9	37.5	-	54.9	1.9	0.5	3.6	clayy SILT to silty CLAY	115	2.0	19	27	10	-	-	3.8	9.9	36	2.60	15
23.95	53.0	36.0	-	53.1	1.9	1.3	3.6	clayy SILT to silty CLAY	115	2.0	18	27	9	-	-	3.6	9.9	37	2.62	15
24.12	41.1	27.7	-	41.1	1.6	1.9	4.2	silty CLAY to CLAY	115	1.5	18	27	8	-	-	2.8	8.8	43	2.75	15
24.28	34.2	22.9	-	34.2	1.5	2.2	4.5	silty CLAY to CLAY	115	1.5	15	23	7	-	-	2.3	7.2	48	2.83	15
24.44	35.4	23.6	-	35.5	1.5	2.9	4.5	silty CLAY to CLAY	115	1.5	16	24	7	-	-	2.4	7.5	48	2.83	15
24.61	39.7	26.3	-	39.8	1.7	3.1	4.5	silty CLAY to CLAY	115	1.5	18	26	7	-	-	2.7	8.3	45	2.79	15
24.77	39.9	26.2	-	39.9	1.7	3.3	4.4	silty CLAY to CLAY	115	1.5	17	27	7	-	-	2.7	8.3	45	2.78	15
24.94	41.3	27.0	-	41.3	1.9	3.3	4.8	silty CLAY to CLAY	115	1.5	18	28	8	-	-	2.8	8.6	46	2.80	15
25.10	46.5	30.3	-	46.6	2.8	3.5	6.3	silty CLAY to CLAY	115	1.5	20	31	9	-	-	3.2	9.7	49	2.85	15
25.26	79.5	51.7	-	79.6	4.4	4.3	5.7	silty CLAY to CLAY	115	1.5	34	53	14	-	-	5.5	9.9	38	2.65	15
25.43	177.4	138.7	237.4	177.5	6.3	3.2	3.6	stiff SAND to clayy SAND	115	5.0	28	35	30	78	41	-	-	20	2.22	16
25.59	216.6	169.1	250.7	216.6	6.6	2.9	3.1	silty SAND to sandy SILT	120	3.0	56	72	35	84	42	-	-	16	2.12	16
25.76	212.9	165.9	244.4	212.9	6.3	3.0	3.0	silty SAND to sandy SILT	120	3.0	55	71	34	84	42	-	-	16	2.11	16
25.92	144.0	112.1	215.2	144.1	5.3	2.9	3.7	silty SAND to sandy SILT	120	3.0	37	48	25	71	40	-	-	22	2.29	16
26.08	110.4	85.8	215.0	110.5	5.2	3.0	4.8	clayy SILT to silty CLAY	115	2.0	43	55	20	-	-	7.7	9.9	28	2.45	15
26.25	94.4	73.2	210.1	94.4	4.8	3.5	5.2	clayy SILT to silty CLAY	115	2.0	37	47	18	-	-	6.6	9.9	32	2.52	15
26.41	62.7	39.9	-	62.8	3.8	3.8	6.2	silty CLAY to CLAY	115	1.5	27	42	11	-	-	4.3	9.9	43	2.75	15
26.58	70.3	44.6	-	70.3	3.2	3.7	4.7	clayy SILT to silty CLAY	115	2.0	22	35	12	-	-	4.9	9.9	37	2.63	15
26.74	77.9	60.2	162.0	78.0	3.0	3.7	3.9	clayy SILT to silty CLAY	115	2.0	30	39	15	-	-	5.4	9.9	30	2.48	15
26.90	77.2	59.6	151.9	77.3	2.7	3.6	3.5	clayy SILT to silty CLAY	115	2.0	30	39	14	-	-	5.3	9.9	29	2.45	15
27.07	59.1	37.2	-	59.2	2.6	3.3	4.5	clayy SILT to silty CLAY	115	2.0	19	30	10	-	-	4.1	9.9	39	2.68	15
27.23	74.2	57.1	134.5	74.3	2.1	3.7	2.9	clayy SILT to silty CLAY	115	2.0	29	37	13	-	-	5.1	9.9	27	2.41	15
27.40	87.1	67.0	127.3	87.2	1.9	3.3	2.3	silty SAND to sandy SILT	120	3.0	22	29	15	54	37	-	-	22	2.28	16
27.56	82.8	63.6	127.2	82.9	1.9	3.2	2.4	silty SAND to sandy SILT	120	3.0	21	28	14	52	37	-	-	23	2.32	16
27.72	98.8	75.7	124.0	98.8	1.8	2.6	1.9	silty SAND to sandy SILT	120	3.0	25	33	16	58	38	-	-	19	2.19	16
27.89	107.2	82.0	124.4	107.2	1.8	2.6	1.7	silty SAND to sandy SILT	120	3.0	27	36	17	60	38	-	-	17	2.13	16
28.05	102.0	78.0	124.9	102.1	1.8	2.6	1.8	silty SAND to sandy SILT	120	3.0	26	34	16	59	38	-	-	18	2.17	16
28.22	100.4	76.6	122.7	100.4	1.8	2.7	1.8	silty SAND to sandy SILT	120	3.0	26	33	16	58	38	-	-	18	2.17	16
28.38	108.4	82.6	123.6	108.5	1.8	2.7	1.7	silty SAND to sandy SILT	120	3.0	28	36	17	61	38	-	-	16	2.12	16
28.54	122.4	93.1	118.3	122.4	1.4	2.7	1.1	clean SAND to silty SAND	125	5.0	19	24	18	65	39	-	-	12	1.98	16
28.71	122.5	93.1	115.4	122.6	1.3	2.6	1.0	clean SAND to silty SAND	125	5.0	19	25	18	65	39	-	-	12	1.95	16
28.87	120.4	91.3	114.1	120.4	1.2	2.6	1.0	clean SAND to silty SAND	125	5.0	18	24	18	64	39	-	-	12	1.96	16
29.04	125.5	95.0	118.7	125.5	1.4	2.6	1.1	clean SAND to silty SAND	125	5.0	19	25	18	65	39	-	-	12	1.96	16
29.20	128.4	97.1	120.3	128.5	1.4	2.6	1.1	clean SAND to silty SAND	125	5.0	19	26	19	66	39	-	-	12	1.95	16
29.36	131.7	99.4	122.2	131.7	1.4	2.6	1.1	clean SAND to silty SAND	125	5.0	20	26	19	67	39	-	-	11	1.94	16
29.53	136.1	102.6	127.2	136.2	1.6	2.6	1.2	clean SAND to silty SAND	125	5.0	21	27	20	68	39	-	-	12	1.95	16
29.69	143.2	107.8	136.2	143.3	1.9	2.7	1.3	clean SAND to silty SAND	125	5.0	22	29	21	69	40	-	-	12	1.97	16
29.86	148.2	111.3	150.1	148.2	2.5	2.7	1.7	silty SAND to sandy SILT	120	3.0	37	49	22	71	40	-	-	14	2.03	16
30.02	144.0	108.1	160.2	144.0	3.0	2.7	2.1	silty SAND to sandy SILT	120	3.0	36	48	22	70	40	-	-	16	2.11	16
30.19	142.2	106.5	172.7	142.2	3.6	2.9	2.6	silty SAND to sandy SILT	120	3.0	36	47	22	69	40	-	-	18	2.18	16
30.35	141.1	105.6	187.4	141.2	4.3	3.2	3.1	silty SAND to sandy SILT	120	3.0	35	47	23	69	40	-	-	20	2.24	16
30.51	113.2	84.6	187.4	113.2	4.2	3.2	3.8	clayy SILT to silty CLAY	115	2.0	42	57	19	-	-	7.9	9.9	25	2.38	15
30.68	105.4	78.6	181.4	105.4	4.0	3.4	3.8	clayy SILT to silty CLAY	115	2.0	39	53	18	-	-	7.3	9.9	26	2.40	15
30.84	110.9	82.6	164.6	110.9	3.4	3.6	3.1	silty SAND to sandy SILT	120	3.0	28	37	18	61	38	-	-	23	2.31	16

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Kaiser Fresno MOB

Project ID: Geosphere Consultants, Inc. Page: 3
Data File: SDF(160).cpt Sounding ID: CPT-05
CPT Date: 6/2/2020 3:22:15 PM Project No: 91-04769
GW During Test: 25 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT	Nk -
31.01	175.3	130.5	161.6	175.4	2.6	3.9	1.5	clean SAND to silty SAND	125	5.0	26	35	25	76	41	-	-	12	1.95	16
31.17	214.0	159.0	183.5	214.0	2.9	3.7	1.4	clean SAND to silty SAND	125	5.0	32	43	30	82	42	-	-	9	1.86	16
31.33	243.3	180.5	201.2	243.3	3.2	3.6	1.3	clean SAND to silty SAND	125	5.0	36	49	33	86	42	-	-	8	1.81	16
31.50	252.9	187.4	205.7	252.9	3.2	3.1	1.3	clean SAND to silty SAND	125	5.0	37	51	34	88	43	-	-	8	1.79	16
31.66	259.1	191.7	204.3	259.1	2.9	3.2	1.1	clean SAND to silty SAND	125	5.0	38	52	34	88	43	-	-	7	1.74	16
31.83	252.1	186.2	193.7	252.1	2.4	3.3	1.0	clean SAND to silty SAND	125	5.0	37	50	33	88	42	-	-	6	1.70	16
31.99	231.7	170.9	185.6	231.8	2.5	3.2	1.1	clean SAND to silty SAND	125	5.0	34	46	31	85	42	-	-	8	1.77	16
32.15	223.0	164.2	187.9	223.0	3.0	3.1	1.4	clean SAND to silty SAND	125	5.0	33	45	30	83	42	-	-	9	1.85	16
32.32	227.9	167.6	196.0	228.0	3.4	3.1	1.5	clean SAND to silty SAND	125	5.0	34	46	31	84	42	-	-	10	1.88	16
32.48	228.6	167.9	193.6	228.6	3.3	3.5	1.4	clean SAND to silty SAND	125	5.0	34	46	31	84	42	-	-	9	1.86	16
32.65	219.0	160.6	189.3	219.0	3.3	3.3	1.5	clean SAND to silty SAND	125	5.0	32	44	30	83	42	-	-	10	1.89	16
32.81	215.4	157.7	198.4	215.5	4.0	3.3	1.9	clean SAND to silty SAND	125	5.0	32	43	31	82	42	-	-	12	1.97	16
32.97	170.1	124.4	180.2	170.2	3.8	3.2	2.3	silty SAND to sandy SILT	120	3.0	41	57	25	74	40	-	-	16	2.10	16
33.14	100.8	73.6	131.4	100.9	2.2	3.1	2.2	silty SAND to sandy SILT	120	3.0	25	34	16	57	37	-	-	21	2.25	16
33.30	58.6	42.7	104.4	58.6	1.3	3.6	2.2	silty SAND to sandy SILT	120	3.0	14	20	10	39	34	-	-	28	2.43	16
33.47	45.3	25.5	-	45.4	1.4	4.2	3.1	clayy SILT to silty CLAY	115	2.0	13	23	7	-	-	3.1	8.0	40	2.70	15
33.63	43.3	24.3	-	43.4	1.4	4.5	3.4	clayy SILT to silty CLAY	115	2.0	12	22	7	-	-	2.9	7.6	42	2.74	15
33.79	42.8	23.9	-	42.8	1.3	3.8	3.2	clayy SILT to silty CLAY	115	2.0	12	21	7	-	-	2.9	7.5	42	2.73	15
33.96	38.2	21.3	-	38.3	1.6	2.6	4.4	silty CLAY to CLAY	115	1.5	14	25	6	-	-	2.6	6.7	49	2.86	15
34.12	35.2	19.6	-	35.3	2.1	2.1	6.4	silty CLAY to CLAY	115	1.5	13	23	6	-	-	2.4	6.1	58	2.99	15
34.29	48.6	27.0	-	48.6	3.5	2.2	7.5	silty CLAY to CLAY	115	1.5	18	32	8	-	-	3.3	8.5	54	2.94	15
34.45	90.0	49.9	-	90.1	4.6	2.9	5.3	clayy SILT to silty CLAY	115	2.0	25	45	13	-	-	6.2	9.9	37	2.63	15
34.61	112.2	81.0	211.3	112.2	5.3	3.0	4.8	clayy SILT to silty CLAY	115	2.0	41	56	19	-	-	7.8	9.9	29	2.47	15
34.78	116.6	84.1	212.5	116.6	5.4	3.4	4.7	clayy SILT to silty CLAY	115	2.0	42	58	20	-	-	8.1	9.9	28	2.45	15
34.94	133.5	96.2	190.2	133.6	4.6	3.7	3.5	silty SAND to sandy SILT	120	3.0	32	45	21	66	39	-	-	23	2.31	16
35.11	133.1	95.7	177.0	133.1	4.0	3.6	3.0	silty SAND to sandy SILT	120	3.0	32	44	21	66	39	-	-	21	2.27	16
35.27	119.5	85.9	173.4	119.6	3.8	3.4	3.3	silty SAND to sandy SILT	120	3.0	29	40	19	62	38	-	-	23	2.32	16
35.43	132.4	95.0	172.5	132.4	3.8	3.4	2.9	silty SAND to sandy SILT	120	3.0	32	44	21	65	39	-	-	21	2.26	16
35.60	147.5	105.7	175.7	147.6	3.9	3.4	2.7	silty SAND to sandy SILT	120	3.0	35	49	22	69	39	-	-	19	2.20	16
35.76	161.7	115.8	167.6	161.8	3.4	3.6	2.1	silty SAND to sandy SILT	120	3.0	39	54	24	72	40	-	-	16	2.10	16
35.93	182.1	130.2	193.7	182.2	4.5	3.6	2.5	silty SAND to sandy SILT	120	3.0	43	61	27	76	40	-	-	16	2.12	16
36.09	178.9	127.7	203.1	178.9	5.1	3.7	2.9	silty SAND to sandy SILT	120	3.0	43	60	27	75	40	-	-	18	2.17	16
36.26	192.8	137.5	211.4	192.8	5.4	3.5	2.9	silty SAND to sandy SILT	120	3.0	46	64	29	78	41	-	-	17	2.14	16
36.42	190.0	135.3	219.3	190.1	5.9	3.5	3.1	silty SAND to sandy SILT	120	3.0	45	63	29	77	41	-	-	18	2.18	16
36.58	219.1	155.8	237.2	219.2	6.7	3.6	3.1	silty SAND to sandy SILT	120	3.0	52	73	32	82	41	-	-	17	2.14	16
36.75	257.0	182.6	252.4	257.1	7.0	3.8	2.8	silty SAND to sandy SILT	120	3.0	61	86	37	87	42	-	-	15	2.06	16
36.91	259.9	184.4	248.1	260.0	6.7	3.9	2.6	silty SAND to sandy SILT	120	3.0	61	87	37	87	42	-	-	14	2.03	16
37.08	248.4	176.0	240.4	248.5	6.4	3.9	2.6	silty SAND to sandy SILT	120	3.0	59	83	35	86	42	-	-	14	2.05	16
37.24	258.9	183.2	250.6	259.0	6.9	3.9	2.7	silty SAND to sandy SILT	120	3.0	61	86	37	87	42	-	-	14	2.05	16
37.40	293.4	207.4	267.9	293.5	7.4	4.1	2.5	silty SAND to sandy SILT	120	3.0	69	98	41	91	43	-	-	13	1.99	16
37.57	307.8	217.3	279.4	307.9	7.9	4.4	2.6	silty SAND to sandy SILT	120	3.0	72	100	42	93	43	-	-	13	1.99	16
37.73	291.9	205.8	273.3	292.0	7.9	4.5	2.7	silty SAND to sandy SILT	120	3.0	69	97	41	91	43	-	-	14	2.02	16
37.90	268.1	188.8	260.2	268.2	7.5	4.3	2.8	silty SAND to sandy SILT	120	3.0	63	89	38	88	42	-	-	14	2.05	16
38.06	245.5	172.6	239.0	245.6	6.5	4.3	2.7	silty SAND to sandy SILT	120	3.0	58	82	35	85	42	-	-	15	2.06	16
38.22	225.3	158.3	213.7	225.4	5.2	4.3	2.3	silty SAND to sandy SILT	120	3.0	53	75	32	82	41	-	-	14	2.04	16
38.39	207.1	145.3	193.7	207.2	4.3	4.3	2.1	silty SAND to sandy SILT	120	3.0	48	69	29	79	41	-	-	14	2.02	16
38.55	195.2	136.8	180.3	195.3	3.7	4.3	1.9	silty SAND to sandy SILT	120	3.0	46	65	27	77	41	-	-	13	2.01	16
38.72	196.1	137.3	190.0	196.2	4.3	4.2	2.2	silty SAND to sandy SILT	120	3.0	46	65	28	77	41	-	-	15	2.06	16
38.88	201.4	140.8	190.4	201.5	4.2	4.1	2.1	silty SAND to sandy SILT	120	3.0	47	67	28	78	41	-	-	14	2.04	16
39.04	195.6	136.5	188.3	195.6	4.2	3.7	2.2	silty SAND to sandy SILT	120	3.0	46	65	27	77	41	-	-	14	2.06	16
39.21	202.8	141.4	193.5	202.8	4.4	3.8	2.2	silty SAND to sandy SILT	120	3.0	47	68	28	78	41	-	-	14	2.05	16
39.37	210.3	146.5	202.9	210.4	4.9	4.0	2.3	silty SAND to sandy SILT	120	3.0	49	70	29	80	41	-	-	15	2.06	16
39.54	224.0	155.8	211.2	224.1	5.1	4.1	2.3	silty SAND to sandy SILT	120	3.0	52	75	31	82	41	-	-	14	2.04	16
39.70	228.2	158.5	212.5	228.2	5.2	4.0	2.3	silty SAND to sandy SILT	120	3.0	53	76	31	82	41	-	-	14	2.03	16
39.86	219.8	152.5	207.0	219.9	5.0	3.9	2.3	silty SAND to sandy SILT	120	3.0	51	73	30	81	41	-	-	14	2.04	16
40.03	205.4	142.4	198.7	205.5	4.7	3.9	2.3	silty SAND to sandy SILT	120	3.0	47	68	29	79	41	-	-	15	2.07	16
40.19	190.0	131.6	189.0	190.1	4.4	3.8	2.3	silty SAND to sandy SILT	120	3.0	44	63	27	76	40	-	-	16	2.09	16
40.36	176.2	121.8	183.8	176.3	4.3	3.9	2.5	silty SAND to sandy SILT	120	3.0	41	59	25	74	40	-	-	17	2.13	16
40.52	167.5	115.7	179.6	167.5	4.1	3.8	2.5	silty SAND to sandy SILT	120	3.0	39	56	24	72	40	-	-	17	2.15	16
40.68	161.2	111.2	182.4	161.3	4.3	4.1	2.7	silty SAND to sandy SILT	120	3.0	37	54	24	70	39	-	-	19	2.19	16
40.85	157.1	108.2	189.3	157.1	4.7	4.0	3.0	silty SAND to sandy SILT	120	3.0	36	52	23	70	39	-	-	20	2.23	16
41.01	156.0	107.4	200.6	156.1	5.3	4.3	3.4	silty SAND to sandy SILT	120	3.0	36	52	24	69	39	-	-	22	2.27	16
41.18	150.5	103.4	210.9	150.6	5.8	4.2	3.9	silty SAND to sandy SILT	120	3.0	34	50	23	68	39	-	-	24	2.33	16
41.34	133.9	91.9	209.9	134.0	5.6	4.4	4.3	clayy SILT to silty CLAY	115	2.0	46	67	21	-	-	9.3	9.9	26	2.39	15
41.50	102.2	51.0	-	102.3	5.2	4.6	5.2	clayy SILT to silty CLAY	115	2.0	25	51	13	-	-	7.1	9.9	37	2.63	15
41.67	82.5	41.0	-	82.6	4.9	4.9	6.1	silty CLAY to CLAY	115	1.5	27	55	11	-	-	5.7	9.9	43	2.74	15
41.83	83.5	41.5	-	83.7	4.5	5.4	5.6	silty CLAY to CLAY	115	1.5	28	56	11	-	-	5.8	9.9	41	2.71	15
42.00	78.9	39.1	-	79.0	3.5	5.6	4.6	clayy SILT to silty CLAY	115	2.0	20	39	10	-	-	5.4	9.9	39	2.67	15
42.16	54.7	27.0	-	54.8	3.5	6.0	6.8	silty CLAY to CLAY	115	1.5	18	36	8	-	-	3.7	8.5	52	2.91	15
42.32	60.0	29.6	-	60.2	3.1	7.2	5.4	silty CLAY to CLAY	115	1.5	20	40	8	-	-	4.1	9.4	46	2.81	15
42.49	55.0	27.1	-	55.2	2.3	8.9	4.5	silty CLAY to CLAY	115	1.5	18	37	8	-	-	3.7	8.5	45	2.78	15
42.65	49.5	24.3	-	49.7	1.9	9.4	4.1	silty CLAY to CLAY	115	1.5	16	33	7	-	-	3.4	7.6	46	2.79	15
42.82	47.1	23.1	-	47.3	2.2	10.7	4.9	silty CLAY to CLAY	115	1.5	15	31	7	-	-	3.2	7.2	50	2.86	15
42.98	50.3	24.6	-	50.6	3.3	11.5	7.0	silty CLAY to CLAY	115	1.5	16	34	8	-	-	3.4	7.7	55	2.94	15
43.15	66.3	32.3	-	66.5	5.0	12.8	7.9	silty CLAY to CLAY	115	1.5	22	44	10	-	-	4.5	9.9	52	2.90	15
43.31	102.9	50.1	-	103.1	6.2	12.1	6.2	silty CLAY to CLAY	115	1.5	33	69	13	-	-	7.1	9.9	40	2.69	15
43.47	201.5	136.4	240.4	201.8	7.4	13.2	3.7	stiff SAND to clayy SAND	115	5.0	27	40	29	77	40	-	-	20	2.24	16
43.64	312.3	211.3	273.7	312.6	8.0	10.9	2.6	silty SAND to sandy SILT	120	3.0	70	100	41	92	43	-	-	13	2.00	16
43.80	348.7	235.6	294.5	348.9	8.7	10.6	2.5	clean SAND to silty SAND	125	5.0	47	70	46	95	43	-	-	12	1.96	16
43.97	363.3	245.1	303.4	363.5	9.0	8.9	2.5	clean SAND to silty SAND	125	5.0	49	73	47	95	43	-	-	12	1.95	16
44.13	387.7	261.3	319.4	387.9	9.7	8.9	2.5	stiff SAND to clayy SAND	115	5.0	52	78	50	95	44	-	-	11	1.93	16
44.29	405.8	273.2	327.5	406.0	9.8	9.2	2.4	clean SAND to silty SAND	125	5.0	55	81	52	95	44	-	-	11	1.91	16
44.46	405.8	272.9	325.5	406.0	9.6	9.5	2.4	clean SAND to silty SAND	125	5.0	55	81	52	95	44	-	-	10	1.90	16
44.62	411.6	276.4	331.0	411.8	10.0	9.2	2.4	clean SAND to silty SAND	125	5.0	55	82	52	95	44	-	-	11	1.91	16
44.79	425.8	285.6	342.7	426.0	10.6	9.8	2.5	stiff SAND to clayy SAND	115	5.0	57	85	54	95	44	-	-	11	1.91	16
44.95	430.9	288.7	350.8	431.1	11.2	9.9	2.6	stiff SAND to clayy SAND	115	5.0	58	86	55	95	44	-	-	11	1.93	16
45.11	421.8	282.3	343.7	422.0	10.9	10.1	2.6	stiff SAND to clayy SAND	115	5.0	56	84	54	95	44	-	-	11	1.93	16
45.28	394.5	263.8	322.7	394.7	9.9	10.0	2.5	stiff SAND to clayy SAND	115	5.0	53	79	51	95	44	-	-	11	1.93	16
45.44	351.1	234.6	296.0	351.3	9.0	9.3	2.6	stiff SAND to clayy SAND	115	5.0	47	70	46	95	43	-	-	12	1.97	16
45.61	321.5	214.5	265.5	321.6	7.3	9.3	2.3	clean SAND to silty SAND	125	5.0	43	64	41	92	43	-	-	12	1.95	16
45.77	290.0	193.3	259.8	290.2	7.7	8.9	2.7	silty SAND to sandy SILT	120	3.0	64	97	38	89	42	-	-	14	2.03	16
45.93	269.6	179.5	267.0	269.7	8.6	9.1	3.2	stiff SAND to clayy SAND	115	5.0	36	54	37	86	42	-	-	16	2.12	16
46.10	253.6	168.7	291.4	253.8	10.5	9.1	4.2	very stiff fine SOIL	120	1.0	100	100	36	-	-	8.9	9.9	20	2.22	30
46.26	278.2	184.8	296.3	278.3	10.6	9.8	3.9	stiff SAND to clayy SAND	115	5.0	37	56	39	87	42	-	-	18	2.17	16

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Geosphere Consultants, Inc. Page: 4
Data File: SDF(160).cpt Sounding ID: CPT-05
CPT Date: 6/2/2020 3:22:15 PM Project No: 91-04769
GW During Test: 25 ft Cone/Rig: DDG1496

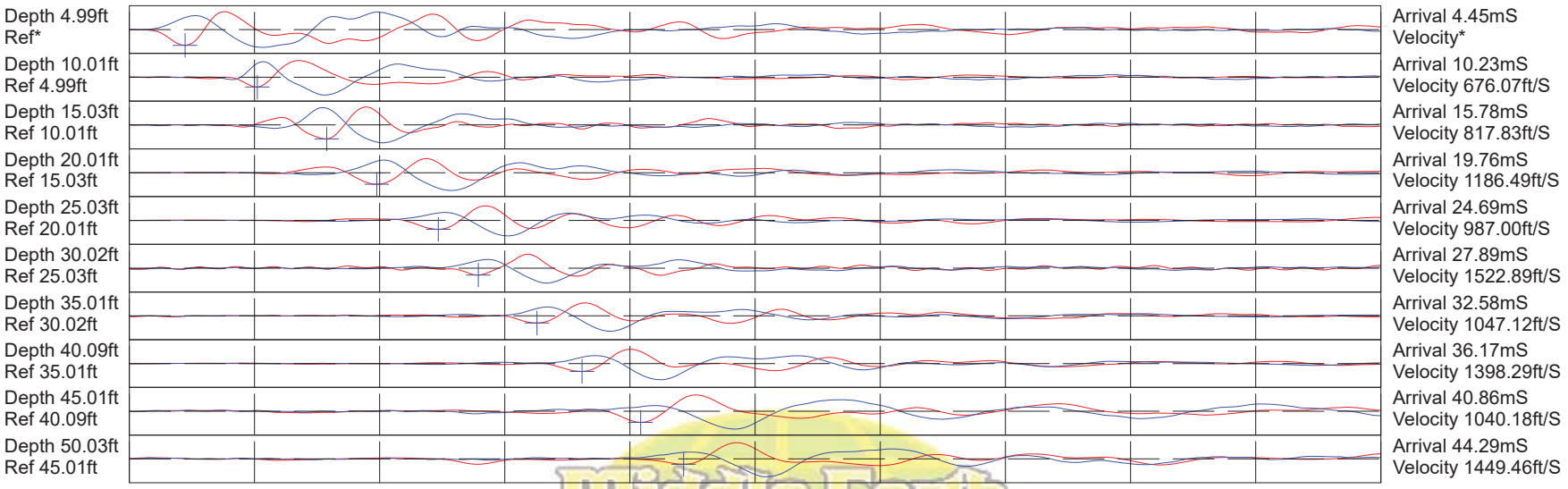
Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -
46.43	309.4	205.3	301.6	309.6	10.6	10.8	3.5	stiff SAND to clayy SAND	115	5.0	41	62	42	91	42	-	-	16	2.11	16
46.59	224.2	148.6	260.7	224.4	8.7	10.0	3.9	stiff SAND to clayy SAND	115	5.0	30	45	32	80	41	-	-	20	2.23	16
46.75	150.7	99.8	219.8	150.9	6.4	9.9	4.3	very stiff fine SOIL	120	1.0	100	100	23	-	-	5.2	9.9	25	2.37	30
46.92	91.6	42.5	-	91.7	4.6	9.8	5.2	silty CLAY to CLAY	115	1.5	28	61	11	-	-	6.3	9.9	39	2.68	15
47.08	64.2	29.7	-	64.4	3.4	12.7	5.5	silty CLAY to CLAY	115	1.5	20	43	8	-	-	4.4	9.4	47	2.81	15
47.25	57.7	26.7	-	58.0	2.9	15.9	5.3	silty CLAY to CLAY	115	1.5	18	38	8	-	-	3.9	8.4	48	2.84	15
47.41	66.5	30.7	-	66.9	3.1	18.5	4.9	silty CLAY to CLAY	115	1.5	20	44	9	-	-	4.5	9.7	44	2.77	15
47.57	65.0	29.9	-	65.5	4.6	21.2	7.4	silty CLAY to CLAY	115	1.5	20	43	9	-	-	4.4	9.4	52	2.90	15
47.74	77.7	35.7	-	78.2	6.4	24.1	8.6	silty CLAY to CLAY	115	1.5	24	52	11	-	-	5.3	9.9	52	2.90	15
47.90	138.3	63.4	-	138.8	9.0	29.4	6.6	very stiff fine SOIL	120	1.0	63	100	17	-	-	4.8	9.9	37	2.64	30
48.07	127.3	58.3	-	127.9	11.2	29.6	9.0	silty CLAY to CLAY	115	1.5	39	85	16	-	-	8.8	9.9	44	2.77	15
48.23	126.9	58.0	-	127.5	10.0	31.5	8.0	silty CLAY to CLAY	115	1.5	39	85	16	-	-	8.8	9.9	42	2.73	15
48.39	134.9	61.5	-	135.5	8.7	30.6	6.6	silty CLAY to CLAY	115	1.5	41	90	16	-	-	9.4	9.9	38	2.65	15
48.56	133.3	60.6	-	133.8	8.3	27.6	6.4	silty CLAY to CLAY	115	1.5	40	89	16	-	-	9.3	9.9	37	2.64	15
48.72	134.6	88.1	242.3	135.1	7.4	22.2	5.6	very stiff fine SOIL	120	1.0	88	100	21	-	-	4.7	9.9	31	2.50	30
48.89	197.8	129.3	244.4	198.2	7.9	20.4	4.1	very stiff fine SOIL	120	1.0	100	100	28	-	-	6.9	9.9	22	2.28	30

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

CPT-05

Geosphere Consultants, Inc.

Kaiser Fresno MOB



Hammer to Rod String Distance (ft): 5.83

* = Not Determined

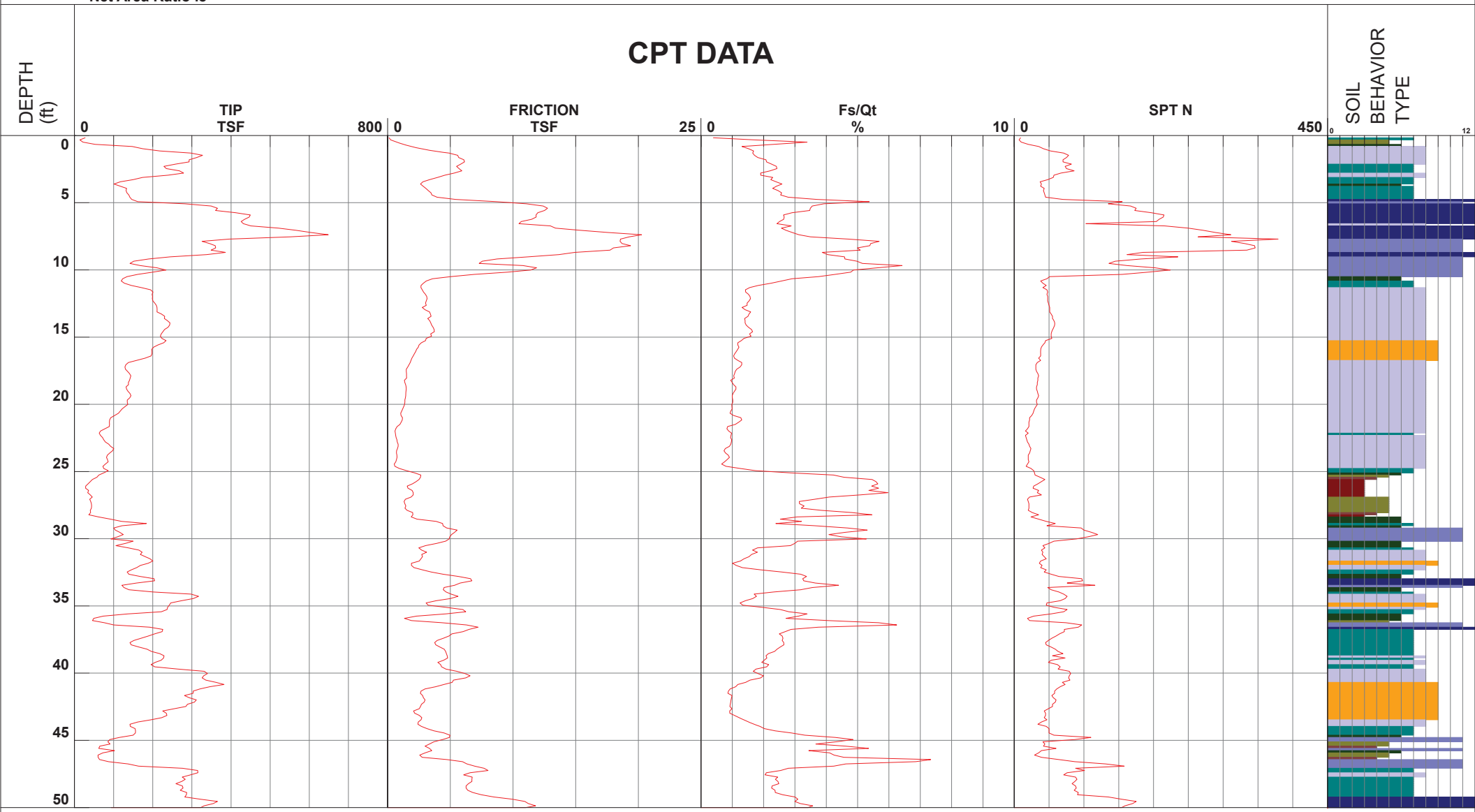
COMMENT:

Geosphere Consultants, Inc.

Project	Kaiser Fresno MOB	Operator	BH-GH	Filename	SDF(155).cpt
Job Number	91-04769	Cone Number	DDG1496	GPS	
Hole Number	CPT-06	Date and Time	6/2/2020 11:05:17 AM	Maximum Depth	50.69 ft
EST GW Depth During Test		25.10 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

S*Soil behavior type and SPT based on data from UBC-1983

Kaiser Fresno MOB

Project ID: Geosphere Consultants, Inc. Page: 1
Data File: SDF(155).cpt Sounding ID: CPT-06
CPT Date: 6/2/2020 11:05:17 AM Project No: 91-04769
GW During Test: 25 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -
0.33	14.1	22.6	70.9	14.1	0.2	0.0	1.7	clayy SILT to silty CLAY	115	2.0	11	7	6	-	-	1.0	9.9	34	2.57	15
0.49	21.5	34.6	-	21.5	0.7	0.1	3.4	clayy SILT to silty CLAY	115	2.0	17	11	9	-	-	1.5	9.9	36	2.61	15
0.66	52.7	84.6	143.5	52.7	1.2	0.2	2.3	silty SAND to sandy SILT	120	3.0	28	18	18	61	48	-	-	19	2.21	16
0.82	147.7	236.9	250.5	147.7	1.9	0.2	1.3	clean SAND to silty SAND	125	5.0	47	30	42	95	48	-	-	7	1.73	16
0.98	174.2	279.4	296.7	174.2	2.6	0.1	1.5	clean SAND to silty SAND	125	5.0	56	35	50	95	48	-	-	7	1.74	16
1.15	218.1	349.8	367.0	218.1	3.7	0.2	1.7	clean SAND to silty SAND	125	5.0	70	44	62	95	48	-	-	6	1.72	16
1.31	297.2	476.7	475.3	297.2	4.9	0.1	1.7	clean SAND to silty SAND	125	5.0	95	59	82	95	48	-	-	5	1.64	16
1.48	327.5	525.3	525.3	327.5	5.6	0.2	1.7	clean SAND to silty SAND	125	5.0	100	66	90	95	48	-	-	5	1.63	16
1.64	312.2	500.7	508.6	312.2	5.7	0.2	1.8	clean SAND to silty SAND	125	5.0	100	62	87	95	48	-	-	6	1.67	16
1.80	292.9	469.7	497.7	292.9	6.1	0.0	2.1	stiff SAND to clayy SAND	115	5.0	94	59	84	95	48	-	-	7	1.73	16
1.97	292.8	469.6	498.6	292.8	6.1	0.0	2.1	stiff SAND to clayy SAND	115	5.0	94	59	84	95	48	-	-	7	1.74	16
2.13	258.4	414.4	455.4	258.4	5.8	0.1	2.3	stiff SAND to clayy SAND	115	5.0	83	52	75	95	48	-	-	8	1.79	16
2.30	228.5	366.4	416.7	228.5	5.5	0.1	2.4	stiff SAND to clayy SAND	115	5.0	73	46	68	95	48	-	-	9	1.84	16
2.46	235.1	377.0	427.7	235.1	5.7	0.0	2.4	stiff SAND to clayy SAND	115	5.0	75	47	70	95	48	-	-	9	1.84	16
2.62	268.2	430.2	468.0	268.2	5.9	0.1	2.2	stiff SAND to clayy SAND	115	5.0	86	54	78	95	48	-	-	8	1.77	16
2.79	279.1	447.5	467.2	279.1	5.3	0.0	1.9	clean SAND to silty SAND	125	5.0	90	56	79	95	48	-	-	6	1.71	16
2.95	239.3	383.8	409.4	239.3	4.6	-0.4	1.9	clean SAND to silty SAND	125	5.0	77	48	69	95	48	-	-	7	1.74	16
3.12	174.1	279.2	327.6	174.1	4.0	-0.8	2.3	clean SAND to silty SAND	125	5.0	56	35	52	95	48	-	-	10	1.88	16
3.28	149.8	240.3	288.0	149.8	3.3	-0.9	2.2	clean SAND to silty SAND	125	5.0	48	30	46	95	48	-	-	11	1.91	16
3.45	117.4	188.2	244.2	117.4	2.8	-0.4	2.4	silty SAND to sandy SILT	120	3.0	63	39	37	88	48	-	-	13	2.00	16
3.61	101.1	162.2	225.7	101.1	2.6	-0.1	2.6	silty SAND to sandy SILT	120	3.0	54	34	33	83	48	-	-	15	2.06	16
3.77	117.5	188.5	244.9	117.5	2.8	0.1	2.4	silty SAND to sandy SILT	120	3.0	63	39	37	88	48	-	-	13	2.00	16
3.94	133.2	213.6	264.7	133.2	3.0	-0.2	2.3	clean SAND to silty SAND	125	5.0	43	27	41	92	48	-	-	12	1.95	16
4.10	131.7	211.3	268.7	131.8	3.2	0.3	2.5	silty SAND to sandy SILT	120	3.0	70	44	41	92	48	-	-	12	1.98	16
4.27	134.1	215.1	276.7	134.1	3.5	0.2	2.6	silty SAND to sandy SILT	120	3.0	72	45	42	92	48	-	-	13	1.99	16
4.43	138.8	222.6	282.8	138.8	3.5	-0.1	2.5	silty SAND to sandy SILT	120	3.0	74	46	43	93	48	-	-	12	1.98	16
4.59	141.6	227.1	296.4	141.6	3.9	-0.2	2.8	stiff SAND to clayy SAND	115	5.0	45	28	45	94	48	-	-	13	2.00	16
4.76	146.6	235.0	342.1	146.5	5.4	-0.8	3.7	stiff SAND to clayy SAND	115	5.0	47	29	48	95	48	-	-	16	2.10	16
4.92	161.7	259.3	444.5	161.7	8.7	-1.8	5.4	very stiff fine SOIL	120	1.0	100	100	56	-	-	5.7	9.9	20	2.22	30
5.09	281.9	452.1	581.4	281.9	11.1	0.7	3.9	stiff SAND to clayy SAND	115	5.0	90	56	88	95	48	-	-	13	1.99	16
5.25	349.3	560.2	672.7	349.4	12.4	2.8	3.6	stiff SAND to clayy SAND	115	5.0	100	70	100	95	48	-	-	11	1.91	16
5.41	365.3	585.9	695.6	365.5	12.8	6.8	3.5	stiff SAND to clayy SAND	115	5.0	100	73	100	95	48	-	-	10	1.90	16
5.58	360.6	578.4	686.4	360.7	12.5	2.3	3.5	stiff SAND to clayy SAND	115	5.0	100	72	100	95	48	-	-	10	1.90	16
5.74	412.0	660.7	733.6	412.2	12.0	13.3	2.9	stiff SAND to clayy SAND	115	5.0	100	82	100	95	48	-	-	8	1.81	16
5.91	449.3	720.6	773.0	449.4	11.8	2.9	2.6	stiff SAND to clayy SAND	115	5.0	100	90	100	95	48	-	-	7	1.75	16
6.07	446.3	715.8	769.8	446.3	11.8	-0.2	2.7	stiff SAND to clayy SAND	115	5.0	100	89	100	95	48	-	-	7	1.76	16
6.23	434.8	693.6	747.3	434.8	11.5	-1.4	2.6	stiff SAND to clayy SAND	115	5.0	100	87	100	95	48	-	-	7	1.76	16
6.40	425.7	670.7	715.2	425.7	10.7	-0.5	2.5	stiff SAND to clayy SAND	115	5.0	100	85	100	95	48	-	-	7	1.74	16
6.56	431.7	671.7	710.4	431.7	10.5	-0.2	2.4	stiff SAND to clayy SAND	115	5.0	100	86	100	95	48	-	-	7	1.73	16
6.73	450.8	693.1	764.0	450.8	13.0	1.4	2.9	stiff SAND to clayy SAND	115	5.0	100	90	100	95	48	-	-	8	1.79	16
6.89	521.5	792.5	837.0	521.6	13.4	4.3	2.6	stiff SAND to clayy SAND	115	5.0	100	100	100	95	48	-	-	7	1.73	16
7.05	565.4	849.4	904.3	565.5	15.3	6.7	2.7	stiff SAND to clayy SAND	115	5.0	100	100	100	95	48	-	-	7	1.74	16
7.22	603.7	897.0	968.8	603.9	17.6	9.1	2.9	stiff SAND to clayy SAND	115	5.0	100	100	100	95	48	-	-	7	1.76	16
7.38	648.5	953.1	1043.7	648.7	20.3	7.1	3.1	stiff SAND to clayy SAND	115	5.0	100	100	100	95	48	-	-	8	1.78	16
7.55	551.0	801.1	919.3	551.0	19.3	2.7	3.5	stiff SAND to clayy SAND	115	5.0	100	100	100	95	48	-	-	9	1.85	16
7.71	395.2	568.7	757.5	395.3	18.6	3.1	4.7	very stiff fine SOIL	120	1.0	100	100	100	-	-	13.9	9.9	14	2.02	30
7.87	325.9	464.0	704.3	326.1	18.5	5.7	5.7	very stiff fine SOIL	120	1.0	100	100	96	-	-	11.5	9.9	17	2.13	30
8.04	345.3	486.5	712.6	346.0	18.7	34.4	5.4	very stiff fine SOIL	120	1.0	100	100	100	-	-	12.2	9.9	16	2.11	30
8.20	359.6	501.4	728.2	360.5	19.4	48.2	5.4	very stiff fine SOIL	120	1.0	100	100	100	-	-	12.7	9.9	16	2.10	30
8.37	360.9	498.2	697.9	361.6	18.0	35.4	5.0	very stiff fine SOIL	120	1.0	100	100	100	-	-	12.7	9.9	15	2.07	30
8.53	349.2	477.3	680.0	349.2	17.7	2.1	5.1	very stiff fine SOIL	120	1.0	100	100	97	-	-	12.3	9.9	15	2.08	30
8.69	386.0	522.5	652.9	386.0	14.9	0.8	3.9	stiff SAND to clayy SAND	115	5.0	100	77	100	95	48	-	-	12	1.96	16
8.86	337.7	453.0	589.5	337.8	13.7	6.1	4.1	stiff SAND to clayy SAND	115	5.0	91	68	89	95	48	-	-	13	2.00	16
9.02	244.6	325.3	480.4	246.1	11.2	75.4	4.6	very stiff fine SOIL	120	1.0	100	100	67	-	-	8.6	9.9	16	2.11	30
9.19	189.9	250.2	398.0	190.0	8.7	4.6	4.6	very stiff fine SOIL	120	1.0	100	100	53	-	-	6.7	9.9	18	2.17	30
9.35	151.5	197.9	355.9	151.5	7.5	-2.2	5.0	very stiff fine SOIL	120	1.0	100	100	43	-	-	5.3	9.9	21	2.25	30
9.51	141.7	183.4	346.2	142.1	7.3	20.8	5.2	very stiff fine SOIL	120	1.0	100	100	40	-	-	5.0	9.9	22	2.28	30
9.68	168.2	215.8	439.2	169.0	10.8	41.3	6.4	very stiff fine SOIL	120	1.0	100	100	48	-	-	5.9	9.9	23	2.33	30
9.84	210.7	268.1	468.2	211.2	11.9	23.9	5.7	very stiff fine SOIL	120	1.0	100	100	58	-	-	7.4	9.9	20	2.23	30
10.01	234.1	295.4	461.8	234.1	11.4	-2.6	4.9	very stiff fine SOIL	120	1.0	100	100	62	-	-	8.3	9.9	18	2.15	30
10.17	200.1	250.4	406.9	200.9	9.6	39.7	4.8	very stiff fine SOIL	120	1.0	100	100	53	-	-	7.0	9.9	18	2.18	30
10.34	161.6	200.6	330.0	162.2	6.9	30.3	4.3	very stiff fine SOIL	120	1.0	100	100	43	-	-	5.7	9.9	19	2.19	30
10.50	134.4	165.5	272.0	134.3	5.0	-3.3	3.8	stiff SAND to clayy SAND	115	5.0	33	27	35	84	44	-	-	19	2.19	16
10.66	123.2	150.5	226.2	123.1	3.6	-3.8	2.9	silty SAND to sandy SILT	120	3.0	50	41	31	80	44	-	-	17	2.13	16
10.83	119.6	145.0	209.5	119.5	3.1	-2.5	2.6	silty SAND to sandy SILT	120	3.0	48	40	30	79	44	-	-	16	2.09	16
10.99	127.4	153.3	205.9	127.3	2.8	-2.4	2.2	silty SAND to sandy SILT	120	3.0	51	42	30	81	44	-	-	14	2.03	16
11.16	145.4	173.7	211.4	145.3	2.7	-2.4	1.8	clean SAND to silty SAND	125	5.0	35	29	33	85	44	-	-	11	1.93	16
11.32	170.6	202.3	228.8	170.6	2.7	-1.9	1.6	clean SAND to silty SAND	125	5.0	40	34	37	90	45	-	-	9	1.83	16
11.48	194.6	228.9	248.0	194.6	2.8	-1.8	1.4	clean SAND to silty SAND	125	5.0	46	39	41	94	46	-	-	7	1.77	16
11.65	200.8	234.5	253.1	200.8	2.9	-1.9	1.4	clean SAND to silty SAND	125	5.0	47	40	42	95	46	-	-	7	1.76	16
11.81	198.3	229.9	252.5	198.3	3.0	-1.7	1.5	clean SAND to silty SAND	125	5.0	46	40	42	94	46	-	-	8	1.79	16
11.98	199.6	229.7	254.1	199.6	3.1	-1.8	1.6	clean SAND to silty SAND	125	5.0	46	40	42	94	46	-	-	8	1.80	16
12.14	199.0	227.3	252.5	198.9	3.1	-1.5	1.6	clean SAND to silty SAND	125	5.0	45	40	42	94	46	-	-	8	1.81	16
12.30	200.3	227.3	250.9	200.4	3.1	1.2	1.5	clean SAND to silty SAND	125	5.0	45	40	41	94	45	-	-	8	1.80	16
12.47	205.2	231.2	252.0	205.2	3.0	0.6	1.5	clean SAND to silty SAND	125	5.0	46	41	42	95	46	-	-	8	1.78	16
12.63	209.4	234.3	254.9	209.4	3.1	0.5	1.5	clean SAND to silty SAND	125	5.0	47	42	42	95	46	-	-	8	1.77	16
12.80	210.9	234.4	248.6	210.9	2.8	0.3	1.3	clean SAND to silty SAND	125	5.0	47	42	42	95	46	-	-	7	1.73	16
12.96	211.3	233.2	251.5	211.3	3.0	0.3	1.4	clean SAND to silty SAND	125	5.0	47	42	42	95	45	-	-	7	1.76	16
13.12	210.9	231.3	256.3	210.9	3.3	0.6	1.6	clean SAND to silty SAND	125	5.0	46	42	42	95	45	-	-	8	1.80	16
13.29	222.3	242.3	264.4	222.3	3.4	-1.7	1.5	clean SAND to silty SAND	125	5.0	48	44	44	95	46	-	-	8	1.78	16
13.45	230.6	249.7	269.8	230.6	3.5	0.0	1.5	clean SAND to silty SAND	125	5.0	50	46	45	95	46	-	-	7	1.76	16
13.62	229.7	247.1	263.3	229.7	3.2	-1.5	1.4	clean SAND to silty SAND	125	5.0	49	46	44	95	46	-	-	7	1.74	16
13.78	237.6	254.0	269.9	237.5	3.3	-1.4	1.4	clean SAND to silty SAND	125	5.0	51	48	45	95	46	-	-	7	1.74	16
13.94	244.0	259.2	274.5	243.9	3.4	-1.2	1.4	clean SAND to silty SAND	125	5.0	52	49	46	95	46	-	-	7	1.73	16
14.11	243.2	256.9	273.8	243.2	3.5	-1.0	1.4	clean SAND to silty SAND	125	5.0	51	49	46	95	46	-	-	7	1.74	16
14.27	239.0	250.9	271.5	238.9	3.6	-0.9	1.5	clean SAND to silty SAND	125	5.0	50	48	45	95	46	-	-	7	1.77	16
14.44	230.2	240.3	265.4	230.2	3.7	-1.2	1.6	clean SAND to silty SAND	125	5.0	48	46	44	95	45	-	-	8	1.80	16
14.60	226.2	234.6	261.6	226.1	3.7	-1.1	1.7	clean SAND to silty SAND	125	5.0	47	45	43	95	45	-	-	8	1.81	16
14.76	221.9	228.8	252.7	221.8	3.4	-1.2	1.6	clean SAND to silty SAND	125	5.0	46	44	42	94	45	-	-	8	1.80	16
14.93	219.4	225.0	251.0	219.4	3.5	-1.2	1.6	clean SAND to silty SAND	125	5.0	45	44	41	94	45	-	-	8	1.81	16
15.09	223.6	228.0	245.6	223.6	3.1	-1.1	1.4	clean SAND to silty SAND	125	5.0	46	45	41	94	45	-	-	7	1.76	16
15.26	234.1	237.4	250.3	234.1	3.0	-0.9	1.3	clean SAND to silty SAND	125	5.0	47	47	42	95	45	-	-	7	1.72	16
15.42	228.1	230.1	239.4	228.2	2.7	0.3	1.2	clean SAND to silty SAND	125	5.0	46	46	41	95	45	-	-	6	1.70	16

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Geosphere Consultants, Inc. Page: 2
Data File: SDF(155).cpt Sounding ID: CPT-06
CPT Date: 6/2/2020 11:05:17 AM Project No: 91-04769
GW During Test: 25 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT	Nk -
15.58	213.2	213.8	225.4	213.2	2.5	-0.8	1.2	clean SAND to silty SAND	125	5.0	43	43	38	92	45	-	-	7	1.72	16
15.75	202.1	201.6	216.1	202.1	2.4	-0.6	1.2	clean SAND to silty SAND	125	5.0	40	40	36	90	44	-	-	7	1.75	16
15.91	197.3	195.8	209.7	197.3	2.3	-0.7	1.2	clean SAND to silty SAND	125	5.0	39	39	35	89	44	-	-	7	1.75	16
16.08	198.2	195.5	207.8	198.1	2.2	-0.5	1.1	clean SAND to silty SAND	125	5.0	39	40	35	89	44	-	-	7	1.74	16
16.24	198.0	194.4	204.9	198.0	2.1	-0.7	1.1	clean SAND to silty SAND	125	5.0	39	40	35	89	44	-	-	7	1.72	16
16.40	195.8	191.2	200.9	195.8	2.0	-0.9	1.0	clean SAND to silty SAND	125	5.0	38	39	34	88	44	-	-	6	1.72	16
16.57	180.5	175.4	188.4	180.5	1.9	-1.0	1.1	clean SAND to silty SAND	125	5.0	35	36	31	86	44	-	-	7	1.75	16
16.73	158.6	153.3	172.3	158.5	1.9	-1.0	1.2	clean SAND to silty SAND	125	5.0	31	32	28	81	43	-	-	9	1.82	16
16.90	138.0	132.7	157.9	138.0	1.8	-1.2	1.3	clean SAND to silty SAND	125	5.0	27	28	25	76	42	-	-	10	1.90	16
17.06	131.2	125.5	151.4	131.2	1.7	-1.3	1.3	clean SAND to silty SAND	125	5.0	25	26	24	75	42	-	-	11	1.92	16
17.23	129.1	122.9	147.5	129.1	1.6	-1.2	1.3	clean SAND to silty SAND	125	5.0	25	26	23	74	42	-	-	11	1.91	16
17.39	130.6	123.7	145.2	130.6	1.5	-1.2	1.1	clean SAND to silty SAND	125	5.0	25	26	23	74	42	-	-	10	1.88	16
17.55	135.5	127.8	147.4	135.5	1.5	-1.3	1.1	clean SAND to silty SAND	125	5.0	26	27	24	75	42	-	-	9	1.86	16
17.72	140.7	132.0	150.6	140.7	1.5	-1.3	1.1	clean SAND to silty SAND	125	5.0	26	28	24	76	42	-	-	9	1.84	16
17.88	144.2	134.7	152.0	144.1	1.5	-1.2	1.1	clean SAND to silty SAND	125	5.0	27	29	25	77	42	-	-	9	1.83	16
18.05	142.5	132.5	150.7	142.5	1.5	-1.1	1.1	clean SAND to silty SAND	125	5.0	27	29	25	76	42	-	-	9	1.84	16
18.21	140.8	130.3	145.4	140.8	1.3	-1.1	1.0	clean SAND to silty SAND	125	5.0	26	28	24	76	42	-	-	8	1.81	16
18.37	138.0	127.1	144.1	138.0	1.4	-1.2	1.0	clean SAND to silty SAND	125	5.0	25	28	23	75	42	-	-	9	1.84	16
18.54	138.2	126.7	144.9	138.2	1.4	-1.2	1.0	clean SAND to silty SAND	125	5.0	25	28	24	75	42	-	-	9	1.85	16
18.70	131.9	120.4	141.6	131.9	1.5	-0.8	1.1	clean SAND to silty SAND	125	5.0	24	26	23	73	41	-	-	10	1.89	16
18.87	133.3	121.1	142.2	133.3	1.5	-1.1	1.1	clean SAND to silty SAND	125	5.0	24	27	23	73	41	-	-	10	1.88	16
19.03	136.7	123.6	143.0	136.7	1.5	-0.9	1.1	clean SAND to silty SAND	125	5.0	25	27	23	74	41	-	-	10	1.86	16
19.19	141.6	127.5	145.2	141.6	1.4	-0.9	1.0	clean SAND to silty SAND	125	5.0	26	28	24	75	42	-	-	9	1.84	16
19.36	144.3	129.4	146.1	144.3	1.4	-1.1	1.0	clean SAND to silty SAND	125	5.0	26	29	24	76	42	-	-	9	1.83	16
19.52	141.3	126.1	143.3	141.3	1.4	-1.1	1.0	clean SAND to silty SAND	125	5.0	25	28	23	75	41	-	-	9	1.84	16
19.69	135.0	120.0	138.4	134.9	1.4	-0.8	1.0	clean SAND to silty SAND	125	5.0	24	27	22	73	41	-	-	9	1.86	16
19.85	135.0	119.5	137.9	135.0	1.4	-1.0	1.0	clean SAND to silty SAND	125	5.0	24	27	22	73	41	-	-	9	1.86	16
20.01	136.4	120.2	137.7	136.4	1.3	-1.0	1.0	clean SAND to silty SAND	125	5.0	24	27	22	73	41	-	-	9	1.85	16
20.18	129.0	113.2	131.7	129.0	1.3	-1.0	1.0	clean SAND to silty SAND	125	5.0	23	26	21	71	41	-	-	10	1.87	16
20.34	121.8	106.4	125.9	121.7	1.2	-1.1	1.0	clean SAND to silty SAND	125	5.0	21	24	20	69	40	-	-	10	1.89	16
20.51	117.0	101.9	120.8	117.0	1.1	-0.9	1.0	clean SAND to silty SAND	125	5.0	20	23	19	68	40	-	-	10	1.90	16
20.67	112.6	97.6	116.4	112.5	1.0	-0.9	0.9	clean SAND to silty SAND	125	5.0	20	23	18	66	40	-	-	11	1.90	16
20.83	102.6	88.6	111.9	102.6	1.1	-1.0	1.1	clean SAND to silty SAND	125	5.0	18	21	17	63	39	-	-	12	1.97	16
21.00	92.6	79.6	110.7	92.6	1.2	-0.9	1.3	silty SAND to sandy SILT	120	3.0	27	31	16	59	39	-	-	15	2.06	16
21.16	89.8	76.9	109.1	89.8	1.2	-0.9	1.3	silty SAND to sandy SILT	120	3.0	26	30	16	58	39	-	-	15	2.08	16
21.33	89.5	76.3	105.9	89.4	1.1	-0.9	1.2	silty SAND to sandy SILT	120	3.0	25	30	15	58	38	-	-	15	2.06	16
21.49	89.7	76.3	102.9	89.7	1.0	0.0	1.1	clean SAND to silty SAND	125	5.0	15	18	15	58	38	-	-	14	2.04	16
21.65	88.8	75.2	95.4	88.8	0.8	-0.5	0.9	clean SAND to silty SAND	125	5.0	15	18	15	58	38	-	-	12	1.97	16
21.82	78.0	65.8	86.9	78.0	0.6	-0.9	0.8	clean SAND to silty SAND	125	5.0	13	16	13	53	38	-	-	13	2.02	16
21.98	66.9	56.2	80.8	66.9	0.6	-1.3	0.9	silty SAND to sandy SILT	120	3.0	19	22	11	48	37	-	-	16	2.09	16
22.15	63.3	53.0	80.8	63.2	0.6	-0.8	1.0	silty SAND to sandy SILT	120	3.0	18	21	11	46	36	-	-	17	2.14	16
22.31	66.6	55.6	82.4	66.6	0.6	-0.7	1.0	silty SAND to sandy SILT	120	3.0	19	22	11	48	36	-	-	16	2.11	16
22.47	71.8	59.7	85.3	71.8	0.7	-0.8	1.0	silty SAND to sandy SILT	120	3.0	20	24	12	50	37	-	-	15	2.09	16
22.64	74.9	62.0	88.0	74.8	0.7	-0.7	1.0	silty SAND to sandy SILT	120	3.0	21	25	13	51	37	-	-	15	2.08	16
22.80	79.1	65.3	90.4	79.1	0.8	-0.7	1.0	silty SAND to sandy SILT	120	3.0	22	26	13	53	37	-	-	15	2.06	16
22.97	87.4	71.9	95.3	87.4	0.8	-0.7	1.0	clean SAND to silty SAND	125	5.0	14	17	14	56	38	-	-	13	2.02	16
23.13	92.6	75.8	97.4	92.6	0.8	-0.8	0.9	clean SAND to silty SAND	125	5.0	15	19	15	58	38	-	-	13	1.99	16
23.30	100.7	82.2	99.3	100.7	0.8	-0.5	0.8	clean SAND to silty SAND	125	5.0	16	20	16	61	39	-	-	11	1.92	16
23.46	97.2	79.1	95.5	97.2	0.7	-0.5	0.7	clean SAND to silty SAND	125	5.0	16	19	15	59	38	-	-	11	1.92	16
23.62	90.1	73.0	91.7	90.1	0.7	-0.7	0.8	clean SAND to silty SAND	125	5.0	15	18	14	57	38	-	-	12	1.96	16
23.79	84.2	68.0	89.9	84.2	0.7	-0.6	0.9	clean SAND to silty SAND	125	5.0	14	17	13	54	37	-	-	13	2.02	16
23.95	81.9	65.9	89.4	81.9	0.7	-0.6	0.9	clean SAND to silty SAND	125	5.0	13	16	13	53	37	-	-	14	2.04	16
24.12	84.5	67.7	88.7	84.5	0.7	-0.6	0.8	clean SAND to silty SAND	125	5.0	14	17	13	54	37	-	-	13	2.01	16
24.28	86.3	69.0	87.6	86.3	0.6	-0.6	0.8	clean SAND to silty SAND	125	5.0	14	17	13	55	37	-	-	12	1.98	16
24.44	79.2	63.1	80.2	79.2	0.5	-0.8	0.7	clean SAND to silty SAND	125	5.0	13	16	12	52	37	-	-	12	1.98	16
24.61	72.7	57.7	79.7	72.7	0.6	-0.8	0.8	clean SAND to silty SAND	125	5.0	12	15	12	49	36	-	-	15	2.06	16
24.77	75.0	59.3	93.2	74.9	0.9	-0.9	1.3	silty SAND to sandy SILT	120	3.0	20	25	12	50	37	-	-	18	2.16	16
24.94	86.7	68.3	114.5	86.7	1.5	-0.2	1.8	silty SAND to sandy SILT	120	3.0	23	29	15	54	37	-	-	19	2.20	16
25.10	74.9	59.0	136.7	74.9	2.2	-0.2	2.9	clayy SILT to silty CLAY	115	2.0	29	37	14	-	-	5.2	9.9	26	2.40	15
25.26	62.5	40.9	-	62.5	2.6	0.6	4.3	clayy SILT to silty CLAY	115	2.0	20	31	11	-	-	4.3	9.9	37	2.63	15
25.43	57.3	37.4	-	57.3	2.6	1.4	4.7	silty CLAY to CLAY	115	1.5	25	38	10	-	-	3.9	9.9	40	2.69	15
25.59	45.8	29.8	-	45.8	2.5	1.5	5.7	silty CLAY to CLAY	115	1.5	20	31	9	-	-	3.1	9.5	47	2.82	15
25.76	40.6	26.4	-	40.7	2.3	3.3	5.8	silty CLAY to CLAY	115	1.5	18	27	8	-	-	2.8	8.4	50	2.86	15
25.92	35.0	22.7	-	35.1	2.0	3.8	5.9	silty CLAY to CLAY	115	1.5	15	23	7	-	-	2.4	7.1	53	2.92	15
26.08	28.7	18.5	-	28.8	1.6	3.8	5.8	silty CLAY to CLAY	115	1.5	12	19	6	-	-	1.9	5.8	57	2.98	15
26.25	28.5	18.3	-	28.6	1.6	3.7	6.0	silty CLAY to CLAY	115	1.5	12	19	6	-	-	1.9	5.7	58	3.00	15
26.41	36.5	23.4	-	36.5	2.0	2.8	5.6	silty CLAY to CLAY	115	1.5	16	24	7	-	-	2.5	7.4	52	2.89	15
26.58	34.1	21.8	-	34.2	2.0	3.1	6.3	silty CLAY to CLAY	115	1.5	15	23	7	-	-	2.3	6.9	55	2.95	15
26.74	40.3	25.7	-	40.4	2.0	4.7	5.3	silty CLAY to CLAY	115	1.5	17	27	7	-	-	2.7	8.2	49	2.84	15
26.90	45.7	29.1	-	45.8	1.9	4.8	4.2	silty CLAY to CLAY	115	1.5	19	30	8	-	-	3.1	9.3	43	2.74	15
27.07	39.1	24.8	-	39.2	1.4	5.0	3.8	clayy SILT to silty CLAY	115	2.0	12	20	7	-	-	2.6	7.8	44	2.76	15
27.23	41.7	26.4	-	41.8	1.3	6.1	3.3	clayy SILT to silty CLAY	115	2.0	13	21	7	-	-	2.8	8.4	40	2.70	15
27.40	43.5	27.5	-	43.6	1.4	8.4	3.3	clayy SILT to silty CLAY	115	2.0	14	22	7	-	-	3.0	8.7	40	2.68	15
27.56	44.1	27.8	-	44.3	1.5	9.0	3.4	clayy SILT to silty CLAY	115	2.0	14	22	7	-	-	3.0	8.8	40	2.69	15
27.72	43.2	27.1	-	43.4	1.4	10.6	3.3	clayy SILT to silty CLAY	115	2.0	14	22	7	-	-	2.9	8.6	40	2.69	15
27.89	40.6	25.4	-	40.8	1.6	11.4	4.0	silty CLAY to CLAY	115	1.5	17	27	7	-	-	2.8	8.0	44	2.77	15
28.05	41.3	25.8	-	41.5	2.0	12.0	5.0	silty CLAY to CLAY	115	1.5	17	28	7	-	-	2.8	8.2	48	2.83	15
28.22	36.9	23.0	-	37.1	2.0	8.4	5.7	silty CLAY to CLAY	115	1.5	15	25	7	-	-	2.5	7.2	52	2.91	15
28.38	61.3	46.9	129.2	61.5	1.9	10.8	3.2	clayy SILT to silty CLAY	115	2.0	23	31	11	-	-	4.2	9.9	31	2.50	15
28.54	92.4	70.6	139.0	92.4	2.3	0.8	2.6	silty SAND to sandy SILT	120	3.0	24	31	16	56	37	-	-	23	2.31	16
28.71	120.6	92.1	179.2	120.7	3.9	1.0	3.3	silty SAND to sandy SILT	120	3.0	31	40	20	64	39	-	-	22	2.30	16
28.87	183.7	140.1	199.1	183.8	4.4	1.1	2.4	silty SAND to sandy SILT	120	3.0	47	61	28	78	41	-	-	15	2.08	16
29.04	121.5	92.5	192.7	121.5	4.4	0.8	3.7	clayy SILT to silty CLAY	115	2.0	46	61	21	-	-	8.5	9.9	24	2.34	15
29.20	100.6	76.5	203.4	100.8	4.7	5.9	4.8	clayy SILT to silty CLAY	115	2.0	38	50	18	-	-	7.0	9.9	30	2.48	15
29.36	104.4	79.3	223.7	104.9	5.5	24.5	5.4	very stiff fine SOIL	120	1.0	79	100	19	-	-	3.6	9.9	31	2.51	30
29.53	115.9	87.9	215.6	116.0	5.3	3.8	4.7	clayy SILT to silty CLAY	115	2.0	44	58	21	-	-	8.1	9.9	28	2.43	15
29.69	124.8	94.5	208.2	124.9	5.1	3.7	4.1	clayy SILT to silty CLAY	115	2.0	47	62	22	-	-	8.7	9.9	25	2.37	15
29.86	110.7	83.7	207.2	110.7	5.0	4.0	4.6	clayy SILT to silty CLAY	115	2.0	42	55	20	-	-	7.7	9.9	28	2.44	15
30.02	93.1	56.3	-	93.3	4.9	11.3	5.4	clayy SILT to silty CLAY	115	2.0	28	47	14	-	-	6.5	9.9	36	2.61	15
30.19	149.8	113.0	196.3	150.1	4.6	16.9	3.1	silty SAND to sandy SILT	120	3.0	38	50	24	71	40	-	-	20	2.23	16
30.35	130.5	98.3	179.1	130.6	3.9	4.3	3.0	silty SAND to sandy SILT	120	3.0	33	43	21	66	39	-	-	21	2.26	16
30.51	105.8	79.5	156.7	105.8	3.0	2.7	2.9	silty SAND to sandy SILT	120	3.0	27	35	18	59	38	-	-	23	2.31	16
30.68	137.6	103.4	147.0	137.7	2.5	2.7	1.8	silty SAND to sandy SILT	120	3.0	34	46	21	68	39	-	-	15	2.08	16
30.84	164.6	123.4	160.2	164.6	2.7	2.5	1.7	clean SAND to silty SAND	125	5.0	25	33	24	74	40	-	-	13	2.00	16

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Geosphere Consultants, Inc. Page: 3
Data File: SDF(155).cpt Sounding ID: CPT-06
CPT Date: 6/2/2020 11:05:17 AM Project No: 91-04769
GW During Test: 25 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -
31.01	172.9	129.5	170.3	172.9	3.1	2.6	1.8	silty SAND to sandy SILT	120	3.0	43	58	26	76	41	-	-	13	2.01	16
31.17	168.5	126.0	161.4	168.5	2.7	3.1	1.6	clean SAND to silty SAND	125	5.0	25	34	25	75	41	-	-	13	1.99	16
31.33	181.0	135.2	167.3	181.1	2.8	2.8	1.6	clean SAND to silty SAND	125	5.0	27	36	26	77	41	-	-	12	1.95	16
31.50	193.1	144.0	170.3	193.1	2.7	2.8	1.4	clean SAND to silty SAND	125	5.0	29	39	27	79	41	-	-	10	1.89	16
31.66	200.5	149.2	171.5	200.5	2.5	2.6	1.3	clean SAND to silty SAND	125	5.0	30	40	28	80	41	-	-	9	1.86	16
31.83	188.4	140.0	155.8	188.4	1.9	2.4	1.0	clean SAND to silty SAND	125	5.0	28	38	26	78	41	-	-	8	1.81	16
31.99	168.7	125.2	146.2	168.8	1.9	2.2	1.1	clean SAND to silty SAND	125	5.0	25	34	23	74	40	-	-	10	1.88	16
32.15	159.1	117.9	145.5	159.2	2.1	2.0	1.3	clean SAND to silty SAND	125	5.0	24	32	23	72	40	-	-	11	1.94	16
32.32	145.2	107.4	154.1	145.3	2.8	2.6	1.9	silty SAND to sandy SILT	120	3.0	36	48	22	69	40	-	-	15	2.09	16
32.48	134.8	99.6	167.4	134.9	3.5	2.6	2.6	silty SAND to sandy SILT	120	3.0	33	45	21	67	39	-	-	19	2.21	16
32.65	139.0	102.6	189.3	139.0	4.4	3.0	3.2	silty SAND to sandy SILT	120	3.0	34	46	22	68	39	-	-	21	2.27	16
32.81	168.0	123.8	216.5	168.1	5.7	3.5	3.4	silty SAND to sandy SILT	120	3.0	41	56	27	74	40	-	-	20	2.23	16
32.97	203.5	149.7	238.4	203.5	6.6	4.0	3.3	silty SAND to sandy SILT	120	3.0	50	68	31	80	41	-	-	18	2.17	16
33.14	204.6	150.4	240.3	204.7	6.7	4.2	3.3	silty SAND to sandy SILT	120	3.0	50	68	32	80	41	-	-	18	2.17	16
33.30	158.3	116.2	218.2	158.4	5.8	3.6	3.7	silty SAND to sandy SILT	120	3.0	39	53	26	72	40	-	-	22	2.28	16
33.47	121.4	89.0	211.2	121.4	5.3	3.1	4.5	clayy SILT to silty CLAY	115	2.0	44	61	21	-	-	8.5	9.9	27	2.42	15
33.63	126.5	92.6	190.7	126.6	4.5	3.9	3.6	silty SAND to sandy SILT	120	3.0	31	42	21	64	39	-	-	24	2.33	16
33.79	139.3	101.9	188.6	139.4	4.4	4.5	3.2	silty SAND to sandy SILT	120	3.0	34	46	22	68	39	-	-	21	2.27	16
33.96	201.2	146.9	203.2	201.3	4.7	5.4	2.3	silty SAND to sandy SILT	120	3.0	49	67	30	80	41	-	-	15	2.06	16
34.12	297.9	217.2	247.8	298.0	5.1	5.3	1.7	clean SAND to silty SAND	125	5.0	43	60	40	93	43	-	-	9	1.84	16
34.29	316.9	230.7	262.9	317.0	5.6	5.6	1.8	clean SAND to silty SAND	125	5.0	46	63	43	95	43	-	-	9	1.84	16
34.45	303.5	220.6	249.1	303.6	5.0	4.7	1.7	clean SAND to silty SAND	125	5.0	44	61	41	93	43	-	-	9	1.83	16
34.61	273.6	198.6	221.1	273.7	3.9	4.0	1.4	clean SAND to silty SAND	125	5.0	40	55	36	90	43	-	-	8	1.81	16
34.78	246.2	178.4	197.3	246.2	3.1	3.4	1.3	clean SAND to silty SAND	125	5.0	36	49	33	86	42	-	-	8	1.80	16
34.94	242.4	175.5	197.4	242.5	3.2	3.2	1.3	clean SAND to silty SAND	125	5.0	35	48	32	86	42	-	-	9	1.82	16
35.11	238.1	172.1	214.3	238.2	4.6	3.2	2.0	clean SAND to silty SAND	125	5.0	34	48	33	85	42	-	-	12	1.95	16
35.27	236.7	170.8	233.4	236.7	6.0	3.5	2.6	silty SAND to sandy SILT	120	3.0	57	79	34	85	42	-	-	14	2.05	16
35.43	222.0	160.0	232.8	222.1	6.2	4.1	2.8	silty SAND to sandy SILT	120	3.0	53	74	33	83	42	-	-	16	2.10	16
35.60	137.1	98.7	191.9	137.2	4.6	4.6	3.4	silty SAND to sandy SILT	120	3.0	33	46	22	67	39	-	-	22	2.30	16
35.76	73.6	52.9	137.5	73.7	2.3	3.8	3.2	clayy SILT to silty CLAY	115	2.0	26	37	13	-	-	5.1	9.9	29	2.46	15
35.93	49.4	27.0	-	49.6	1.3	8.8	2.8	clayy SILT to silty CLAY	115	2.0	14	25	7	-	-	3.4	8.5	38	2.65	15
36.09	46.5	25.4	-	46.9	1.9	20.0	4.3	silty CLAY to CLAY	115	1.5	17	31	7	-	-	3.2	8.0	45	2.79	15
36.26	76.4	41.6	-	76.9	4.3	25.8	5.8	silty CLAY to CLAY	115	1.5	28	51	11	-	-	5.3	9.9	42	2.72	15
36.42	100.7	54.7	-	101.7	6.3	49.3	6.4	silty CLAY to CLAY	115	1.5	36	67	14	-	-	7.0	9.9	39	2.67	15
36.58	192.2	137.4	243.8	192.8	7.2	31.9	3.8	stiff SAND to clayy SAND	115	5.0	27	38	30	77	41	-	-	20	2.24	16
36.75	225.6	161.1	236.3	225.8	6.5	10.1	2.9	silty SAND to sandy SILT	120	3.0	54	75	33	83	42	-	-	16	2.11	16
36.91	224.0	159.7	228.2	224.1	6.0	8.6	2.7	silty SAND to sandy SILT	120	3.0	53	75	32	82	42	-	-	15	2.09	16
37.08	205.0	146.0	208.7	205.1	5.1	6.5	2.5	silty SAND to sandy SILT	120	3.0	49	68	30	79	41	-	-	15	2.09	16
37.24	188.8	134.3	200.8	189.0	4.9	5.9	2.6	silty SAND to sandy SILT	120	3.0	45	63	28	77	41	-	-	16	2.12	16
37.40	170.2	120.9	188.9	170.3	4.5	4.7	2.7	silty SAND to sandy SILT	120	3.0	40	57	25	73	40	-	-	18	2.15	16
37.57	152.0	107.8	175.9	152.1	3.9	3.9	2.6	silty SAND to sandy SILT	120	3.0	36	51	23	69	39	-	-	19	2.19	16
37.73	142.0	100.6	170.8	142.1	3.8	3.5	2.7	silty SAND to sandy SILT	120	3.0	34	47	22	67	39	-	-	19	2.21	16
37.90	145.1	102.7	172.8	145.1	3.8	3.4	2.7	silty SAND to sandy SILT	120	3.0	34	48	22	68	39	-	-	19	2.21	16
38.06	165.1	116.7	182.1	165.2	4.2	3.6	2.6	silty SAND to sandy SILT	120	3.0	39	55	24	72	40	-	-	17	2.15	16
38.22	185.5	131.0	192.2	185.6	4.5	4.0	2.5	silty SAND to sandy SILT	120	3.0	44	62	27	76	40	-	-	16	2.11	16
38.39	196.8	138.7	196.8	196.8	4.6	4.3	2.4	silty SAND to sandy SILT	120	3.0	46	66	28	78	41	-	-	15	2.08	16
38.55	218.0	153.5	203.9	218.1	4.7	4.7	2.2	silty SAND to sandy SILT	120	3.0	51	73	30	81	41	-	-	14	2.02	16
38.72	228.8	160.9	208.3	228.9	4.7	4.7	2.1	silty SAND to sandy SILT	120	3.0	54	76	32	83	41	-	-	13	2.00	16
38.88	227.9	160.1	208.4	228.0	4.8	5.1	2.1	silty SAND to sandy SILT	120	3.0	53	76	31	83	41	-	-	13	2.00	16
39.04	221.5	155.4	201.3	221.6	4.5	5.1	2.0	silty SAND to sandy SILT	120	3.0	52	74	30	82	41	-	-	13	2.00	16
39.21	206.4	144.6	188.7	206.5	4.0	4.1	2.0	silty SAND to sandy SILT	120	3.0	48	69	28	79	41	-	-	13	2.00	16
39.37	195.7	136.9	188.9	195.8	4.2	4.3	2.2	silty SAND to sandy SILT	120	3.0	46	65	27	77	41	-	-	15	2.06	16
39.54	205.1	143.4	192.8	205.2	4.3	3.9	2.1	silty SAND to sandy SILT	120	3.0	48	68	29	79	41	-	-	14	2.03	16
39.70	264.2	184.4	219.6	264.3	4.6	4.7	1.8	clean SAND to silty SAND	125	5.0	37	53	35	87	42	-	-	10	1.90	16
39.86	331.4	231.1	259.5	331.6	5.5	6.6	1.7	clean SAND to silty SAND	125	5.0	46	66	42	95	43	-	-	9	1.82	16
40.03	339.9	236.7	270.0	340.0	6.2	6.1	1.8	clean SAND to silty SAND	125	5.0	47	68	44	95	43	-	-	9	1.84	16
40.19	330.1	229.5	269.8	330.2	6.6	5.1	2.0	clean SAND to silty SAND	125	5.0	46	66	43	94	43	-	-	10	1.89	16
40.36	326.2	226.6	264.0	326.3	6.2	3.8	1.9	clean SAND to silty SAND	125	5.0	45	65	42	94	43	-	-	10	1.87	16
40.52	335.6	232.7	257.3	335.7	5.3	4.1	1.6	clean SAND to silty SAND	125	5.0	47	67	42	95	43	-	-	8	1.80	16
40.68	361.7	250.5	267.8	361.8	5.1	4.8	1.4	clean SAND to silty SAND	125	5.0	50	72	45	95	44	-	-	7	1.75	16
40.85	382.1	264.3	268.2	382.2	4.5	4.0	1.2	clean SAND to silty SAND	125	5.0	53	76	46	95	44	-	-	5	1.67	16
41.01	345.9	238.9	243.9	346.0	3.8	3.6	1.1	clean SAND to silty SAND	125	5.0	48	69	42	95	43	-	-	6	1.67	16
41.18	320.6	221.2	220.5	320.7	3.0	3.1	0.9	clean SAND to silty SAND	125	5.0	44	64	38	93	43	-	-	5	1.64	16
41.34	303.5	209.1	209.1	303.5	2.7	3.0	0.9	clean SAND to silty SAND	125	5.0	42	61	36	91	43	-	-	5	1.64	16
41.50	302.9	208.4	208.4	302.9	2.6	3.2	0.9	clean SAND to silty SAND	125	5.0	42	61	36	91	43	-	-	5	1.64	16
41.67	281.2	193.2	200.9	281.2	2.8	3.9	1.0	clean SAND to silty SAND	125	5.0	39	56	34	89	42	-	-	6	1.70	16
41.83	292.7	200.9	206.6	292.8	2.9	3.6	1.0	clean SAND to silty SAND	125	5.0	40	59	35	90	42	-	-	6	1.69	16
42.00	311.4	213.5	215.9	311.5	3.0	3.7	1.0	clean SAND to silty SAND	125	5.0	43	62	37	92	43	-	-	5	1.66	16
42.16	306.5	209.8	212.6	306.5	2.9	3.7	1.0	clean SAND to silty SAND	125	5.0	42	61	36	91	43	-	-	5	1.66	16
42.32	288.8	197.5	201.9	288.9	2.7	3.5	0.9	clean SAND to silty SAND	125	5.0	39	58	34	89	42	-	-	6	1.68	16
42.49	284.6	194.4	198.9	284.7	2.6	3.4	0.9	clean SAND to silty SAND	125	5.0	39	57	34	89	42	-	-	6	1.68	16
42.65	255.0	173.9	184.5	255.1	2.5	4.9	1.0	clean SAND to silty SAND	125	5.0	35	51	31	85	42	-	-	7	1.73	16
42.82	225.5	153.6	164.8	225.7	2.1	5.8	0.9	clean SAND to silty SAND	125	5.0	31	45	28	81	41	-	-	7	1.75	16
42.98	234.6	159.6	170.0	234.7	2.2	3.9	0.9	clean SAND to silty SAND	125	5.0	32	47	28	82	41	-	-	7	1.74	16
43.15	236.3	160.6	175.8	236.4	2.5	4.0	1.1	clean SAND to silty SAND	125	5.0	32	47	29	83	41	-	-	8	1.78	16
43.31	223.4	151.6	172.8	223.5	2.7	4.4	1.2	clean SAND to silty SAND	125	5.0	30	45	28	81	41	-	-	9	1.84	16
43.47	195.8	132.7	160.1	195.9	2.7	4.3	1.4	clean SAND to silty SAND	125	5.0	27	39	25	76	40	-	-	11	1.92	16
43.64	161.7	109.5	144.0	161.8	2.4	3.7	1.5	clean SAND to silty SAND	125	5.0	22	32	22	70	39	-	-	13	2.01	16
43.80	141.9	95.9	137.9	141.9	2.4	4.0	1.7	silty SAND to sandy SILT	120	3.0	32	47	20	66	38	-	-	16	2.09	16
43.97	142.8	96.4	143.7	142.9	2.7	5.7	1.9	silty SAND to sandy SILT	120	3.0	32	48	20	66	38	-	-	16	2.12	16
44.13	155.1	104.6	155.3	155.2	3.1	6.0	2.1	silty SAND to sandy SILT	120	3.0	35	52	21	68	39	-	-	16	2.12	16
44.29	156.3	105.3	166.6	156.4	3.7	5.0	2.4	silty SAND to sandy SILT	120	3.0	35	52	22	69	39	-	-	18	2.16	16
44.46	155.9	104.9	182.8	156.0	4.5	5.1	2.9	silty SAND to sandy SILT	120	3.0	35	52	23	69	39	-	-	20	2.23	16
44.62	149.8	100.7	192.3	149.9	5.0	5.1	3.4	silty SAND to sandy SILT	120	3.0	34	50	22	67	39	-	-	22	2.29	16
44.79	115.0	77.2	195.4	115.1	4.9	3.5	4.4	clayy SILT to silty CLAY	115	2.0	39	57	18	-	-	8.0	9.9	29	2.45	15
44.95	90.3	43.1	-	90.5	4.4	6.9	5.0	silty CLAY to CLAY	115	1.5	29	60	11	-	-	6.2	9.9	39	2.67	15
45.11	85.3	40.6	-	85.6	3.7	13.4	4.5	clayy SILT to silty CLAY	115	2.0	20	43	11	-	-	5.9	9.9	38	2.65	15
45.28	91.1	61.0	160.6	91.4	3.3	14.6	3.8	clayy SILT to silty CLAY	115	2.0	30	46	15	-	-	6.3	9.9	29	2.47	15
45.44	64.8	30.7	-	65.1	3.0	17.2	4.8	silty CLAY to CLAY	115	1.5	20	43	9	-	-	4.4	9.7	44	2.76	15
45.61	62.4	29.5	-	63.4	3.3	49.8	5.6	silty CLAY to CLAY	115	1.5	20	42	8	-	-	4.3	9.3	47	2.82	15
45.77	102.2	68.2	162.7	102.7	3.5	23.6	3.5	clayy SILT to silty CLAY	115	2.0	34	51	16	-	-	7.1	9.9	27	2.42	15
45.93	72.8	34.3	-	73.3	3.0	21.5	4.3	clayy SILT to silty CLAY	115	2.0	17	36	9	-	-	5.0	9.9	40	2.69	15
46.10	60.2	28.3	-	61.1	2.6	46.6	4.5	silty CLAY to CLAY	115	1.5	19	40	8	-	-	4.1	8.9	44	2.77	15
46.26	60.3	28.3	-	61.9	2.7	80.3	4.8	silty CLAY to CLAY	115	1.5	19	40	8	-	-	4.1	8.9	45	2.79	15

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Geosphere Consultants, Inc. Page: 4
Data File: SDF(155).cpt Sounding ID: CPT-06
CPT Date: 6/2/2020 11:05:17 AM Project No: 91-04769
GW During Test: 25 ft Cone/Rig: DDG1496

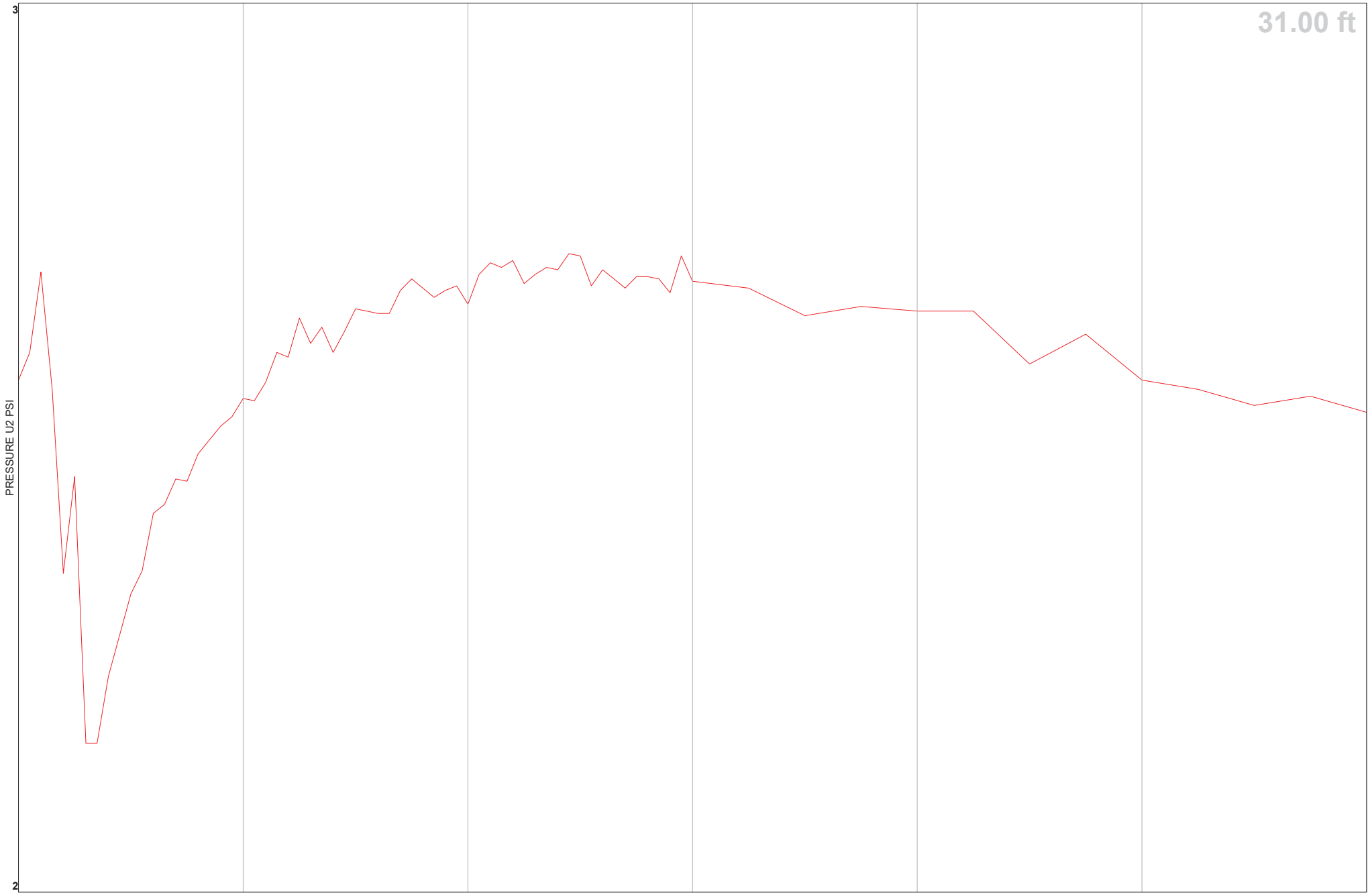
Depth ft	qc PS tsf	qc1n * PS -	q1ncs PS -	qt * PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR - -	Fin Ic %	Ic * SBT Indx	Nk -
46.43	64.3	30.1	-	67.6	4.7	168.3	7.7	silty CLAY to CLAY	115	1.5	20	43	9	-	-	4.4	9.5	53	2.91	15
46.59	87.2	40.7	-	91.9	6.0	244.4	7.1	silty CLAY to CLAY	115	1.5	27	58	12	-	-	6.0	9.9	46	2.79	15
46.75	136.6	90.6	221.0	136.9	6.3	15.4	4.7	very stiff fine SOIL	120	1.0	91	100	21	-	-	4.8	9.9	28	2.43	30
46.92	163.8	108.5	229.7	165.9	6.9	106.9	4.3	very stiff fine SOIL	120	1.0	100	100	25	-	-	5.7	9.9	24	2.35	30
47.08	275.8	182.5	254.3	276.0	7.7	12.3	2.8	silty SAND to sandy SILT	120	3.0	61	92	37	87	42	-	-	15	2.06	16
47.25	314.9	208.2	269.9	315.0	8.0	7.0	2.6	silty SAND to sandy SILT	120	3.0	69	100	41	91	42	-	-	13	2.00	16
47.41	315.3	208.2	253.3	315.4	6.6	4.6	2.1	clean SAND to silty SAND	125	5.0	42	63	40	91	42	-	-	11	1.93	16
47.57	296.5	195.6	239.9	296.6	6.1	3.0	2.1	clean SAND to silty SAND	125	5.0	39	59	38	89	42	-	-	11	1.94	16
47.74	275.3	181.4	240.8	275.3	6.7	2.1	2.5	silty SAND to sandy SILT	120	3.0	60	92	36	87	42	-	-	14	2.02	16
47.90	282.9	186.2	242.8	283.0	6.7	3.0	2.4	silty SAND to sandy SILT	120	3.0	62	94	37	88	42	-	-	13	2.00	16
48.07	274.0	180.1	239.8	274.0	6.7	1.8	2.5	silty SAND to sandy SILT	120	3.0	60	91	36	86	42	-	-	14	2.02	16
48.23	259.2	170.2	231.5	259.3	6.4	2.3	2.5	silty SAND to sandy SILT	120	3.0	57	86	34	85	41	-	-	14	2.04	16
48.39	275.6	180.8	233.9	275.6	6.3	3.0	2.3	silty SAND to sandy SILT	120	3.0	60	92	35	87	42	-	-	13	2.00	16
48.56	277.6	181.9	234.4	277.7	6.3	3.3	2.3	silty SAND to sandy SILT	120	3.0	61	93	36	87	42	-	-	13	1.99	16
48.72	270.4	177.0	233.6	270.5	6.4	2.5	2.4	silty SAND to sandy SILT	120	3.0	59	90	35	86	42	-	-	13	2.01	16
48.89	286.8	187.5	243.8	286.9	6.8	4.4	2.4	silty SAND to sandy SILT	120	3.0	63	96	37	88	42	-	-	13	2.00	16
49.05	286.2	186.9	251.9	286.3	7.5	3.9	2.6	silty SAND to sandy SILT	120	3.0	62	95	37	88	42	-	-	14	2.03	16
49.22	282.1	184.0	263.9	282.1	8.5	3.8	3.0	silty SAND to sandy SILT	120	3.0	61	94	37	87	42	-	-	15	2.09	16
49.38	321.7	209.7	292.7	321.8	9.9	4.5	3.1	stiff SAND to clayy SAND	115	5.0	42	64	42	91	42	-	-	15	2.07	16
49.54	365.3	237.9	316.8	365.4	10.9	5.0	3.0	stiff SAND to clayy SAND	115	5.0	48	73	47	95	43	-	-	14	2.02	16
49.71	354.4	230.5	316.6	354.5	11.2	4.7	3.2	stiff SAND to clayy SAND	115	5.0	46	71	46	95	43	-	-	14	2.05	16
49.87	331.2	215.2	317.4	331.3	11.8	5.2	3.6	stiff SAND to clayy SAND	115	5.0	43	66	44	92	43	-	-	16	2.11	16
50.04	322.5	209.4	305.4	322.6	11.0	5.5	3.4	stiff SAND to clayy SAND	115	5.0	42	64	43	91	42	-	-	16	2.10	16
50.20	313.0	203.0	281.1	313.1	9.3	7.0	3.0	stiff SAND to clayy SAND	115	5.0	41	63	41	90	42	-	-	15	2.06	16

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Geosphere Consultants, Inc.

Location	Kaiser Fresno MOB	Operator	BH-GH	GPS
Job Number	91-04769	Cone Number	DDG1496	
Hole Number	CPT-06	Date and Time	6/2/2020 11:05:17 AM	
Equilized Pressure	2.5	EST GW Depth During Test	25.1	

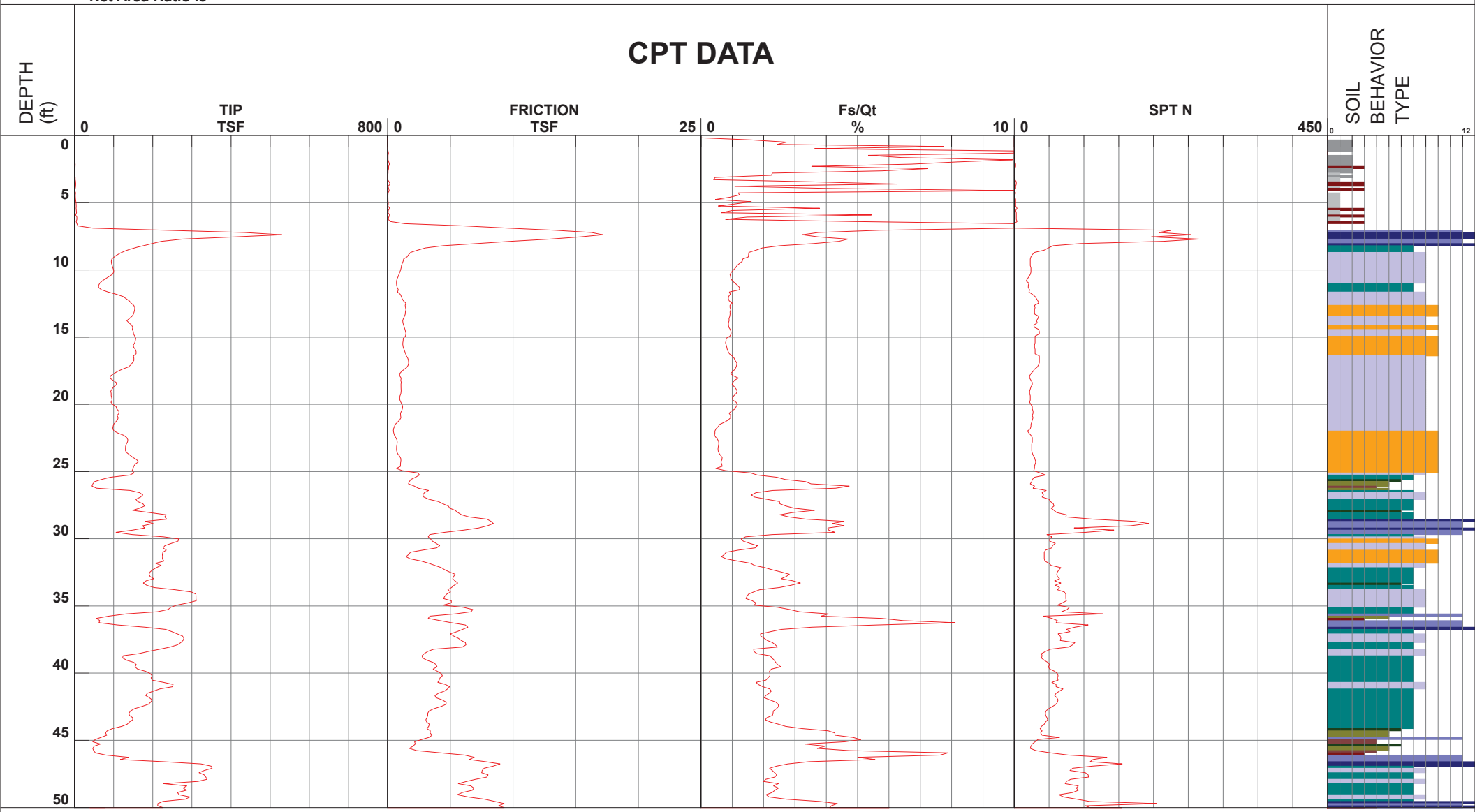


Geosphere Consultants, Inc.

Project	Kaiser Fresno MOB	Operator	BH-GH	Filename	SDF(159).cpt
Job Number	91-04769	Cone Number	DDG1496	GPS	
Hole Number	CPT-07	Date and Time	6/2/2020 2:26:46 PM	Maximum Depth	51.51 ft
EST GW Depth During Test		25.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

S*Soil behavior type and SPT based on data from UBC-1983

Kaiser Fresno MOB

Project ID: Geosphere Consultants, Inc. Page: 1
Data File: SDF(159).cpt Sounding ID: CPT-07
CPT Date: 6/2/2020 2:26:46 PM Project No: 91-04769
GW During Test: 25 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT -	Nk Indx -
0.33	1.1	0.3	-	1.1	0.0	0.1	1.8	silty CLAY to CLAY	115	1.5	0	1	1	-	-	0.1	9.9	95	4.38	15
0.49	1.1	0.2	-	1.1	0.0	0.1	3.3	Organic SOILS - Peats	100	1.0	0	1	1	-	-	0.1	9.9	95	4.51	10
0.66	1.1	0.4	-	1.1	0.0	0.2	2.8	Organic SOILS - Peats	100	1.0	0	1	1	-	-	0.1	9.9	95	4.24	10
0.82	1.1	0.1	-	1.1	0.0	0.0	9.9	Organic SOILS - Peats	100	1.0	0	1	1	-	-	0.1	8.0	95	5.34	10
0.98	1.1	0.2	-	1.1	0.0	0.0	5.6	Organic SOILS - Peats	100	1.0	0	1	1	-	-	0.1	6.7	95	4.72	10
1.15	1.1	0.4	-	1.1	0.0	0.0	9.9	Organic SOILS - Peats	100	1.0	0	1	5	-	-	0.1	5.7	95	4.56	10
1.31	1.1	0.3	-	1.1	0.1	0.0	9.9	Organic SOILS - Peats	100	1.0	0	1	1	-	-	0.1	5.0	95	4.69	10
1.48	1.1	1.0	-	1.1	0.0	0.0	6.1	Organic SOILS - Peats	100	1.0	1	1	1	-	-	0.1	4.4	95	4.05	10
1.64	1.1	0.7	-	1.1	0.0	0.0	8.0	Organic SOILS - Peats	100	1.0	1	1	1	-	-	0.1	4.0	95	4.30	10
1.80	1.1	0.5	-	1.1	0.0	0.0	9.9	Organic SOILS - Peats	100	1.0	0	1	7	-	-	0.1	3.6	95	4.56	10
1.97	1.1	1.8	-	1.1	0.1	0.0	9.0	Organic SOILS - Peats	100	1.0	2	1	1	-	-	0.1	3.3	95	3.92	10
2.13	2.1	3.4	-	2.1	0.1	0.0	7.1	Organic SOILS - Peats	100	1.0	3	2	2	-	-	0.2	6.0	95	3.62	10
2.30	2.1	3.4	-	2.1	0.1	0.0	3.7	silty CLAY to CLAY	115	1.5	2	1	2	-	-	0.1	5.6	95	3.46	15
2.46	1.1	1.7	-	1.1	0.1	0.1	8.2	Organic SOILS - Peats	100	1.0	2	1	1	-	-	0.1	2.5	95	3.92	10
2.62	1.1	0.9	-	1.1	0.0	0.1	7.7	Organic SOILS - Peats	100	1.0	1	1	1	-	-	0.1	2.4	95	4.22	10
2.79	1.5	2.4	-	1.5	0.0	0.1	2.5	silty CLAY to CLAY	115	1.5	2	1	1	-	-	0.1	3.1	95	3.52	15
2.95	1.1	0.6	-	1.1	0.0	0.1	3.6	Organic SOILS - Peats	100	1.0	1	1	1	-	-	0.1	2.0	95	4.26	10
3.12	2.1	3.3	-	2.1	0.0	0.2	0.5	sensitive fine SOIL	115	2.0	2	1	1	-	-	0.1	3.9	67	3.12	15
3.28	2.2	3.6	-	2.2	0.0	0.1	0.4	sensitive fine SOIL	115	2.0	2	1	1	-	-	0.1	3.9	64	3.08	15
3.45	3.1	4.9	-	3.1	0.1	0.1	3.8	silty CLAY to CLAY	115	1.5	3	2	2	-	-	0.2	5.2	84	3.33	15
3.61	3.2	5.1	-	3.2	0.2	0.1	6.6	silty CLAY to CLAY	115	1.5	3	2	2	-	-	0.2	5.2	95	3.45	15
3.77	3.5	5.7	-	3.5	0.0	0.1	1.1	silty CLAY to CLAY	115	1.5	4	2	2	-	-	0.2	5.5	60	3.02	15
3.94	1.9	3.0	-	1.9	0.1	0.1	4.5	silty CLAY to CLAY	115	1.5	2	1	2	-	-	0.1	2.7	95	3.57	15
4.10	1.1	1.6	-	1.1	0.1	0.1	9.9	Organic SOILS - Peats	100	1.0	2	1	1	-	-	0.1	1.3	95	4.04	10
4.27	3.1	5.0	-	3.1	0.0	0.2	1.3	silty CLAY to CLAY	115	1.5	3	2	2	-	-	0.2	4.2	66	3.10	15
4.43	2.3	3.8	-	2.4	0.0	0.2	1.4	silty CLAY to CLAY	115	1.5	3	2	1	-	-	0.1	2.9	76	3.24	15
4.59	2.5	4.0	-	2.5	0.0	0.2	1.0	silty CLAY to CLAY	115	1.5	3	2	1	-	-	0.2	3.0	70	3.16	15
4.76	3.3	5.3	-	3.3	0.0	0.2	0.5	sensitive fine SOIL	115	2.0	3	2	2	-	-	0.2	3.9	54	2.93	15
4.92	3.4	5.4	-	3.4	0.1	0.2	1.7	silty CLAY to CLAY	115	1.5	4	2	2	-	-	0.2	3.9	68	3.13	15
5.09	4.7	7.6	-	4.7	0.1	0.2	1.2	clayy SILT to silty CLAY	115	2.0	4	2	2	-	-	0.3	5.4	53	2.92	15
5.25	4.3	6.9	-	4.3	0.0	0.2	0.6	clayy SILT to silty CLAY	115	2.0	3	2	2	-	-	0.3	4.7	48	2.84	15
5.41	4.4	7.0	-	4.4	0.2	0.2	4.1	silty CLAY to CLAY	115	1.5	5	3	3	-	-	0.3	4.6	75	3.22	15
5.58	4.9	7.8	-	4.9	0.0	0.2	1.1	clayy SILT to silty CLAY	115	2.0	4	2	2	-	-	0.3	5.0	51	2.89	15
5.74	5.4	8.7	-	5.4	0.0	0.2	0.7	clayy SILT to silty CLAY	115	2.0	4	3	2	-	-	0.4	5.4	44	2.77	15
5.91	3.2	5.1	-	3.2	0.2	0.2	6.1	silty CLAY to CLAY	115	1.5	3	2	2	-	-	0.2	2.9	94	3.45	15
6.07	6.2	9.9	-	6.2	0.1	0.1	1.6	clayy SILT to silty CLAY	115	2.0	5	3	3	-	-	0.4	5.8	50	2.87	15
6.23	6.1	9.8	-	6.1	0.0	0.1	0.8	clayy SILT to silty CLAY	115	2.0	5	3	3	-	-	0.4	5.6	43	2.75	15
6.40	4.5	7.2	-	4.5	0.2	0.1	5.3	silty CLAY to CLAY	115	1.5	5	3	3	-	-	0.3	3.9	80	3.29	15
6.56	6.2	10.0	-	6.2	1.4	0.1	9.9	silty CLAY to CLAY	115	1.5	7	4	4	-	-	0.4	5.4	84	3.34	15
6.73	9.1	14.6	-	9.1	6.1	0.2	9.9	silty CLAY to CLAY	115	1.5	10	6	5	-	-	0.6	7.9	74	3.21	15
6.89	47.4	76.0	-	47.4	9.6	0.2	9.9	very stiff fine SOIL	120	1.0	76	47	21	-	-	1.7	9.9	42	2.73	30
7.05	234.8	366.3	588.3	234.8	13.4	0.2	5.7	very stiff fine SOIL	120	1.0	100	100	77	-	-	8.3	9.9	18	2.17	30
7.22	434.8	669.9	800.2	434.9	16.3	6.7	3.7	stiff SAND to clayy SAND	115	5.0	100	87	100	95	48	-	-	11	1.91	16
7.38	529.7	806.7	904.7	530.6	17.1	43.3	3.2	stiff SAND to clayy SAND	115	5.0	100	100	100	95	48	-	-	9	1.82	16
7.55	410.9	618.6	746.1	411.6	15.4	34.7	3.7	stiff SAND to clayy SAND	115	5.0	100	82	100	95	48	-	-	11	1.92	16
7.71	276.1	411.0	581.3	276.7	12.9	28.6	4.7	very stiff fine SOIL	120	1.0	100	100	83	-	-	9.7	9.9	15	2.08	30
7.87	222.6	327.6	473.8	223.1	9.8	25.2	4.4	very stiff fine SOIL	120	1.0	100	100	67	-	-	7.8	9.9	16	2.10	30
8.04	198.4	288.7	392.7	198.8	7.1	23.5	3.6	stiff SAND to clayy SAND	115	5.0	58	40	58	95	48	-	-	14	2.04	16
8.20	176.0	253.5	312.5	176.4	4.5	17.2	2.5	stiff SAND to clayy SAND	115	5.0	51	35	49	95	47	-	-	11	1.94	16
8.37	153.3	218.6	257.8	153.5	3.0	7.7	2.0	clean SAND to silty SAND	125	5.0	44	31	41	93	46	-	-	10	1.89	16
8.53	135.8	191.5	225.6	136.0	2.4	5.5	1.8	clean SAND to silty SAND	125	5.0	38	27	36	88	46	-	-	10	1.89	16
8.69	120.0	167.5	196.0	120.2	1.8	5.5	1.5	clean SAND to silty SAND	125	5.0	33	24	31	84	45	-	-	10	1.88	16
8.86	110.2	152.2	181.8	110.3	1.7	5.5	1.5	clean SAND to silty SAND	125	5.0	30	22	29	81	45	-	-	11	1.91	16
9.02	102.0	139.4	170.0	102.1	1.5	5.6	1.5	clean SAND to silty SAND	125	5.0	28	20	27	78	44	-	-	11	1.93	16
9.19	95.6	129.3	155.6	95.7	1.3	4.7	1.3	clean SAND to silty SAND	125	5.0	26	19	25	75	44	-	-	11	1.91	16
9.35	94.2	126.2	152.4	94.3	1.2	4.6	1.3	clean SAND to silty SAND	125	5.0	25	19	24	75	43	-	-	11	1.92	16
9.51	94.7	125.7	149.4	94.8	1.2	4.6	1.2	clean SAND to silty SAND	125	5.0	25	19	24	75	43	-	-	10	1.90	16
9.68	96.4	126.7	148.0	96.5	1.1	3.9	1.2	clean SAND to silty SAND	125	5.0	25	19	24	75	43	-	-	10	1.88	16
9.84	98.1	127.7	147.4	98.2	1.1	3.9	1.1	clean SAND to silty SAND	125	5.0	26	20	24	75	43	-	-	9	1.86	16
10.01	100.2	129.2	146.9	100.2	1.0	3.9	1.0	clean SAND to silty SAND	125	5.0	26	20	24	75	43	-	-	9	1.84	16
10.17	100.4	128.4	144.3	100.5	1.0	4.0	1.0	clean SAND to silty SAND	125	5.0	26	20	24	75	43	-	-	9	1.82	16
10.34	96.8	122.7	138.1	96.9	0.9	3.9	0.9	clean SAND to silty SAND	125	5.0	25	19	23	74	43	-	-	9	1.83	16
10.50	88.1	110.7	128.0	88.2	0.8	3.9	0.9	clean SAND to silty SAND	125	5.0	22	18	21	70	43	-	-	10	1.86	16
10.66	79.5	99.0	118.2	79.5	0.8	3.8	1.0	clean SAND to silty SAND	125	5.0	20	16	19	67	42	-	-	11	1.91	16
10.83	70.9	87.6	109.8	70.9	0.7	3.9	1.0	clean SAND to silty SAND	125	5.0	18	14	17	63	41	-	-	12	1.96	16
10.99	65.0	79.6	105.3	65.1	0.7	3.8	1.1	clean SAND to silty SAND	125	5.0	16	13	16	59	41	-	-	13	2.02	16
11.16	61.6	74.9	103.4	61.7	0.7	3.7	1.2	silty SAND to sandy SILT	120	3.0	25	21	15	57	40	-	-	15	2.06	16
11.32	62.1	74.9	105.3	62.2	0.8	3.7	1.2	silty SAND to sandy SILT	120	3.0	25	21	15	57	40	-	-	15	2.07	16
11.48	69.3	82.9	112.0	69.3	0.9	3.8	1.2	silty SAND to sandy SILT	120	3.0	28	23	17	61	41	-	-	14	2.04	16
11.65	86.2	102.4	119.8	86.3	0.8	3.8	0.9	clean SAND to silty SAND	125	5.0	20	17	19	68	42	-	-	10	1.88	16
11.81	107.1	126.3	141.5	107.2	1.0	3.9	0.9	clean SAND to silty SAND	125	5.0	25	21	23	75	43	-	-	9	1.82	16
11.98	124.2	145.4	156.2	124.3	1.1	4.0	0.9	clean SAND to silty SAND	125	5.0	29	25	26	79	44	-	-	7	1.75	16
12.14	132.3	153.7	163.1	132.4	1.2	3.9	0.9	clean SAND to silty SAND	125	5.0	31	26	27	81	44	-	-	7	1.73	16
12.30	140.2	161.7	170.8	140.2	1.3	3.9	0.9	clean SAND to silty SAND	125	5.0	32	28	29	83	44	-	-	7	1.73	16
12.47	144.9	165.9	177.7	145.0	1.4	3.9	1.0	clean SAND to silty SAND	125	5.0	33	29	30	84	44	-	-	7	1.75	16
12.63	151.5	172.2	180.4	151.5	1.4	4.0	0.9	clean SAND to silty SAND	125	5.0	34	30	30	85	44	-	-	6	1.71	16
12.80	154.1	174.0	182.0	154.1	1.4	4.0	0.9	clean SAND to silty SAND	125	5.0	35	31	31	85	44	-	-	6	1.71	16
12.96	153.9	172.6	181.7	154.0	1.5	4.1	1.0	clean SAND to silty SAND	125	5.0	35	31	31	85	44	-	-	7	1.72	16
13.12	152.4	169.8	178.4	152.5	1.4	4.1	0.9	clean SAND to silty SAND	125	5.0	34	30	30	84	44	-	-	6	1.72	16
13.29	151.0	167.1	176.3	151.1	1.4	4.1	0.9	clean SAND to silty SAND	125	5.0	33	30	30	84	44	-	-	7	1.73	16
13.45	146.9	161.5	171.1	147.0	1.3	4.1	0.9	clean SAND to silty SAND	125	5.0	32	29	29	83	44	-	-	7	1.73	16
13.62	140.6	153.5	163.6	140.6	1.3	4.1	0.9	clean SAND to silty SAND	125	5.0	31	28	27	81	43	-	-	7	1.74	16
13.78	133.8	145.2	156.6	133.9	1.2	4.1	0.9	clean SAND to silty SAND	125	5.0	29	27	26	79	43	-	-	7	1.76	16
13.94	139.4	150.3	160.3	139.5	1.2	4.2	0.9	clean SAND to silty SAND	125	5.0	30	28	27	80	43	-	-	7	1.74	16
14.11	146.2	156.7	165.7	146.3	1.3	4.3	0.9	clean SAND to silty SAND	125	5.0	31	29	28	82	43	-	-	7	1.73	16
14.27	149.2	158.9	167.9	149.3	1.3	4.4	0.9	clean SAND to silty SAND	125	5.0	32	30	28	82	43	-	-	7	1.73	16
14.44	147.9	156.5	167.4	148.0	1.4	4.5	0.9	clean SAND to silty SAND	125	5.0	31	30	28	82	43	-	-	7	1.75	16
14.60	150.2	158.0	169.6	150.3	1.4	4.5	1.0	clean SAND to silty SAND	125	5.0	32	30	28	82	43	-	-	7	1.75	16
14.76	151.1	157.9	169.7	151.1	1.5	4.5	1.0	clean SAND to silty SAND	125	5.0	32	30	28	82	43	-	-	7	1.75	16
14.93	154.0	160.1	170.1	154.1	1.4	4.6	0.9	clean SAND to silty SAND	125	5.0	32	31	29	83	43	-	-	7	1.74	16
15.09	156.7	161.9	167.0	156.8	1.2	4.6	0.8	clean SAND to silty SAND	125	5.0	32	31	28	83	43	-	-	6	1.69	16
15.26	155.5	159.8	165.4	155.6	1.2	4.8	0.8	clean SAND to silty SAND	125	5.0	32	31	28	82	43	-	-	6	1.70	16
15.42	154.1	157.4	162.9	154.1	1.2	4.8	0.8	clean SAND to silty SAND	125	5.0	31	31	28	82	43	-	-	6	1.70	16

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Geosphere Consultants, Inc. Page: 2
Data File: SDF(159).cpt Sounding ID: CPT-07
CPT Date: 6/2/2020 2:26:46 PM Project No: 91-04769
GW During Test: 25 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -
15.58	150.6	152.9	160.1	150.7	1.2	4.7	0.8	clean SAND to silty SAND	125	5.0	31	30	27	81	43	-	-	6	1.71	16
15.75	151.3	152.9	160.6	151.4	1.2	4.7	0.8	clean SAND to silty SAND	125	5.0	31	30	27	81	43	-	-	6	1.72	16
15.91	155.6	156.4	163.9	155.7	1.3	4.8	0.8	clean SAND to silty SAND	125	5.0	31	31	28	82	43	-	-	6	1.72	16
16.08	157.8	157.6	166.2	157.9	1.4	4.7	0.9	clean SAND to silty SAND	125	5.0	32	32	28	82	43	-	-	7	1.72	16
16.24	157.5	156.6	166.7	157.6	1.4	4.8	0.9	clean SAND to silty SAND	125	5.0	31	32	28	82	43	-	-	7	1.74	16
16.40	150.8	149.1	163.1	150.9	1.5	4.7	1.0	clean SAND to silty SAND	125	5.0	30	30	27	80	43	-	-	8	1.78	16
16.57	151.7	149.1	165.2	151.8	1.6	4.8	1.1	clean SAND to silty SAND	125	5.0	30	30	27	80	43	-	-	8	1.80	16
16.73	152.0	148.7	165.6	152.1	1.7	4.9	1.1	clean SAND to silty SAND	125	5.0	30	30	27	80	43	-	-	8	1.81	16
16.90	148.3	144.3	163.3	148.4	1.7	4.9	1.1	clean SAND to silty SAND	125	5.0	29	30	27	79	43	-	-	9	1.83	16
17.06	144.4	139.8	159.4	144.5	1.6	4.9	1.1	clean SAND to silty SAND	125	5.0	28	29	26	78	42	-	-	9	1.84	16
17.23	137.6	132.5	152.4	137.7	1.5	4.9	1.1	clean SAND to silty SAND	125	5.0	27	28	25	76	42	-	-	9	1.86	16
17.39	122.3	117.2	138.0	122.4	1.3	4.8	1.1	clean SAND to silty SAND	125	5.0	23	24	22	72	41	-	-	10	1.89	16
17.55	110.6	105.5	125.6	110.7	1.1	4.7	1.0	clean SAND to silty SAND	125	5.0	21	22	20	69	41	-	-	10	1.90	16
17.72	100.9	95.8	115.4	101.0	1.0	4.7	1.0	clean SAND to silty SAND	125	5.0	19	20	18	66	40	-	-	11	1.92	16
17.88	92.5	87.3	110.5	92.5	1.0	4.6	1.0	clean SAND to silty SAND	125	5.0	17	18	17	63	40	-	-	12	1.97	16
18.05	90.7	85.2	113.0	90.8	1.1	4.6	1.2	clean SAND to silty SAND	125	5.0	17	18	17	62	40	-	-	13	2.02	16
18.21	98.5	92.2	115.6	98.6	1.1	4.6	1.1	clean SAND to silty SAND	125	5.0	18	20	18	64	40	-	-	12	1.96	16
18.37	106.8	99.4	120.5	106.9	1.1	4.7	1.0	clean SAND to silty SAND	125	5.0	20	21	19	67	40	-	-	11	1.92	16
18.54	107.5	99.6	120.0	107.6	1.1	4.7	1.0	clean SAND to silty SAND	125	5.0	20	22	19	67	40	-	-	11	1.92	16
18.70	100.0	92.2	115.6	100.0	1.1	3.7	1.1	clean SAND to silty SAND	125	5.0	18	20	18	64	40	-	-	12	1.96	16
18.87	96.3	88.4	113.9	96.4	1.1	3.7	1.1	clean SAND to silty SAND	125	5.0	18	19	17	63	40	-	-	13	1.99	16
19.03	92.7	84.7	111.6	92.8	1.1	3.7	1.2	clean SAND to silty SAND	125	5.0	17	19	17	62	39	-	-	13	2.01	16
19.19	93.8	85.4	111.4	93.9	1.1	3.7	1.1	clean SAND to silty SAND	125	5.0	17	19	17	62	39	-	-	13	2.00	16
19.36	94.0	85.1	109.0	94.0	1.0	3.7	1.1	clean SAND to silty SAND	125	5.0	17	19	17	62	39	-	-	13	1.99	16
19.52	95.4	86.0	108.6	95.5	1.0	3.7	1.0	clean SAND to silty SAND	125	5.0	17	19	17	62	39	-	-	12	1.97	16
19.69	96.4	86.5	109.4	96.4	1.0	3.7	1.0	clean SAND to silty SAND	125	5.0	17	19	17	62	39	-	-	12	1.97	16
19.85	93.4	83.5	109.7	93.5	1.0	3.7	1.1	clean SAND to silty SAND	125	5.0	17	19	16	61	39	-	-	13	2.01	16
20.01	98.3	87.5	114.3	98.4	1.1	3.7	1.2	clean SAND to silty SAND	125	5.0	17	20	17	63	39	-	-	13	2.01	16
20.18	106.6	94.5	119.2	106.7	1.2	3.8	1.1	clean SAND to silty SAND	125	5.0	19	21	18	65	40	-	-	12	1.97	16
20.34	108.1	95.4	119.0	108.2	1.2	3.8	1.1	clean SAND to silty SAND	125	5.0	19	22	18	65	40	-	-	12	1.96	16
20.51	113.4	99.7	119.5	113.5	1.1	3.9	1.0	clean SAND to silty SAND	125	5.0	20	23	19	67	40	-	-	11	1.91	16
20.67	114.1	99.9	117.6	114.2	1.0	3.8	0.9	clean SAND to silty SAND	125	5.0	20	23	19	67	40	-	-	10	1.89	16
20.83	109.3	95.2	114.8	109.3	1.0	3.8	1.0	clean SAND to silty SAND	125	5.0	19	22	18	65	40	-	-	11	1.92	16
21.00	111.8	97.0	116.5	111.9	1.1	3.9	1.0	clean SAND to silty SAND	125	5.0	19	22	18	66	40	-	-	11	1.91	16
21.16	109.8	94.9	112.6	109.8	1.0	3.9	0.9	clean SAND to silty SAND	125	5.0	19	22	18	65	40	-	-	10	1.90	16
21.33	104.5	90.0	105.2	104.6	0.8	3.9	0.8	clean SAND to silty SAND	125	5.0	18	21	17	64	39	-	-	10	1.88	16
21.49	99.8	85.6	97.3	99.9	0.6	3.9	0.6	clean SAND to silty SAND	125	5.0	17	20	16	62	39	-	-	9	1.84	16
21.65	98.6	84.2	94.9	98.7	0.5	3.9	0.6	clean SAND to silty SAND	125	5.0	17	20	16	61	39	-	-	9	1.83	16
21.82	97.4	82.9	91.9	97.5	0.5	3.9	0.5	clean SAND to silty SAND	125	5.0	17	19	15	61	39	-	-	8	1.80	16
21.98	101.3	85.8	93.3	101.4	0.5	3.5	0.5	clean SAND to silty SAND	125	5.0	17	20	15	62	39	-	-	8	1.77	16
22.15	111.3	94.0	99.9	111.4	0.5	3.5	0.4	clean SAND to silty SAND	125	5.0	19	22	17	65	40	-	-	7	1.74	16
22.31	126.2	106.1	108.9	126.2	0.5	3.6	0.4	clean SAND to silty SAND	125	5.0	21	25	19	69	40	-	-	6	1.68	16
22.47	133.8	112.0	115.4	133.8	0.6	3.6	0.5	clean SAND to silty SAND	125	5.0	22	27	20	71	40	-	-	6	1.69	16
22.64	136.5	113.9	119.0	136.6	0.7	3.7	0.5	clean SAND to silty SAND	125	5.0	23	27	20	71	41	-	-	6	1.71	16
22.80	135.5	112.6	118.8	135.5	0.8	3.7	0.6	clean SAND to silty SAND	125	5.0	23	27	20	71	40	-	-	7	1.72	16
22.97	132.5	109.7	116.5	132.6	0.7	3.7	0.6	clean SAND to silty SAND	125	5.0	22	27	20	70	40	-	-	7	1.74	16
23.13	130.9	108.0	114.9	131.0	0.7	3.7	0.6	clean SAND to silty SAND	125	5.0	22	26	19	70	40	-	-	7	1.74	16
23.30	130.4	107.2	113.6	130.5	0.7	3.7	0.5	clean SAND to silty SAND	125	5.0	21	26	19	69	40	-	-	7	1.73	16
23.46	130.4	106.8	113.8	130.5	0.7	3.7	0.6	clean SAND to silty SAND	125	5.0	21	26	19	69	40	-	-	7	1.74	16
23.62	134.5	109.8	116.9	134.6	0.8	3.8	0.6	clean SAND to silty SAND	125	5.0	22	27	20	70	40	-	-	7	1.74	16
23.79	141.9	115.4	122.8	142.0	0.9	3.8	0.6	clean SAND to silty SAND	125	5.0	23	28	21	72	40	-	-	7	1.74	16
23.95	149.4	121.1	129.3	149.5	1.0	3.9	0.7	clean SAND to silty SAND	125	5.0	24	30	22	73	41	-	-	7	1.75	16
24.12	159.0	128.3	135.1	159.0	1.1	4.0	0.7	clean SAND to silty SAND	125	5.0	26	32	23	75	41	-	-	7	1.72	16
24.28	163.5	131.6	136.5	163.6	1.0	4.1	0.6	clean SAND to silty SAND	125	5.0	26	33	23	76	41	-	-	6	1.70	16
24.44	155.4	124.6	131.8	155.5	1.0	4.1	0.7	clean SAND to silty SAND	125	5.0	25	31	22	74	41	-	-	7	1.73	16
24.61	151.3	120.9	129.3	151.4	1.0	4.1	0.7	clean SAND to silty SAND	125	5.0	24	30	22	73	41	-	-	7	1.75	16
24.77	150.0	119.4	120.7	150.1	0.7	4.1	0.5	clean SAND to silty SAND	125	5.0	24	30	21	73	41	-	-	5	1.66	16
24.94	147.2	116.8	129.1	147.3	1.2	4.2	0.8	clean SAND to silty SAND	125	5.0	23	29	21	72	40	-	-	8	1.80	16
25.10	152.5	120.8	155.6	152.5	2.4	4.3	1.6	clean SAND to silty SAND	125	5.0	24	30	24	73	41	-	-	13	1.99	16
25.26	141.4	111.8	154.1	141.5	2.5	4.0	1.8	silty SAND to sandy SILT	120	3.0	37	47	22	71	40	-	-	14	2.05	16
25.43	92.0	72.7	137.5	92.1	2.2	4.1	2.5	silty SAND to sandy SILT	120	3.0	24	31	16	56	38	-	-	22	2.28	16
25.59	68.9	54.3	127.3	69.0	1.9	5.9	2.7	silty SAND to sandy SILT	120	3.0	18	23	13	47	36	-	-	27	2.41	16
25.76	51.6	33.9	-	51.7	1.7	8.2	3.4	clayy SILT to silty CLAY	115	2.0	17	26	9	-	-	3.5	9.9	37	2.63	15
25.92	47.0	30.8	-	47.2	1.7	9.6	3.6	clayy SILT to silty CLAY	115	2.0	15	24	8	-	-	3.2	9.8	39	2.67	15
26.08	44.8	29.3	-	45.1	2.1	10.6	4.9	silty CLAY to CLAY	115	1.5	20	30	8	-	-	3.1	9.3	45	2.78	15
26.25	56.8	37.0	-	57.0	2.4	11.0	4.4	clayy SILT to silty CLAY	115	2.0	18	28	10	-	-	3.9	9.9	39	2.67	15
26.41	142.5	111.5	169.2	142.7	3.3	10.6	2.3	silty SAND to sandy SILT	120	3.0	37	48	23	71	40	-	-	17	2.13	16
26.58	166.8	130.3	169.6	166.9	2.9	7.2	1.8	clean SAND to silty SAND	125	5.0	26	33	26	76	41	-	-	13	2.00	16
26.74	174.8	136.3	170.5	174.9	2.8	6.6	1.6	clean SAND to silty SAND	125	5.0	27	35	26	77	41	-	-	12	1.96	16
26.90	168.9	131.5	169.2	169.0	2.9	5.6	1.7	clean SAND to silty SAND	125	5.0	26	34	26	76	41	-	-	13	1.99	16
27.07	156.9	122.0	172.8	157.0	3.3	5.3	2.1	silty SAND to sandy SILT	120	3.0	41	52	25	74	41	-	-	15	2.08	16
27.23	161.4	125.3	189.1	161.5	4.0	5.3	2.5	silty SAND to sandy SILT	120	3.0	42	54	26	74	41	-	-	17	2.13	16
27.40	175.1	135.8	199.3	175.2	4.4	5.2	2.5	silty SAND to sandy SILT	120	3.0	45	58	28	77	41	-	-	16	2.11	16
27.56	179.1	138.7	208.2	179.3	4.8	5.3	2.7	silty SAND to sandy SILT	120	3.0	46	60	29	78	41	-	-	17	2.12	16
27.72	166.5	128.7	208.0	166.6	5.0	5.4	3.0	silty SAND to sandy SILT	120	3.0	43	56	27	75	41	-	-	18	2.18	16
27.89	148.7	114.8	215.5	148.8	5.4	5.5	3.7	silty SAND to sandy SILT	120	3.0	38	50	25	72	40	-	-	22	2.28	16
28.05	192.1	148.1	224.9	192.3	5.6	6.5	2.9	silty SAND to sandy SILT	120	3.0	49	64	31	80	42	-	-	17	2.13	16
28.22	234.5	180.5	241.8	234.7	5.9	6.8	2.5	silty SAND to sandy SILT	120	3.0	60	78	36	86	43	-	-	14	2.03	16
28.38	230.7	177.3	249.3	230.9	6.5	6.6	2.8	silty SAND to sandy SILT	120	3.0	59	77	36	86	42	-	-	15	2.07	16
28.54	235.9	181.0	273.6	236.1	7.9	6.5	3.4	stiff SAND to clayy SAND	115	5.0	36	47	37	87	43	-	-	17	2.13	16
28.71	180.6	138.4	273.2	180.7	8.3	7.1	4.6	very stiff fine SOIL	120	1.0	100	100	31	-	-	6.3	9.9	23	2.31	30
28.87	201.1	153.8	276.8	201.2	8.4	6.7	4.2	very stiff fine SOIL	120	1.0	100	100	33	-	-	7.0	9.9	21	2.25	30
29.04	174.4	133.2	267.5	174.6	8.0	7.0	4.6	very stiff fine SOIL	120	1.0	100	100	30	-	-	6.1	9.9	23	2.32	30
29.20	179.0	136.5	253.0	179.1	7.2	7.4	4.1	very stiff fine SOIL	120	1.0	100	100	30	-	-	6.3	9.9	21	2.27	30
29.36	149.0	113.5	228.9	149.2	6.1	7.6	4.1	very stiff fine SOIL	120	1.0	100	100	25	-	-	5.2	9.9	23	2.32	30
29.53	106.3	80.8	198.2	106.4	4.5	7.5	4.4	clayy SILT to silty CLAY	115	2.0	40	53	19	-	-	7.4	9.9	28	2.43	15
29.69	147.6	112.1	169.5	147.8	3.4	10.0	2.3	silty SAND to sandy SILT	120	3.0	37	49	23	71	40	-	-	17	2.13	16
29.86	227.0	172.2	197.3	227.2	3.2	9.1	1.4	clean SAND to silty SAND	125	5.0	34	45	32	85	42	-	-	9	1.85	16
30.02	266.7	201.9	219.2	266.8	3.4	8.3	1.3	clean SAND to silty SAND	125	5.0	40	53	36	90	43	-	-	7	1.77	16
30.19	264.7	200.2	220.1	264.9	3.6	7.8	1.4	clean SAND to silty SAND	125	5.0	40	53	36	90	43	-	-	8	1.79	16
30.35	247.3	186.7	215.0	247.5	3.9	7.4	1.6	clean SAND to silty SAND	125	5.0	37	49	35	88	43	-	-	9	1.86	16
30.51	231.2	174.3	211.3	231.3	4.2	7.2	1.8	clean SAND to silty SAND	125	5.0	35	46	33	85	42	-	-	11	1.92	16
30.68	226.3	170.3	205.5	226.5	3.9	7.3	1.7	clean SAND to silty SAND	125	5.0	34	45	32	85	42	-	-	11	1.92	16
30.84	234.6	176.3	193.5	234.7	2.8	7.5	1.2	clean SAND to silty SAND	125	5.0	35	47	32	86	42	-	-	8	1.79	16

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Kaiser Fresno MOB

Project ID: Geosphere Consultants, Inc. Page: 3
Data File: SDF(159).cpt Sounding ID: CPT-07
CPT Date: 6/2/2020 2:26:46 PM Project No: 91-04769
GW During Test: 25 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin %	Ic Ic	SBT Indx	Nk -
31.01	226.0	169.6	173.8	226.1	1.8	7.5	0.8	clean SAND to silty SAND	125	5.0	34	45	30	84	42	-	-	6	1.68		16
31.17	224.8	168.4	170.1	225.0	1.7	7.3	0.7	clean SAND to silty SAND	125	5.0	34	45	29	84	42	-	-	5	1.66		16
31.33	225.2	168.5	168.5	225.4	1.5	7.3	0.7	clean SAND to silty SAND	125	5.0	34	45	29	84	42	-	-	5	1.62		16
31.50	224.4	167.6	172.1	224.6	1.8	7.2	0.8	clean SAND to silty SAND	125	5.0	34	45	29	84	42	-	-	6	1.68		16
31.66	228.5	170.4	187.7	228.6	2.7	7.1	1.2	clean SAND to silty SAND	125	5.0	34	46	31	85	42	-	-	8	1.79		16
31.83	207.3	154.4	186.4	207.4	3.3	6.8	1.6	clean SAND to silty SAND	125	5.0	31	41	29	81	42	-	-	11	1.92		16
31.99	221.5	164.7	199.4	221.6	3.8	7.0	1.7	clean SAND to silty SAND	125	5.0	33	44	31	83	42	-	-	11	1.92		16
32.15	209.4	155.4	202.0	209.5	4.3	7.3	2.1	silty SAND to sandy SILT	120	3.0	52	70	31	82	42	-	-	13	2.00		16
32.32	199.6	148.0	203.2	199.8	4.6	7.3	2.3	silty SAND to sandy SILT	120	3.0	49	67	30	80	41	-	-	14	2.05		16
32.48	193.1	142.9	207.6	193.2	4.9	7.2	2.6	silty SAND to sandy SILT	120	3.0	48	64	29	79	41	-	-	16	2.10		16
32.65	190.7	141.0	214.8	190.8	5.4	7.1	2.8	silty SAND to sandy SILT	120	3.0	47	64	29	78	41	-	-	17	2.14		16
32.81	193.4	142.8	213.1	193.6	5.3	7.2	2.8	silty SAND to sandy SILT	120	3.0	48	64	29	79	41	-	-	16	2.12		16
32.97	202.5	149.3	213.8	202.7	5.2	7.3	2.6	silty SAND to sandy SILT	120	3.0	50	68	30	80	41	-	-	15	2.09		16
33.14	183.1	134.8	212.6	183.2	5.4	7.3	3.0	silty SAND to sandy SILT	120	3.0	45	61	28	77	41	-	-	18	2.16		16
33.30	175.9	129.4	215.6	176.1	5.6	7.5	3.2	silty SAND to sandy SILT	120	3.0	43	59	28	75	41	-	-	19	2.20		16
33.47	184.8	135.7	211.4	184.9	5.3	7.3	2.9	silty SAND to sandy SILT	120	3.0	45	62	28	77	41	-	-	17	2.15		16
33.63	203.7	149.4	211.9	203.8	5.1	7.6	2.5	silty SAND to sandy SILT	120	3.0	50	68	30	80	41	-	-	15	2.08		16
33.79	257.2	188.4	226.8	257.4	4.8	7.9	1.9	clean SAND to silty SAND	125	5.0	38	51	36	88	42	-	-	11	1.92		16
33.96	298.6	218.4	248.1	298.8	5.0	8.2	1.7	clean SAND to silty SAND	125	5.0	44	60	40	93	43	-	-	9	1.84		16
34.12	310.2	226.5	249.9	310.4	4.7	8.4	1.5	clean SAND to silty SAND	125	5.0	45	62	41	94	43	-	-	8	1.80		16
34.29	310.6	226.4	247.9	310.7	4.6	8.2	1.5	clean SAND to silty SAND	125	5.0	45	62	41	94	43	-	-	8	1.78		16
34.45	310.5	226.1	246.4	310.7	4.5	7.9	1.4	clean SAND to silty SAND	125	5.0	45	62	41	94	43	-	-	8	1.78		16
34.61	311.2	226.2	253.8	311.3	5.1	7.9	1.6	clean SAND to silty SAND	125	5.0	45	62	42	94	43	-	-	9	1.82		16
34.78	289.6	210.3	243.3	289.8	5.1	7.9	1.8	clean SAND to silty SAND	125	5.0	42	58	39	92	43	-	-	10	1.86		16
34.94	260.8	189.1	221.9	261.0	4.4	7.9	1.7	clean SAND to silty SAND	125	5.0	38	52	36	88	42	-	-	10	1.88		16
35.11	246.4	178.4	237.6	246.6	6.0	7.8	2.5	silty SAND to sandy SILT	120	3.0	59	82	35	86	42	-	-	14	2.02		16
35.27	239.3	173.0	246.5	239.4	6.8	7.8	2.9	silty SAND to sandy SILT	120	3.0	58	80	35	85	42	-	-	15	2.08		16
35.43	211.7	152.9	237.9	211.9	6.7	8.2	3.2	silty SAND to sandy SILT	120	3.0	51	71	32	81	41	-	-	17	2.15		16
35.60	132.6	95.6	209.3	132.7	5.4	8.8	4.1	clayy SILT to silty CLAY	115	2.0	48	66	22	-	-	9.2	9.9	25	2.37		15
35.76	87.7	63.2	166.5	87.9	3.4	7.9	3.9	clayy SILT to silty CLAY	115	2.0	32	44	15	-	-	6.1	9.9	29	2.47		15
35.93	56.1	30.8	-	56.3	3.2	9.6	6.0	silty CLAY to CLAY	115	1.5	21	37	9	-	-	3.8	9.8	48	2.83		15
36.09	64.6	35.4	-	64.9	4.2	11.8	6.7	silty CLAY to CLAY	115	1.5	24	43	10	-	-	4.4	9.9	47	2.82		15
36.26	62.7	34.2	-	62.9	5.1	13.4	8.4	silty CLAY to CLAY	115	1.5	23	42	10	-	-	4.3	9.9	52	2.90		15
36.42	110.0	59.9	-	110.3	6.2	14.2	5.7	clayy SILT to silty CLAY	115	2.0	30	55	15	-	-	7.6	9.9	36	2.61		15
36.58	180.5	129.3	228.2	180.8	6.4	11.7	3.6	silty SAND to sandy SILT	120	3.0	43	60	28	75	40	-	-	20	2.24		16
36.75	233.4	166.9	230.7	233.6	6.0	11.0	2.6	silty SAND to sandy SILT	120	3.0	56	78	34	84	42	-	-	15	2.06		16
36.91	248.9	177.7	229.0	249.1	5.5	10.8	2.2	silty SAND to sandy SILT	120	3.0	59	83	35	86	42	-	-	13	1.99		16
37.08	262.5	187.2	226.9	262.7	5.0	10.9	1.9	clean SAND to silty SAND	125	5.0	37	52	36	88	42	-	-	11	1.92		16
37.24	276.0	196.6	235.8	276.3	5.3	10.7	1.9	clean SAND to silty SAND	125	5.0	39	55	37	89	43	-	-	11	1.91		16
37.40	279.6	198.9	241.8	279.8	5.6	10.8	2.0	clean SAND to silty SAND	125	5.0	40	56	38	90	43	-	-	11	1.93		16
37.57	277.5	197.1	243.6	277.7	5.9	10.7	2.1	clean SAND to silty SAND	125	5.0	39	55	38	89	43	-	-	12	1.95		16
37.73	271.8	192.8	245.4	272.0	6.2	10.5	2.3	silty SAND to sandy SILT	120	3.0	64	91	38	89	42	-	-	12	1.98		16
37.90	263.0	186.3	242.6	263.2	6.2	10.3	2.4	silty SAND to sandy SILT	120	3.0	62	88	37	88	42	-	-	13	2.00		16
38.06	244.3	172.9	232.2	244.5	6.0	10.1	2.5	silty SAND to sandy SILT	120	3.0	58	81	34	85	42	-	-	14	2.03		16
38.22	218.4	154.3	189.4	218.6	3.7	9.9	1.7	clean SAND to silty SAND	125	5.0	31	44	30	81	41	-	-	11	1.94		16
38.39	189.2	133.6	170.7	189.4	3.2	9.3	1.7	clean SAND to silty SAND	125	5.0	27	38	26	77	41	-	-	12	1.98		16
38.55	164.1	115.6	157.4	164.2	2.9	9.0	1.8	silty SAND to sandy SILT	120	3.0	39	55	23	72	40	-	-	14	2.04		16
38.72	124.1	87.4	145.2	124.3	2.7	7.6	2.2	silty SAND to sandy SILT	120	3.0	29	41	19	63	38	-	-	19	2.20		16
38.88	123.5	86.8	146.7	123.7	2.8	7.6	2.3	silty SAND to sandy SILT	120	3.0	29	41	19	62	38	-	-	19	2.21		16
39.04	133.6	93.8	155.1	133.7	3.1	7.5	2.4	silty SAND to sandy SILT	120	3.0	31	45	20	65	39	-	-	19	2.19		16
39.21	151.5	106.2	167.9	151.6	3.6	7.6	2.4	silty SAND to sandy SILT	120	3.0	35	50	22	69	39	-	-	18	2.16		16
39.37	158.2	110.8	174.1	158.4	3.9	7.6	2.5	silty SAND to sandy SILT	120	3.0	37	53	23	70	39	-	-	18	2.16		16
39.54	154.6	108.1	174.8	154.7	3.9	7.6	2.6	silty SAND to sandy SILT	120	3.0	36	52	23	70	39	-	-	18	2.18		16
39.70	161.2	112.6	169.5	161.3	3.6	7.6	2.3	silty SAND to sandy SILT	120	3.0	38	54	23	71	40	-	-	17	2.13		16
39.86	181.4	126.6	180.2	181.5	4.0	8.0	2.2	silty SAND to sandy SILT	120	3.0	42	60	26	75	40	-	-	15	2.08		16
40.03	193.5	134.9	188.5	193.6	4.3	8.3	2.2	silty SAND to sandy SILT	120	3.0	45	64	27	77	40	-	-	15	2.07		16
40.19	198.4	138.1	191.4	198.6	4.4	8.4	2.2	silty SAND to sandy SILT	120	3.0	46	66	28	78	41	-	-	15	2.06		16
40.36	195.6	136.0	187.4	195.8	4.2	8.2	2.2	silty SAND to sandy SILT	120	3.0	45	65	27	77	41	-	-	14	2.05		16
40.52	198.3	137.7	186.8	198.5	4.1	8.2	2.1	silty SAND to sandy SILT	120	3.0	46	66	27	78	41	-	-	14	2.04		16
40.68	227.4	157.7	195.0	227.6	4.0	8.3	1.8	clean SAND to silty SAND	125	5.0	32	45	30	82	41	-	-	12	1.95		16
40.85	252.1	174.6	212.9	252.3	4.6	8.5	1.8	clean SAND to silty SAND	125	5.0	35	50	33	85	42	-	-	11	1.93		16
41.01	250.4	173.2	216.4	250.5	4.9	8.4	2.0	clean SAND to silty SAND	125	5.0	35	50	33	85	42	-	-	12	1.96		16
41.18	218.1	150.7	202.8	218.2	4.8	8.0	2.2	silty SAND to sandy SILT	120	3.0	50	73	30	81	41	-	-	14	2.03		16
41.34	202.5	139.7	194.3	202.6	4.5	7.6	2.3	silty SAND to sandy SILT	120	3.0	47	67	28	78	41	-	-	15	2.06		16
41.50	186.3	128.4	181.5	186.4	4.0	7.4	2.2	silty SAND to sandy SILT	120	3.0	43	62	26	75	40	-	-	15	2.08		16
41.67	182.1	125.4	175.4	182.2	3.8	7.6	2.1	silty SAND to sandy SILT	120	3.0	42	61	25	74	40	-	-	15	2.07		16
41.83	191.2	131.5	179.4	191.4	3.9	7.8	2.0	silty SAND to sandy SILT	120	3.0	44	64	26	76	40	-	-	14	2.05		16
42.00	198.5	136.4	189.5	198.7	4.3	7.8	2.2	silty SAND to sandy SILT	120	3.0	45	66	27	77	40	-	-	15	2.06		16
42.16	195.0	133.8	193.7	195.1	4.7	8.0	2.4	silty SAND to sandy SILT	120	3.0	45	65	27	77	40	-	-	16	2.10		16
42.32	188.8	129.4	192.1	189.0	4.7	7.8	2.5	silty SAND to sandy SILT	120	3.0	43	63	27	76	40	-	-	16	2.12		16
42.49	172.5	118.0	181.9	172.6	4.3	7.7	2.5	silty SAND to sandy SILT	120	3.0	39	57	25	72	40	-	-	17	2.14		16
42.65	153.4	104.9	167.5	153.6	3.7	8.0	2.4	silty SAND to sandy SILT	120	3.0	35	51	22	69	39	-	-	18	2.17		16
42.82	143.1	97.7	157.9	143.3	3.3	7.9	2.4	silty SAND to sandy SILT	120	3.0	33	48	21	66	39	-	-	18	2.18		16
42.98	139.3	95.0	155.1	139.4	3.2	8.1	2.3	silty SAND to sandy SILT	120	3.0	32	46	20	65	38	-	-	19	2.19		16
43.15	140.2	95.5	155.1	140.4	3.2	7.7	2.3	silty SAND to sandy SILT	120	3.0	32	47	20	65	38	-	-	18	2.18		16
43.31	148.6	101.1	154.8	148.8	3.1	7.5	2.1	silty SAND to sandy SILT	120	3.0	34	50	21	67	39	-	-	17	2.14		16
43.47	148.9	101.2	152.9	149.0	3.0	7.4	2.1	silty SAND to sandy SILT	120	3.0	34	50	21	67	39	-	-	17	2.13		16
43.64	140.4	95.3	152.9	140.5	3.1	7.3	2.3	silty SAND to sandy SILT	120	3.0	32	47	20	65	38	-	-	18	2.17		16
43.80	134.6	91.3	157.3	134.7	3.3	7.4	2.5	silty SAND to sandy SILT	120	3.0	30	45	20	64	38	-	-	20	2.22		16
43.97	120.9	81.9	155.4	121.1	3.3	7.6	2.8	silty SAND to sandy SILT	120	3.0	27	40	18	60	38	-	-	22	2.28		16
44.13	97.0	65.6	154.4	97.2	3.1	7.6	3.3	clayy SILT to silty CLAY	115	2.0	33	49	15	-	-	6.7	9.9	27	2.41		15
44.29	83.7	40.5	-	83.9	3.4	8.3	4.2	clayy SILT to silty CLAY	115	2.0	20	42	11	-	-	5.8	9.9	37	2.63		15
44.46	79.3	38.3	-	79.5	3.4	8.9	4.4	clayy SILT to silty CLAY	115	2.0	19	40	10	-	-	5.5	9.9	39	2.66		15
44.62	82.7	39.9	-	82.9	3.5	8.8	4.4	clayy SILT to silty CLAY	115	2.0	20	41	10	-	-	5.7	9.9	38	2.65		15
44.79	67.6	32.5	-	67.8	3.3	8.6	5.1	silty CLAY to CLAY	115	1.5	22	45	9	-	-	4.6	9.9	44	2.76		15
44.95	53.1	25.5	-	53.2	2.7	8.3	5.4	silty CLAY to CLAY	115	1.5	17	35	7	-	-	3.6	8.0	49	2.86		15
45.11	46.8	22.4	-	47.0	2.1	10.8	4.9	silty CLAY to CLAY	115	1.5	15	31	7	-	-	3.2	7.0	50	2.87		15
45.28	66.5	31.8	-	66.7	2.2	11.4	3.5	clayy SILT to silty CLAY	115	2.0	16	33	8	-	-	4.6	9.9	38	2.65		15
45.44	50.9	24.3	-	51.1	2.0	11.7	4.2	silty CLAY to CLAY	115	1.5	16	34	7	-	-	3.4	7.6	46	2.80		15
45.61	46.8	22.3	-	47.1	1.7	13.9	3.9	silty CLAY to CLAY	115	1.5	15	31	6	-	-	3.2	6.9	47	2.81		15
45.77	48.9	23.2	-	49.2	2.3	16.5	5.0	silty CLAY to CLAY	115	1.5	15	33	7	-	-	3.3	7.2	50	2.87		15
45.93	53.6	25.4	-	54.0	4.2	20.6	8.3	silty CLAY to CLAY	115	1.5	17	36	8	-	-	3.6	8.0	58	2.99		15
46.10	80.6	38.1	-	81.1	6.1	26.5	7.9	silty CLAY to CLAY	115	1.5	25	54	11	-	-	5.5	9.9	49	2.85		15
46.26	138.1	92.2	233.8	138.5	6.9	20.3	5.1	very stiff fine SOIL	120	1.0	92	100	22	-	-	4.8	9.9	29	2.45		30

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Geosphere Consultants, Inc. Page: 4
Data File: SDF(159).cpt Sounding ID: CPT-07
CPT Date: 6/2/2020 2:26:46 PM Project No: 91-04769
GW During Test: 25 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -
46.43	117.2	55.2	-	117.6	6.5	21.4	5.7	silty CLAY to CLAY	115	1.5	37	78	14	-	-	8.1	9.9	37	2.63	15
46.59	226.4	150.8	247.3	227.2	7.8	39.6	3.5	stiff SAND to clayy SAND	115	5.0	30	45	32	81	41	-	-	19	2.19	16
46.75	323.0	214.9	285.4	323.4	9.0	23.7	2.8	stiff SAND to clayy SAND	115	5.0	43	65	43	92	43	-	-	14	2.02	16
46.92	349.2	232.1	287.9	349.6	8.4	21.0	2.4	clean SAND to silty SAND	125	5.0	46	70	45	95	43	-	-	12	1.95	16
47.08	351.7	233.5	280.9	352.1	7.7	19.5	2.2	clean SAND to silty SAND	125	5.0	47	70	44	95	43	-	-	11	1.91	16
47.25	331.8	220.0	271.2	332.2	7.5	18.9	2.3	clean SAND to silty SAND	125	5.0	44	66	42	93	43	-	-	11	1.94	16
47.41	318.2	210.8	265.5	318.6	7.5	18.5	2.4	clean SAND to silty SAND	125	5.0	42	64	41	92	43	-	-	12	1.97	16
47.57	331.2	219.1	275.8	331.6	8.0	18.0	2.4	clean SAND to silty SAND	125	5.0	44	66	42	93	43	-	-	12	1.97	16
47.74	335.5	221.7	276.1	335.9	7.9	18.2	2.4	clean SAND to silty SAND	125	5.0	44	67	43	93	43	-	-	12	1.95	16
47.90	338.9	223.6	267.2	339.2	7.0	18.3	2.1	clean SAND to silty SAND	125	5.0	45	68	42	94	43	-	-	11	1.91	16
48.07	315.0	207.6	249.6	315.3	6.3	18.3	2.0	clean SAND to silty SAND	125	5.0	42	63	39	91	42	-	-	11	1.91	16
48.23	228.4	150.4	212.0	228.7	5.6	16.8	2.5	silty SAND to sandy SILT	120	3.0	50	76	30	80	41	-	-	15	2.07	16
48.39	286.8	188.6	242.9	287.1	6.6	16.1	2.3	silty SAND to sandy SILT	120	3.0	63	96	37	88	42	-	-	13	1.99	16
48.56	277.7	182.4	242.7	278.0	6.9	15.7	2.5	silty SAND to sandy SILT	120	3.0	61	93	36	87	42	-	-	14	2.02	16
48.72	286.4	188.0	243.9	286.7	6.8	16.6	2.4	silty SAND to sandy SILT	120	3.0	63	95	37	88	42	-	-	13	2.00	16
48.89	262.9	172.4	226.0	263.3	6.0	16.5	2.3	silty SAND to sandy SILT	120	3.0	57	88	34	85	41	-	-	13	2.01	16
49.05	267.6	175.2	222.1	267.9	5.6	16.2	2.1	clean SAND to silty SAND	125	5.0	35	54	34	86	42	-	-	12	1.97	16
49.22	294.9	192.9	242.1	295.3	6.4	16.7	2.2	clean SAND to silty SAND	125	5.0	39	59	37	89	42	-	-	12	1.96	16
49.38	283.1	185.0	254.8	283.4	7.7	16.0	2.8	silty SAND to sandy SILT	120	3.0	62	94	37	87	42	-	-	14	2.05	16
49.54	225.8	147.4	256.1	226.1	8.5	15.6	3.8	stiff SAND to clayy SAND	115	5.0	29	45	32	80	41	-	-	20	2.23	16
49.71	213.2	139.0	267.6	213.5	9.3	15.6	4.4	very stiff fine SOIL	120	1.0	100	100	31	-	-	7.5	9.9	22	2.29	30
49.87	212.6	138.5	260.2	213.0	8.8	17.2	4.2	very stiff fine SOIL	120	1.0	100	100	30	-	-	7.4	9.9	22	2.28	30
50.04	226.3	147.2	267.6	226.7	9.3	18.3	4.2	very stiff fine SOIL	120	1.0	100	100	32	-	-	7.9	9.9	21	2.26	30
50.20	160.4	104.2	229.3	160.7	7.0	17.6	4.5	very stiff fine SOIL	120	1.0	100	100	24	-	-	5.6	9.9	25	2.37	30
50.36	94.7	42.3	-	95.1	4.7	17.1	5.1	silty CLAY to CLAY	115	1.5	28	63	11	-	-	6.5	9.9	39	2.68	15
50.53	54.5	24.3	-	54.9	3.3	18.5	6.4	silty CLAY to CLAY	115	1.5	16	36	7	-	-	3.7	7.6	53	2.92	15
50.69	44.7	19.9	-	45.1	2.3	22.6	5.4	silty CLAY to CLAY	115	1.5	13	30	6	-	-	3.0	6.1	55	2.95	15
50.86	38.9	17.3	-	39.5	1.8	26.0	4.9	silty CLAY to CLAY	115	1.5	12	26	5	-	-	2.6	5.3	56	2.96	15
51.02	39.0	17.3	-	39.6	1.7	29.6	4.9	silty CLAY to CLAY	115	1.5	12	26	5	-	-	2.6	5.3	56	2.96	15

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

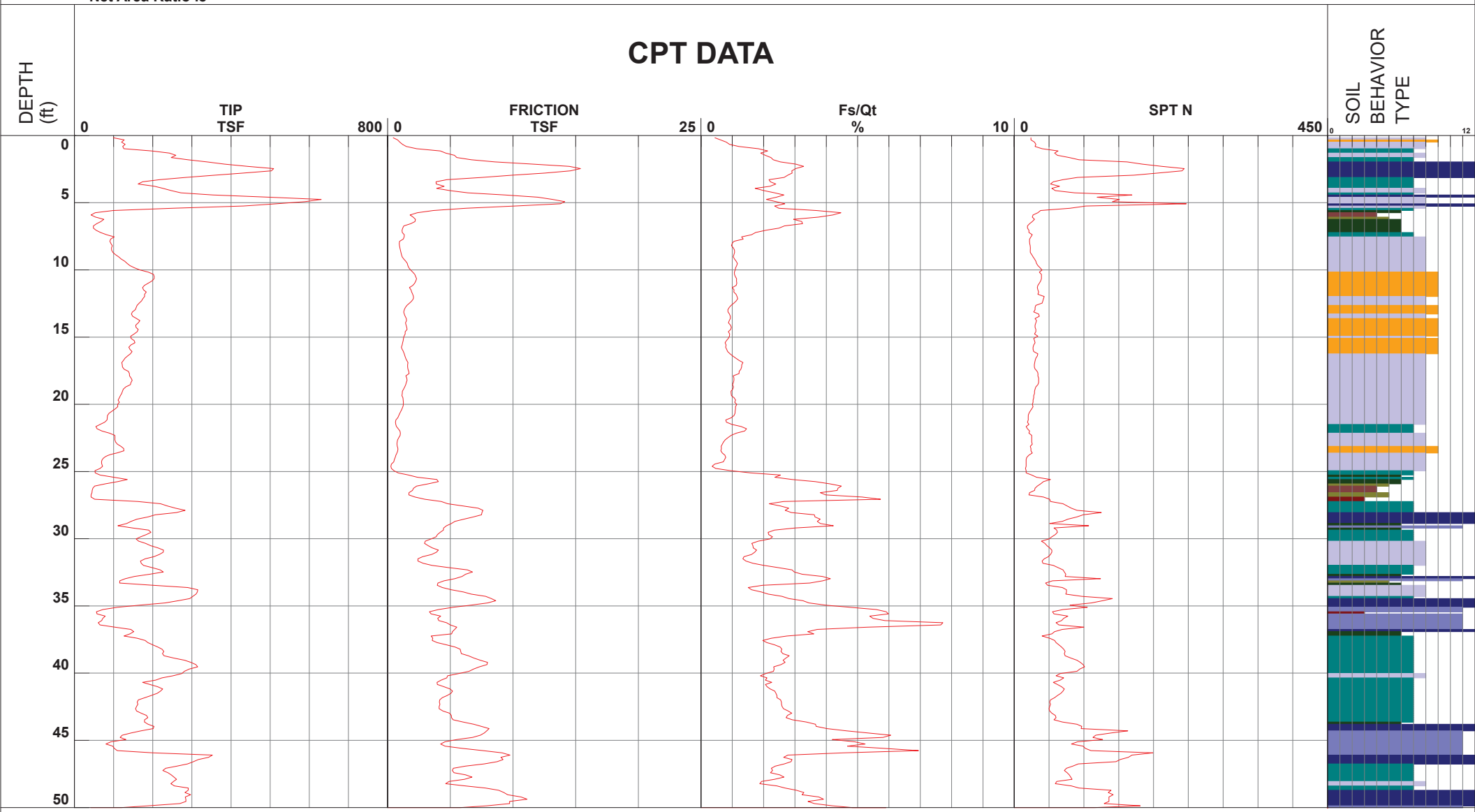
Middle Earth Geo Testing

Geosphere Consultants, Inc.

Project	Kaiser Fresno MOB	Operator	BH-GH	Filename	SDF(154).cpt
Job Number	91-04769	Cone Number	DDG1496	GPS	
Hole Number	CPT-08	Date and Time	6/2/2020 10:22:46 AM	Maximum Depth	50.69 ft
EST GW Depth During Test		25.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Cone Size 10cm squared

S*Soil behavior type and SPT based on data from UBC-1983

Kaiser Fresno MOB

Project ID: Geosphere Consultants, Inc. Page: 1
Data File: SDF(154).cpt Sounding ID: CPT-08
CPT Date: 6/2/2020 10:22:46 AM Project No: 91-04769
GW During Test: 25 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -
0.33	127.1	203.9	203.9	127.1	0.8	-0.1	0.6	clean SAND to silty SAND	125	5.0	41	25	34	91	48	-	-	5	1.54	16
0.49	120.5	193.2	193.2	120.5	1.0	0.0	0.8	clean SAND to silty SAND	125	5.0	39	24	33	89	48	-	-	5	1.64	16
0.66	129.7	207.9	208.4	129.7	1.2	0.1	0.9	clean SAND to silty SAND	125	5.0	42	26	36	91	48	-	-	5	1.65	16
0.82	123.2	197.6	212.2	123.2	1.5	0.1	1.2	clean SAND to silty SAND	125	5.0	40	25	35	89	48	-	-	7	1.75	16
0.98	126.5	202.9	238.4	126.5	2.3	0.2	1.8	clean SAND to silty SAND	125	5.0	41	25	38	90	48	-	-	10	1.88	16
1.15	197.5	316.8	357.0	197.5	4.2	0.2	2.1	clean SAND to silty SAND	125	5.0	63	40	58	95	48	-	-	9	1.83	16
1.31	242.4	388.8	414.1	242.4	4.6	0.4	1.9	clean SAND to silty SAND	125	5.0	78	48	69	95	48	-	-	7	1.74	16
1.48	259.3	415.8	446.5	259.3	5.3	0.0	2.1	clean SAND to silty SAND	125	5.0	83	52	75	95	48	-	-	7	1.75	16
1.64	247.1	396.3	437.2	247.1	5.5	0.3	2.2	stiff SAND to clayy SAND	115	5.0	79	49	72	95	48	-	-	8	1.80	16
1.80	289.9	464.9	506.2	289.9	6.7	0.4	2.3	stiff SAND to clayy SAND	115	5.0	93	58	84	95	48	-	-	8	1.78	16
1.97	338.5	542.8	593.7	338.5	8.6	0.0	2.5	stiff SAND to clayy SAND	115	5.0	100	68	98	95	48	-	-	8	1.78	16
2.13	383.5	615.0	695.6	383.5	11.6	0.4	3.0	stiff SAND to clayy SAND	115	5.0	100	77	100	95	48	-	-	9	1.83	16
2.30	442.2	709.2	808.0	442.2	14.5	1.2	3.3	stiff SAND to clayy SAND	115	5.0	100	88	100	95	48	-	-	9	1.84	16
2.46	508.9	816.1	897.2	508.9	15.4	1.4	3.0	stiff SAND to clayy SAND	115	5.0	100	100	100	95	48	-	-	8	1.79	16
2.62	503.1	806.8	878.0	503.1	14.6	0.3	2.9	stiff SAND to clayy SAND	115	5.0	100	100	100	95	48	-	-	8	1.77	16
2.79	431.1	691.3	764.2	431.1	12.5	0.0	2.9	stiff SAND to clayy SAND	115	5.0	100	86	100	95	48	-	-	8	1.80	16
2.95	358.8	575.5	640.4	358.8	9.9	0.4	2.8	stiff SAND to clayy SAND	115	5.0	100	72	100	95	48	-	-	8	1.81	16
3.12	284.1	455.6	515.7	284.1	7.5	0.0	2.7	stiff SAND to clayy SAND	115	5.0	91	57	84	95	48	-	-	9	1.83	16
3.28	217.8	349.3	389.6	217.8	4.7	0.2	2.2	clean SAND to silty SAND	125	5.0	70	44	64	95	48	-	-	8	1.81	16
3.45	174.1	279.3	324.8	174.1	3.9	0.3	2.2	clean SAND to silty SAND	125	5.0	56	35	52	95	48	-	-	10	1.87	16
3.61	162.6	260.8	313.7	162.6	3.9	0.6	2.4	clean SAND to silty SAND	125	5.0	52	33	50	95	48	-	-	11	1.91	16
3.77	204.3	327.6	370.6	204.3	4.5	0.7	2.2	clean SAND to silty SAND	125	5.0	66	41	60	95	48	-	-	9	1.83	16
3.94	226.5	363.3	381.5	226.5	3.9	0.9	1.7	clean SAND to silty SAND	125	5.0	73	45	64	95	48	-	-	6	1.72	16
4.10	247.4	396.7	426.5	247.4	5.0	0.6	2.0	clean SAND to silty SAND	125	5.0	79	49	71	95	48	-	-	7	1.75	16
4.27	272.1	436.5	481.6	272.2	6.4	0.7	2.4	stiff SAND to clayy SAND	115	5.0	87	54	79	95	48	-	-	8	1.80	16
4.43	353.7	567.3	624.6	353.8	9.4	1.6	2.6	stiff SAND to clayy SAND	115	5.0	100	71	100	95	48	-	-	8	1.79	16
4.59	496.9	796.9	827.3	497.0	12.0	5.8	2.4	stiff SAND to clayy SAND	115	5.0	100	99	100	95	48	-	-	6	1.70	16
4.76	630.5	1011.1	1011.1	630.8	13.2	14.5	2.1	stiff SAND to clayy SAND	115	5.0	100	100	100	95	48	-	-	5	1.61	16
4.92	588.8	944.4	964.1	589.0	14.1	9.4	2.4	stiff SAND to clayy SAND	115	5.0	100	100	100	95	48	-	-	6	1.68	16
5.09	515.5	826.8	879.0	515.6	13.8	4.5	2.7	stiff SAND to clayy SAND	115	5.0	100	100	100	95	48	-	-	7	1.74	16
5.25	431.1	691.5	723.5	431.2	10.2	5.0	2.4	stiff SAND to clayy SAND	115	5.0	100	86	100	95	48	-	-	6	1.71	16
5.41	250.6	401.9	455.0	250.5	6.2	-1.9	2.5	stiff SAND to clayy SAND	115	5.0	80	50	74	95	48	-	-	9	1.83	16
5.58	99.8	160.0	263.0	99.7	3.7	-0.3	3.7	stiff SAND to clayy SAND	115	5.0	32	20	34	83	46	-	-	19	2.19	16
5.74	53.1	85.2	206.4	53.1	2.4	-0.3	4.5	clayy SILT to silty CLAY	115	2.0	43	27	20	-	-	3.7	9.9	28	2.43	15
5.91	42.6	68.2	178.9	42.6	1.8	2.1	4.2	clayy SILT to silty CLAY	115	2.0	34	21	16	-	-	3.0	9.9	29	2.47	15
6.07	54.0	86.6	188.1	54.2	2.0	9.3	3.8	clayy SILT to silty CLAY	115	2.0	43	27	20	-	-	3.8	9.9	25	2.36	15
6.23	75.2	119.9	197.7	75.3	2.2	5.3	3.0	silty SAND to sandy SILT	120	3.0	40	25	25	73	44	-	-	19	2.19	16
6.40	67.9	106.8	193.0	67.8	2.2	-0.3	3.2	silty SAND to sandy SILT	120	3.0	36	23	23	69	43	-	-	21	2.25	16
6.56	56.8	88.3	175.0	56.8	1.8	-1.1	3.3	silty SAND to sandy SILT	120	3.0	29	19	20	63	42	-	-	23	2.31	16
6.73	48.6	74.6	144.9	48.5	1.3	-1.1	2.7	silty SAND to sandy SILT	120	3.0	25	16	17	57	42	-	-	22	2.30	16
6.89	48.5	73.5	139.1	48.4	1.2	-1.4	2.5	silty SAND to sandy SILT	120	3.0	25	16	16	57	41	-	-	22	2.28	16
7.05	55.4	83.0	135.8	55.3	1.1	-2.2	2.1	silty SAND to sandy SILT	120	3.0	28	18	18	61	42	-	-	19	2.19	16
7.22	66.8	99.0	140.4	66.8	1.2	-1.3	1.8	silty SAND to sandy SILT	120	3.0	33	22	20	67	43	-	-	15	2.08	16
7.38	82.3	120.6	156.0	82.3	1.3	-0.9	1.6	clean SAND to silty SAND	125	5.0	24	16	24	73	44	-	-	13	1.99	16
7.55	101.5	146.9	170.3	101.4	1.3	-1.9	1.3	clean SAND to silty SAND	125	5.0	29	20	27	80	45	-	-	10	1.87	16
7.71	92.5	132.4	158.7	92.4	1.2	-2.0	1.4	clean SAND to silty SAND	125	5.0	26	18	25	76	44	-	-	11	1.91	16
7.87	90.3	127.9	146.1	90.3	0.9	-2.0	1.1	clean SAND to silty SAND	125	5.0	26	18	24	75	44	-	-	9	1.85	16
8.04	93.5	131.0	147.1	93.4	0.9	-1.6	1.0	clean SAND to silty SAND	125	5.0	26	19	24	76	44	-	-	9	1.82	16
8.20	96.8	134.2	149.4	96.8	0.9	-1.6	1.0	clean SAND to silty SAND	125	5.0	27	19	25	77	44	-	-	8	1.81	16
8.37	94.9	130.2	147.6	94.8	1.0	-2.0	1.0	clean SAND to silty SAND	125	5.0	26	19	24	76	44	-	-	9	1.84	16
8.53	95.1	129.1	147.8	95.0	1.0	-2.1	1.1	clean SAND to silty SAND	125	5.0	26	19	24	75	44	-	-	9	1.85	16
8.69	98.2	132.0	150.4	98.1	1.1	-2.0	1.1	clean SAND to silty SAND	125	5.0	26	20	24	76	44	-	-	9	1.84	16
8.86	104.7	139.4	156.3	104.6	1.1	-2.0	1.1	clean SAND to silty SAND	125	5.0	28	21	26	78	44	-	-	9	1.82	16
9.02	113.0	149.1	164.1	113.0	1.2	-1.9	1.0	clean SAND to silty SAND	125	5.0	30	23	27	80	44	-	-	8	1.79	16
9.19	119.4	156.1	171.5	119.4	1.3	-2.0	1.1	clean SAND to silty SAND	125	5.0	31	24	28	82	44	-	-	8	1.79	16
9.35	128.4	166.3	182.1	128.4	1.4	-1.8	1.1	clean SAND to silty SAND	125	5.0	33	26	30	84	45	-	-	8	1.78	16
9.51	134.8	173.0	189.4	134.8	1.6	-1.8	1.2	clean SAND to silty SAND	125	5.0	35	27	31	85	45	-	-	8	1.78	16
9.68	141.4	179.8	194.6	141.4	1.6	-1.7	1.1	clean SAND to silty SAND	125	5.0	36	28	32	86	45	-	-	7	1.77	16
9.84	153.3	193.3	205.0	153.3	1.7	-1.7	1.1	clean SAND to silty SAND	125	5.0	39	31	34	89	45	-	-	7	1.73	16
10.01	168.1	210.1	218.8	168.0	1.8	-1.8	1.1	clean SAND to silty SAND	125	5.0	42	34	37	92	46	-	-	6	1.70	16
10.17	188.8	234.0	237.3	188.7	2.0	-2.0	1.1	clean SAND to silty SAND	125	5.0	47	38	41	95	46	-	-	5	1.67	16
10.34	202.1	248.4	249.3	202.0	2.2	-1.7	1.1	clean SAND to silty SAND	125	5.0	50	40	43	95	46	-	-	5	1.65	16
10.50	203.8	248.6	250.7	203.8	2.2	-1.7	1.1	clean SAND to silty SAND	125	5.0	50	41	43	95	46	-	-	5	1.66	16
10.66	203.5	246.1	250.8	203.4	2.3	-1.6	1.1	clean SAND to silty SAND	125	5.0	49	41	43	95	46	-	-	6	1.67	16
10.83	198.0	237.7	243.6	198.0	2.2	-1.8	1.1	clean SAND to silty SAND	125	5.0	48	40	42	95	46	-	-	6	1.68	16
10.99	188.4	224.3	233.0	188.3	2.2	-1.9	1.1	clean SAND to silty SAND	125	5.0	45	38	40	94	46	-	-	6	1.70	16
11.16	178.5	211.0	220.9	178.5	2.0	-2.2	1.1	clean SAND to silty SAND	125	5.0	42	36	37	92	45	-	-	6	1.71	16
11.32	174.0	204.1	209.9	174.0	1.7	-2.0	1.0	clean SAND to silty SAND	125	5.0	41	35	36	91	45	-	-	6	1.69	16
11.48	176.4	205.4	213.3	176.4	1.9	-1.8	1.1	clean SAND to silty SAND	125	5.0	41	35	36	91	45	-	-	6	1.70	16
11.65	183.5	212.1	218.5	183.5	1.9	-2.0	1.0	clean SAND to silty SAND	125	5.0	42	37	37	92	45	-	-	6	1.69	16
11.81	179.2	205.6	216.0	179.2	2.0	-1.9	1.1	clean SAND to silty SAND	125	5.0	41	36	36	91	45	-	-	6	1.72	16
11.98	179.3	204.2	216.1	179.2	2.1	-1.7	1.2	clean SAND to silty SAND	125	5.0	41	36	36	91	45	-	-	7	1.73	16
12.14	174.5	197.4	211.0	174.5	2.0	-1.6	1.2	clean SAND to silty SAND	125	5.0	39	35	35	89	45	-	-	7	1.75	16
12.30	171.4	192.6	205.3	171.4	1.9	-1.7	1.1	clean SAND to silty SAND	125	5.0	39	34	34	89	45	-	-	7	1.74	16
12.47	165.6	184.8	195.8	165.6	1.7	-1.9	1.1	clean SAND to silty SAND	125	5.0	37	33	33	87	44	-	-	7	1.73	16
12.63	160.0	177.4	186.1	160.0	1.5	-1.9	1.0	clean SAND to silty SAND	125	5.0	35	32	31	86	44	-	-	6	1.72	16
12.80	157.9	173.9	180.9	157.9	1.4	-2.0	0.9	clean SAND to silty SAND	125	5.0	35	32	31	85	44	-	-	6	1.70	16
12.96	155.6	170.2	176.2	155.5	1.3	-2.0	0.9	clean SAND to silty SAND	125	5.0	34	31	30	85	44	-	-	6	1.70	16
13.12	148.1	161.0	168.7	148.1	1.3	-2.0	0.9	clean SAND to silty SAND	125	5.0	32	30	28	83	44	-	-	6	1.71	16
13.29	145.5	157.2	167.2	145.5	1.3	-1.7	0.9	clean SAND to silty SAND	125	5.0	31	29	28	82	44	-	-	7	1.74	16
13.45	148.7	159.6	170.3	148.7	1.4	-1.9	0.9	clean SAND to silty SAND	125	5.0	32	30	29	82	44	-	-	7	1.74	16
13.62	158.7	169.2	178.3	158.6	1.5	-1.7	0.9	clean SAND to silty SAND	125	5.0	34	32	30	84	44	-	-	7	1.72	16
13.78	167.1	177.2	183.6	167.1	1.5	-1.1	0.9	clean SAND to silty SAND	125	5.0	35	33	31	86	44	-	-	6	1.70	16
13.94	162.8	171.5	178.0	162.8	1.4	-1.5	0.9	clean SAND to silty SAND	125	5.0	34	33	30	85	44	-	-	6	1.70	16
14.11	156.7	164.2	174.2	156.7	1.5	-1.4	0.9	clean SAND to silty SAND	125	5.0	33	31	29	83	44	-	-	7	1.73	16
14.27	157.2	163.7	174.8	157.2	1.5	-1.5	1.0	clean SAND to silty SAND	125	5.0	33	31	29	83	44	-	-	7	1.74	16
14.44	162.8	168.6	178.2	162.8	1.5	-1.5	1.0	clean SAND to silty SAND	125	5.0	34	33	30	84	44	-	-	7	1.73	16
14.60	160.2	164.9	172.3	160.2	1.4	-1.3	0.9	clean SAND to silty SAND	125	5.0	33	32	29	84	44	-	-	6	1.71	16
14.76	152.8	156.3	166.7	152.7	1.4	-1.5	0.9	clean SAND to silty SAND	125	5.0	31	31	28	82	43	-	-	7	1.74	16
14.93	143.8	146.3	158.0	143.7	1.3	-1.6	0.9	clean SAND to silty SAND	125	5.0	29	29	26	80	43	-	-	7	1.76	16
15.09	144.5	146.2	156.7	144.5	1.3	-1.7	0.9	clean SAND to silty SAND	125	5.0	29	29	26	80	43	-	-	7	1.75	16
15.26	152.6	153.6	160.8	152.6	1.2	-1.5	0.8	clean SAND to silty SAND	125	5.0	31	31	27	81	43	-	-	6	1.71	16
15.42	154.8	154.9	160.3	154.7	1.2	-1.6	0.8	clean SAND to silty SAND	125	5.0	31	31	27	81	43	-	-	6	1.70	16

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Geosphere Consultants, Inc. Page: 2
Data File: SDF(154).cpt Sounding ID: CPT-08
CPT Date: 6/2/2020 10:22:46 AM Project No: 91-04769
GW During Test: 25 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -
15.58	144.2	143.5	152.1	144.1	1.2	-1.6	0.8	clean SAND to silty SAND	125	5.0	29	29	26	79	43	-	-	7	1.73	16
15.75	139.0	137.6	146.7	138.9	1.1	-1.6	0.8	clean SAND to silty SAND	125	5.0	28	28	25	78	42	-	-	7	1.74	16
15.91	141.9	139.7	149.4	141.8	1.2	-1.6	0.8	clean SAND to silty SAND	125	5.0	28	28	25	78	42	-	-	7	1.75	16
16.08	147.3	144.3	154.4	147.2	1.3	-1.3	0.9	clean SAND to silty SAND	125	5.0	29	29	26	79	43	-	-	7	1.75	16
16.24	143.0	139.4	152.7	143.0	1.3	-1.4	0.9	clean SAND to silty SAND	125	5.0	28	29	25	78	42	-	-	8	1.78	16
16.40	135.8	131.7	148.4	135.8	1.4	-1.3	1.0	clean SAND to silty SAND	125	5.0	26	27	24	76	42	-	-	9	1.83	16
16.57	129.4	124.8	145.3	129.4	1.4	-1.4	1.1	clean SAND to silty SAND	125	5.0	25	26	23	74	42	-	-	10	1.87	16
16.73	125.2	120.2	144.2	125.2	1.5	-1.4	1.2	clean SAND to silty SAND	125	5.0	24	25	23	73	42	-	-	11	1.91	16
16.90	121.1	115.7	143.8	121.1	1.6	-1.4	1.4	clean SAND to silty SAND	125	5.0	23	24	22	72	41	-	-	12	1.95	16
17.06	122.2	116.1	143.0	122.2	1.6	-1.4	1.3	clean SAND to silty SAND	125	5.0	23	24	22	72	41	-	-	11	1.94	16
17.23	122.7	116.0	142.8	122.7	1.6	-1.4	1.3	clean SAND to silty SAND	125	5.0	23	25	22	72	41	-	-	11	1.94	16
17.39	127.0	119.6	145.4	127.0	1.6	-1.4	1.3	clean SAND to silty SAND	125	5.0	24	25	23	73	41	-	-	11	1.93	16
17.55	138.0	129.3	152.4	138.0	1.7	-1.4	1.2	clean SAND to silty SAND	125	5.0	26	28	24	75	42	-	-	10	1.89	16
17.72	140.3	130.8	153.7	140.3	1.7	-1.4	1.2	clean SAND to silty SAND	125	5.0	26	28	25	76	42	-	-	10	1.88	16
17.88	140.9	130.7	148.2	140.9	1.4	-1.3	1.0	clean SAND to silty SAND	125	5.0	26	28	24	76	42	-	-	9	1.84	16
18.05	144.6	133.6	151.3	144.6	1.5	-1.3	1.1	clean SAND to silty SAND	125	5.0	27	29	25	77	42	-	-	9	1.83	16
18.21	147.7	135.8	153.2	147.7	1.5	-1.3	1.1	clean SAND to silty SAND	125	5.0	27	30	25	77	42	-	-	9	1.83	16
18.37	144.4	132.1	149.4	144.4	1.5	-1.4	1.0	clean SAND to silty SAND	125	5.0	26	29	24	76	42	-	-	9	1.83	16
18.54	143.0	130.3	147.1	143.0	1.4	-1.5	1.0	clean SAND to silty SAND	125	5.0	26	29	24	76	42	-	-	9	1.83	16
18.70	131.4	119.1	138.2	131.3	1.4	-1.6	1.0	clean SAND to silty SAND	125	5.0	24	26	22	73	41	-	-	10	1.87	16
18.87	125.2	113.0	132.3	125.1	1.3	-1.6	1.0	clean SAND to silty SAND	125	5.0	23	25	21	71	41	-	-	10	1.88	16
19.03	122.7	110.3	128.2	122.6	1.2	-1.6	1.0	clean SAND to silty SAND	125	5.0	22	25	21	70	41	-	-	10	1.87	16
19.19	120.8	108.1	126.6	120.8	1.2	-1.5	1.0	clean SAND to silty SAND	125	5.0	22	24	20	70	41	-	-	10	1.88	16
19.36	117.2	104.5	123.6	117.2	1.1	-1.5	1.0	clean SAND to silty SAND	125	5.0	21	23	20	68	40	-	-	10	1.89	16
19.52	115.0	102.0	123.8	114.9	1.2	-1.6	1.1	clean SAND to silty SAND	125	5.0	20	23	19	68	40	-	-	11	1.93	16
19.69	111.6	98.6	122.2	111.6	1.2	-1.5	1.1	clean SAND to silty SAND	125	5.0	20	22	19	67	40	-	-	12	1.95	16
19.85	114.6	100.8	123.3	114.5	1.2	-1.6	1.1	clean SAND to silty SAND	125	5.0	20	23	19	67	40	-	-	11	1.94	16
20.01	110.7	97.0	121.9	110.6	1.3	-1.5	1.2	clean SAND to silty SAND	125	5.0	19	22	19	66	40	-	-	12	1.96	16
20.18	110.8	96.7	120.4	110.8	1.2	-1.5	1.1	clean SAND to silty SAND	125	5.0	19	22	19	66	40	-	-	12	1.96	16
20.34	104.1	90.4	115.0	104.0	1.1	-1.6	1.1	clean SAND to silty SAND	125	5.0	18	21	18	64	40	-	-	12	1.98	16
20.51	96.3	83.3	108.7	96.3	1.0	-1.7	1.1	clean SAND to silty SAND	125	5.0	17	19	16	61	39	-	-	13	2.00	16
20.67	88.4	76.2	102.7	88.4	1.0	-1.6	1.1	clean SAND to silty SAND	125	5.0	15	18	15	58	39	-	-	14	2.03	16
20.83	84.4	72.4	98.6	84.4	0.9	-1.6	1.1	clean SAND to silty SAND	125	5.0	14	17	14	56	38	-	-	14	2.04	16
21.00	83.9	71.7	95.6	83.9	0.8	-1.5	1.0	clean SAND to silty SAND	125	5.0	14	17	14	56	38	-	-	14	2.02	16
21.16	83.2	70.8	90.1	83.2	0.7	-1.5	0.8	clean SAND to silty SAND	125	5.0	14	17	14	56	38	-	-	12	1.98	16
21.33	77.3	65.6	86.3	77.3	0.6	-1.6	0.8	clean SAND to silty SAND	125	5.0	13	15	13	53	38	-	-	13	2.01	16
21.49	65.7	55.5	83.1	65.6	0.6	-1.6	1.0	silty SAND to sandy SILT	120	3.0	18	22	11	48	37	-	-	16	2.12	16
21.65	54.8	46.1	83.8	54.8	0.7	-1.5	1.3	silty SAND to sandy SILT	120	3.0	15	18	10	41	35	-	-	21	2.26	16
21.82	58.1	48.7	90.4	58.1	0.8	-1.5	1.5	silty SAND to sandy SILT	120	3.0	16	19	11	43	36	-	-	21	2.27	16
21.98	70.2	58.6	96.7	70.1	1.0	-1.4	1.4	silty SAND to sandy SILT	120	3.0	20	23	12	49	37	-	-	19	2.19	16
22.15	89.4	74.4	102.4	89.3	1.0	-1.3	1.1	silty SAND to sandy SILT	120	3.0	25	30	15	57	38	-	-	14	2.05	16
22.31	103.4	85.8	107.3	103.4	1.0	-1.5	1.0	clean SAND to silty SAND	125	5.0	17	21	17	62	39	-	-	12	1.96	16
22.47	103.6	85.7	104.5	103.6	0.9	-1.5	0.9	clean SAND to silty SAND	125	5.0	17	21	16	62	39	-	-	11	1.93	16
22.64	103.1	84.9	101.6	103.1	0.8	-1.5	0.8	clean SAND to silty SAND	125	5.0	17	21	16	62	39	-	-	11	1.91	16
22.80	105.1	86.2	101.1	105.1	0.8	-1.6	0.7	clean SAND to silty SAND	125	5.0	17	21	16	62	39	-	-	10	1.88	16
22.97	109.9	89.8	103.2	109.9	0.7	-1.5	0.7	clean SAND to silty SAND	125	5.0	18	22	17	63	39	-	-	9	1.85	16
23.13	118.6	96.6	108.0	118.6	0.8	-1.4	0.7	clean SAND to silty SAND	125	5.0	19	24	18	66	40	-	-	8	1.81	16
23.30	125.9	102.2	112.8	125.9	0.8	-1.3	0.7	clean SAND to silty SAND	125	5.0	20	25	19	68	40	-	-	8	1.80	16
23.46	126.5	102.3	112.3	126.4	0.8	-1.4	0.6	clean SAND to silty SAND	125	5.0	20	25	19	68	40	-	-	8	1.79	16
23.62	108.3	87.2	101.0	108.2	0.7	-1.5	0.7	clean SAND to silty SAND	125	5.0	17	22	16	62	39	-	-	10	1.87	16
23.79	87.4	70.2	88.8	87.4	0.7	-1.7	0.8	clean SAND to silty SAND	125	5.0	14	17	14	55	38	-	-	12	1.97	16
23.95	76.5	61.2	82.3	76.5	0.6	-1.4	0.8	clean SAND to silty SAND	125	5.0	12	15	12	51	37	-	-	14	2.03	16
24.12	71.4	57.0	77.9	71.4	0.5	-1.5	0.8	clean SAND to silty SAND	125	5.0	11	14	11	48	36	-	-	14	2.05	16
24.28	69.0	54.9	75.2	69.0	0.5	-1.5	0.7	clean SAND to silty SAND	125	5.0	11	14	11	47	36	-	-	14	2.05	16
24.44	69.9	55.4	68.2	69.9	0.3	-1.4	0.4	clean SAND to silty SAND	125	5.0	11	14	11	47	36	-	-	11	1.94	16
24.61	71.8	56.7	67.0	71.8	0.3	-1.6	0.4	clean SAND to silty SAND	125	5.0	11	14	11	48	36	-	-	10	1.89	16
24.77	65.5	51.6	65.9	65.5	0.3	-1.6	0.5	clean SAND to silty SAND	125	5.0	10	13	10	45	36	-	-	12	1.98	16
24.94	52.6	41.2	71.2	52.6	0.5	-1.6	1.0	silty SAND to sandy SILT	120	3.0	14	18	9	38	34	-	-	20	2.22	16
25.10	53.0	41.5	88.1	52.9	0.8	-1.3	1.6	silty SAND to sandy SILT	120	3.0	14	18	9	38	34	-	-	24	2.35	16
25.26	65.5	51.2	120.6	65.5	1.7	-1.1	2.6	silty SAND to sandy SILT	120	3.0	17	22	12	45	36	-	-	27	2.41	16
25.43	100.4	78.3	140.9	100.3	2.4	-0.7	2.4	silty SAND to sandy SILT	120	3.0	26	33	17	59	38	-	-	21	2.25	16
25.59	135.0	105.2	182.7	135.0	3.9	-0.1	2.9	silty SAND to sandy SILT	120	3.0	35	45	23	69	40	-	-	20	2.23	16
25.76	110.8	86.2	186.0	110.8	4.0	2.4	3.7	clayy SILT to silty CLAY	115	2.0	43	55	20	-	-	7.7	9.9	25	2.36	15
25.92	78.6	61.1	169.9	78.6	3.2	-2.5	4.2	clayy SILT to silty CLAY	115	2.0	31	39	15	-	-	5.4	9.9	31	2.50	15
26.08	51.7	33.0	-	51.7	2.3	0.7	4.6	silty CLAY to CLAY	115	1.5	22	34	9	-	-	3.5	9.9	42	2.72	15
26.25	47.2	30.0	-	47.7	2.1	24.8	4.5	silty CLAY to CLAY	115	1.5	20	31	8	-	-	3.2	9.6	43	2.75	15
26.41	45.4	28.8	-	45.8	2.0	20.3	4.5	silty CLAY to CLAY	115	1.5	19	30	8	-	-	3.1	9.2	44	2.76	15
26.58	44.6	28.2	-	45.2	1.7	32.9	4.0	clayy SILT to silty CLAY	115	2.0	14	22	8	-	-	3.0	9.0	42	2.73	15
26.74	42.6	26.9	-	43.7	1.7	57.3	4.1	silty CLAY to CLAY	115	1.5	18	28	7	-	-	2.9	8.5	44	2.76	15
26.90	42.5	26.7	-	43.9	2.2	72.6	5.4	silty CLAY to CLAY	115	1.5	18	28	8	-	-	2.9	8.5	48	2.84	15
27.07	51.7	32.5	-	53.5	3.0	88.9	5.9	silty CLAY to CLAY	115	1.5	22	34	9	-	-	3.5	9.9	46	2.80	15
27.23	162.1	124.6	192.8	162.2	4.3	7.8	2.7	silty SAND to sandy SILT	120	3.0	42	54	26	74	41	-	-	17	2.15	16
27.40	219.9	168.8	218.9	219.9	4.8	1.8	2.2	silty SAND to sandy SILT	120	3.0	56	73	33	84	42	-	-	13	2.00	16
27.56	237.5	182.0	243.9	237.5	6.0	1.1	2.6	silty SAND to sandy SILT	120	3.0	61	79	36	87	43	-	-	14	2.03	16
27.72	258.3	197.7	268.9	258.4	7.2	2.7	2.8	silty SAND to sandy SILT	120	3.0	66	86	39	89	43	-	-	14	2.04	16
27.89	282.9	216.1	282.7	283.0	7.6	5.0	2.7	silty SAND to sandy SILT	120	3.0	72	94	43	92	43	-	-	13	2.01	16
28.05	260.7	198.9	273.3	260.8	7.5	3.6	2.9	stiff SAND to clayy SAND	115	5.0	40	52	40	90	43	-	-	14	2.05	16
28.22	206.7	157.5	259.6	206.8	7.5	2.1	3.7	stiff SAND to clayy SAND	115	5.0	32	41	33	82	42	-	-	19	2.19	16
28.38	188.0	143.1	245.4	188.1	6.8	5.5	3.7	stiff SAND to clayy SAND	115	5.0	29	38	31	79	41	-	-	20	2.22	16
28.54	159.9	121.5	228.6	160.0	6.1	7.4	3.8	stiff SAND to clayy SAND	115	5.0	24	32	27	73	40	-	-	22	2.28	16
28.71	144.6	109.7	213.1	144.8	5.4	10.4	3.8	silty SAND to sandy SILT	120	3.0	37	48	24	70	40	-	-	22	2.30	16
28.87	133.6	101.3	207.2	134.0	5.1	17.0	3.9	silty SAND to sandy SILT	120	3.0	34	45	23	67	39	-	-	24	2.33	16
29.04	111.1	84.1	200.5	111.4	4.7	13.3	4.3	clayy SILT to silty CLAY	115	2.0	42	56	20	-	-	7.7	9.9	27	2.42	15
29.20	148.4	112.1	192.9	148.4	4.5	2.8	3.0	silty SAND to sandy SILT	120	3.0	37	49	24	71	40	-	-	20	2.22	16
29.36	189.6	143.1	200.4	189.6	4.4	3.0	2.4	silty SAND to sandy SILT	120	3.0	48	63	29	79	41	-	-	15	2.07	16
29.53	195.6	147.4	197.8	195.6	4.2	1.2	2.2	silty SAND to sandy SILT	120	3.0	49	65	29	80	41	-	-	14	2.03	16
29.69	183.8	138.3	190.0	183.8	4.0	-0.3	2.2	silty SAND to sandy SILT	120	3.0	46	61	28	78	41	-	-	14	2.05	16
29.86	169.3	127.3	183.6	169.3	3.9	-0.1	2.3	silty SAND to sandy SILT	120	3.0	42	56	26	75	41	-	-	16	2.09	16
30.02	157.6	118.3	172.7	157.6	3.5	-0.4	2.2	silty SAND to sandy SILT	120	3.0	39	53	24	73	40	-	-	16	2.10	16
30.19	164.1	123.0	165.3	164.1	3.0	0.8	1.8	silty SAND to sandy SILT	120	3.0	41	55	24	74	40	-	-	14	2.03	16
30.35	181.7	135.9	170.6	181.7	2.9	2.7	1.6	clean SAND to silty SAND	125	5.0	27	36	26	77	41	-	-	12	1.96	16
30.51	194.2	145.1	180.1	194.2	3.2	1.5	1.7	clean SAND to silty SAND	125	5.0	29	39	28	79	41	-	-	12	1.95	16
30.68	213.1	159.0	193.0	213.1	3.6	1.4	1.7	clean SAND to silty SAND	125	5.0	32	43	30	82	42	-	-	11	1.93	16
30.84	227.6	169.5	206.2	227.6	4.0	1.8	1.8	clean SAND to silty SAND	125	5.0	34	46	32	84	42	-	-	11	1.93	16

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Geosphere Consultants, Inc. Page: 3
Data File: SDF(154).cpt Sounding ID: CPT-08
CPT Date: 6/2/2020 10:22:46 AM Project No: 91-04769
GW During Test: 25 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -
31.01	226.9	168.8	203.6	227.0	3.9	3.1	1.7	clean SAND to silty SAND	125	5.0	34	45	32	84	42	-	-	11	1.92	16
31.17	217.0	161.1	193.4	217.0	3.5	1.9	1.6	clean SAND to silty SAND	125	5.0	32	43	31	83	42	-	-	11	1.91	16
31.33	202.8	150.4	176.1	202.8	2.8	0.4	1.4	clean SAND to silty SAND	125	5.0	30	41	28	80	41	-	-	10	1.88	16
31.50	180.8	133.8	160.1	180.8	2.4	0.6	1.3	clean SAND to silty SAND	125	5.0	27	36	25	77	41	-	-	11	1.91	16
31.66	168.5	124.6	154.8	168.5	2.4	1.8	1.4	clean SAND to silty SAND	125	5.0	25	34	24	74	40	-	-	12	1.95	16
31.83	170.8	126.1	162.9	170.9	2.8	2.2	1.7	clean SAND to silty SAND	125	5.0	25	34	25	75	40	-	-	13	1.99	16
31.99	176.4	130.0	177.4	176.4	3.5	3.4	2.0	silty SAND to sandy SILT	120	3.0	43	59	26	76	41	-	-	14	2.05	16
32.15	198.3	146.0	207.4	198.4	4.9	4.7	2.5	silty SAND to sandy SILT	120	3.0	49	66	30	79	41	-	-	15	2.08	16
32.32	219.2	161.1	237.3	219.3	6.4	6.8	2.9	silty SAND to sandy SILT	120	3.0	54	73	33	83	42	-	-	16	2.11	16
32.48	226.9	166.6	245.3	227.0	6.8	6.9	3.0	silty SAND to sandy SILT	120	3.0	56	76	34	84	42	-	-	16	2.11	16
32.65	192.6	141.2	229.1	192.7	6.2	5.2	3.3	silty SAND to sandy SILT	120	3.0	47	64	30	78	41	-	-	18	2.18	16
32.81	153.0	112.1	221.2	153.1	5.9	4.6	3.9	stiff SAND to clayy SAND	115	5.0	22	31	25	71	40	-	-	23	2.31	16
32.97	129.8	94.9	210.3	129.9	5.4	5.7	4.2	clayy SILT to silty CLAY	115	2.0	47	65	22	-	-	9.0	9.9	25	2.38	15
33.14	115.8	84.6	191.8	115.9	4.5	6.1	4.0	clayy SILT to silty CLAY	115	2.0	42	58	20	-	-	8.1	9.9	26	2.39	15
33.30	115.7	84.4	179.5	116.4	4.0	36.1	3.5	clayy SILT to silty CLAY	115	2.0	42	58	19	-	-	8.0	9.9	25	2.35	15
33.47	201.3	146.6	191.4	202.0	4.0	35.6	2.0	silty SAND to sandy SILT	120	3.0	49	67	29	80	41	-	-	13	2.00	16
33.63	289.3	210.5	234.9	289.5	4.4	13.9	1.5	clean SAND to silty SAND	125	5.0	42	58	39	92	43	-	-	8	1.81	16
33.79	315.1	229.0	255.5	315.2	5.1	5.9	1.6	clean SAND to silty SAND	125	5.0	46	63	42	94	43	-	-	8	1.81	16
33.96	313.9	227.7	265.8	314.0	6.1	6.7	1.9	clean SAND to silty SAND	125	5.0	46	63	43	94	43	-	-	10	1.88	16
34.12	310.5	225.0	271.0	310.6	6.7	5.5	2.2	clean SAND to silty SAND	125	5.0	45	62	43	94	43	-	-	11	1.92	16
34.29	302.4	218.8	281.5	302.6	7.8	8.4	2.6	silty SAND to sandy SILT	120	3.0	73	100	43	93	43	-	-	13	1.99	16
34.45	294.7	212.9	284.3	294.9	8.3	8.4	2.8	stiff SAND to clayy SAND	115	5.0	43	59	42	92	43	-	-	14	2.03	16
34.61	265.0	191.3	280.3	265.2	8.6	6.5	3.3	stiff SAND to clayy SAND	115	5.0	38	53	39	88	42	-	-	16	2.11	16
34.78	231.6	166.9	263.0	231.7	8.0	6.4	3.5	stiff SAND to clayy SAND	115	5.0	33	46	35	84	42	-	-	18	2.16	16
34.94	166.4	119.8	233.1	166.5	6.6	3.7	4.0	very stiff fine SOIL	120	1.0	100	100	27	-	-	5.8	9.9	22	2.30	30
35.11	109.6	78.8	209.3	109.7	5.2	5.0	4.9	clayy SILT to silty CLAY	115	2.0	39	55	19	-	-	7.6	9.9	30	2.48	15
35.27	72.7	39.7	-	73.0	4.1	14.7	5.8	silty CLAY to CLAY	115	1.5	26	48	11	-	-	5.0	9.9	42	2.73	15
35.43	56.5	30.8	-	57.3	3.3	42.6	6.1	silty CLAY to CLAY	115	1.5	21	38	9	-	-	3.9	9.8	48	2.83	15
35.60	57.8	31.5	-	59.6	3.5	90.3	6.2	silty CLAY to CLAY	115	1.5	21	39	9	-	-	4.0	9.9	48	2.83	15
35.76	78.6	42.7	-	81.2	4.2	132.2	5.5	silty CLAY to CLAY	115	1.5	28	52	11	-	-	5.4	9.9	40	2.70	15
35.93	72.6	39.3	-	74.7	4.0	104.1	5.7	silty CLAY to CLAY	115	1.5	26	48	11	-	-	5.0	9.9	42	2.73	15
36.09	69.6	37.6	-	71.9	4.1	121.7	6.1	silty CLAY to CLAY	115	1.5	25	46	10	-	-	4.8	9.9	44	2.77	15
36.26	60.8	32.8	-	62.9	4.7	107.0	8.0	silty CLAY to CLAY	115	1.5	22	41	10	-	-	4.2	9.9	52	2.90	15
36.42	65.4	35.1	-	67.9	5.0	131.8	7.9	silty CLAY to CLAY	115	1.5	23	44	10	-	-	4.5	9.9	50	2.87	15
36.58	103.7	55.7	-	104.2	5.5	23.8	5.4	clayy SILT to silty CLAY	115	2.0	28	52	14	-	-	7.2	9.9	36	2.61	15
36.75	144.1	102.4	206.0	144.1	5.4	2.3	3.8	silty SAND to sandy SILT	120	3.0	34	48	23	68	39	-	-	23	2.32	16
36.91	151.6	107.6	201.8	151.6	5.2	0.4	3.5	silty SAND to sandy SILT	120	3.0	36	51	24	69	39	-	-	22	2.28	16
37.08	141.7	100.5	200.5	141.7	5.1	-0.1	3.7	silty SAND to sandy SILT	120	3.0	33	47	22	67	39	-	-	23	2.31	16
37.24	126.8	89.8	163.6	126.8	3.5	-1.0	2.8	silty SAND to sandy SILT	120	3.0	30	42	20	63	38	-	-	21	2.26	16
37.40	160.5	113.5	170.1	160.6	3.6	2.1	2.3	silty SAND to sandy SILT	120	3.0	38	54	23	71	40	-	-	17	2.12	16
37.57	180.8	127.7	174.2	180.7	3.6	-1.1	2.0	silty SAND to sandy SILT	120	3.0	43	60	26	75	40	-	-	14	2.05	16
37.73	187.3	132.1	182.7	187.3	3.9	0.0	2.1	silty SAND to sandy SILT	120	3.0	44	62	27	76	40	-	-	15	2.06	16
37.90	200.1	140.9	198.8	200.1	4.7	-0.1	2.4	silty SAND to sandy SILT	120	3.0	47	67	28	78	41	-	-	15	2.07	16
38.06	213.3	150.1	213.5	213.3	5.4	0.8	2.6	silty SAND to sandy SILT	120	3.0	50	71	30	80	41	-	-	15	2.08	16
38.22	223.9	157.3	222.3	223.9	5.8	1.0	2.6	silty SAND to sandy SILT	120	3.0	52	75	32	82	41	-	-	15	2.08	16
38.39	228.3	160.2	224.1	228.3	5.8	1.8	2.6	silty SAND to sandy SILT	120	3.0	53	76	32	83	41	-	-	15	2.07	16
38.55	225.0	157.7	223.9	225.1	5.9	2.0	2.6	silty SAND to sandy SILT	120	3.0	53	75	32	82	41	-	-	15	2.08	16
38.72	228.7	160.1	233.3	228.7	6.4	2.4	2.8	silty SAND to sandy SILT	120	3.0	53	76	33	83	41	-	-	16	2.10	16
38.88	253.2	177.1	246.0	253.3	6.9	4.4	2.7	silty SAND to sandy SILT	120	3.0	59	84	36	86	42	-	-	15	2.06	16
39.04	281.4	196.6	261.5	281.5	7.4	4.9	2.6	silty SAND to sandy SILT	120	3.0	66	94	39	89	42	-	-	14	2.02	16
39.21	297.2	207.3	274.2	297.3	8.0	5.3	2.7	silty SAND to sandy SILT	120	3.0	69	99	41	91	43	-	-	13	2.02	16
39.37	310.3	216.2	277.9	310.3	7.9	4.7	2.6	silty SAND to sandy SILT	120	3.0	72	100	42	92	43	-	-	13	1.99	16
39.54	314.9	219.2	272.1	315.0	7.3	4.8	2.3	clean SAND to silty SAND	125	5.0	44	63	42	93	43	-	-	12	1.95	16
39.70	293.5	204.0	258.0	293.6	6.9	3.0	2.4	silty SAND to sandy SILT	120	3.0	68	98	40	91	43	-	-	12	1.97	16
39.86	280.8	194.9	248.6	280.9	6.5	3.8	2.3	silty SAND to sandy SILT	120	3.0	65	94	38	89	42	-	-	12	1.98	16
40.03	274.6	190.4	235.7	274.7	5.7	2.7	2.1	clean SAND to silty SAND	125	5.0	38	55	37	88	42	-	-	12	1.95	16
40.19	252.2	174.6	215.1	252.2	4.8	1.9	1.9	clean SAND to silty SAND	125	5.0	35	50	34	85	42	-	-	11	1.94	16
40.36	223.7	154.7	203.7	223.7	4.7	0.0	2.1	silty SAND to sandy SILT	120	3.0	52	75	31	81	41	-	-	13	2.01	16
40.52	207.7	143.4	191.6	207.6	4.3	-1.9	2.1	silty SAND to sandy SILT	120	3.0	48	69	28	79	41	-	-	14	2.03	16
40.68	174.2	120.1	176.7	174.2	3.9	2.7	2.3	silty SAND to sandy SILT	120	3.0	40	58	25	73	40	-	-	16	2.11	16
40.85	192.8	132.8	181.8	192.8	4.0	0.6	2.1	silty SAND to sandy SILT	120	3.0	44	64	27	76	40	-	-	14	2.05	16
41.01	212.5	146.2	196.0	212.5	4.5	0.7	2.1	silty SAND to sandy SILT	120	3.0	49	71	29	80	41	-	-	14	2.03	16
41.18	225.4	154.9	207.4	225.4	5.0	0.2	2.2	silty SAND to sandy SILT	120	3.0	52	75	31	81	41	-	-	14	2.03	16
41.34	219.9	151.0	208.6	219.9	5.2	0.1	2.4	silty SAND to sandy SILT	120	3.0	50	73	30	81	41	-	-	15	2.06	16
41.50	211.3	144.9	204.1	211.3	5.1	-0.7	2.4	silty SAND to sandy SILT	120	3.0	48	70	29	79	41	-	-	15	2.07	16
41.67	195.7	134.0	195.0	195.7	4.7	2.4	2.5	silty SAND to sandy SILT	120	3.0	45	65	27	77	40	-	-	16	2.10	16
41.83	180.1	123.2	184.9	180.1	4.4	2.6	2.5	silty SAND to sandy SILT	120	3.0	41	60	25	74	40	-	-	17	2.12	16
42.00	163.4	111.6	178.0	163.4	4.2	3.4	2.6	silty SAND to sandy SILT	120	3.0	37	54	23	71	39	-	-	18	2.17	16
42.16	160.6	109.6	177.0	160.7	4.1	4.5	2.6	silty SAND to sandy SILT	120	3.0	37	54	23	70	39	-	-	18	2.18	16
42.32	162.1	110.5	178.0	162.2	4.2	3.2	2.6	silty SAND to sandy SILT	120	3.0	37	54	23	70	39	-	-	18	2.18	16
42.49	158.7	108.1	176.2	158.7	4.1	2.4	2.6	silty SAND to sandy SILT	120	3.0	36	53	23	70	39	-	-	18	2.19	16
42.65	156.0	106.1	175.8	156.0	4.1	2.3	2.7	silty SAND to sandy SILT	120	3.0	35	52	23	69	39	-	-	19	2.20	16
42.82	158.6	107.7	182.0	158.6	4.4	2.5	2.8	silty SAND to sandy SILT	120	3.0	36	53	23	69	39	-	-	19	2.21	16
42.98	170.2	115.5	193.3	170.3	4.9	2.7	2.9	silty SAND to sandy SILT	120	3.0	39	57	25	72	40	-	-	19	2.20	16
43.15	184.1	124.8	197.6	184.2	5.1	3.4	2.8	silty SAND to sandy SILT	120	3.0	42	61	26	74	40	-	-	18	2.16	16
43.31	187.7	127.1	198.3	187.8	5.1	3.5	2.8	silty SAND to sandy SILT	120	3.0	42	63	27	75	40	-	-	17	2.15	16
43.47	179.4	121.3	199.4	179.4	5.2	3.8	3.0	silty SAND to sandy SILT	120	3.0	40	60	26	73	40	-	-	19	2.19	16
43.64	179.0	120.9	213.9	179.1	6.0	3.3	3.4	silty SAND to sandy SILT	120	3.0	40	60	26	73	40	-	-	20	2.24	16
43.80	188.0	126.9	230.0	188.1	6.9	5.8	3.7	stiff SAND to clayy SAND	115	5.0	25	38	28	75	40	-	-	21	2.26	16
43.97	203.2	137.0	241.2	203.3	7.5	5.6	3.7	stiff SAND to clayy SAND	115	5.0	27	41	30	77	40	-	-	20	2.24	16
44.13	201.3	135.5	251.8	201.4	8.1	5.8	4.1	stiff SAND to clayy SAND	115	5.0	27	40	30	77	40	-	-	21	2.27	16
44.29	170.1	114.4	249.5	170.2	7.9	4.7	4.7	very stiff fine SOIL	120	1.0	100	100	26	-	-	5.9	9.9	25	2.37	30
44.46	144.7	97.2	249.5	144.8	7.7	7.8	5.4	very stiff fine SOIL	120	1.0	97	100	23	-	-	5.0	9.9	29	2.46	30
44.62	122.2	58.3	-	122.7	7.4	29.2	6.2	silty CLAY to CLAY	115	1.5	39	81	15	-	-	8.5	9.9	37	2.64	15
44.79	116.7	55.6	-	118.3	6.8	80.0	5.9	silty CLAY to CLAY	115	1.5	37	78	15	-	-	8.1	9.9	38	2.64	15
44.95	131.6	88.1	205.2	133.3	5.5	89.6	4.3	clayy SILT to silty CLAY	115	2.0	44	66	20	-	-	9.1	9.9	27	2.40	15
45.11	93.2	44.2	-	96.2	4.6	151.4	5.1	silty CLAY to CLAY	115	1.5	29	62	12	-	-	6.4	9.9	38	2.66	15
45.28	80.7	38.2	-	87.7	4.2	356.1	5.4	silty CLAY to CLAY	115	1.5	25	54	10	-	-	5.6	9.9	42	2.73	15
45.44	97.9	46.3	-	105.8	4.6	399.3	4.8	clayy SILT to silty CLAY	115	2.0	23	49	12	-	-	6.8	9.9	37	2.63	15
45.61	101.8	48.0	-	107.7	6.0	300.1	6.0	silty CLAY to CLAY	115	1.5	32	68	13	-	-	7.0	9.9	40	2.69	15
45.77	109.5	51.5	-	117.0	7.6	385.8	7.1	silty CLAY to CLAY	115	1.5	34	73	14	-	-	7.6	9.9	42	2.73	15
45.93	201.2	133.9	268.3	210.0	9.1	450.0	4.6	very stiff fine SOIL	120	1.0	100	100	30	-	-	7.0	9.9	23	2.32	30
46.10	352.5	234.4	304.2	352.6	9.8	4.8	2.8	stiff SAND to clayy SAND	115	5.0	47	70	46	95	43	-	-	13	2.00	16
46.26	342.7	227.6	292.3	342.6	9.0	-3.3	2.7	stiff SAND to clayy SAND	115	5.0	46	69	44	94	43	-	-	13	1.99	16

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Geosphere Consultants, Inc. Page: 4
Data File: SDF(154).cpt Sounding ID: CPT-08
CPT Date: 6/2/2020 10:22:46 AM Project No: 91-04769
GW During Test: 25 ft Cone/Rig: DDG1496

Depth ft	qc PS tsf	qc1n PS -	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N1 60%	SPT R-N 60%	SPT IcN1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin %	Ic SBT	Nk Indx -
46.43	316.5	210.0	285.7	316.5	9.2	-3.1	2.9	stiff SAND to clayy SAND	115	5.0	42	63	42	91	43	-	-	14	2.04	16
46.59	304.0	201.5	276.0	303.9	8.7	-2.9	2.9	stiff SAND to clayy SAND	115	5.0	40	61	40	90	42	-	-	14	2.05	16
46.75	289.2	191.5	258.2	289.1	7.7	-2.6	2.7	silty SAND to sandy SILT	120	3.0	64	96	38	88	42	-	-	14	2.03	16
46.92	261.7	173.1	230.0	261.6	6.2	-2.7	2.4	silty SAND to sandy SILT	120	3.0	58	87	34	85	42	-	-	14	2.02	16
47.08	233.4	154.2	208.0	233.3	5.2	-2.9	2.3	silty SAND to sandy SILT	120	3.0	51	78	31	81	41	-	-	14	2.04	16
47.25	225.7	149.0	204.5	225.7	5.2	-2.3	2.3	silty SAND to sandy SILT	120	3.0	50	75	30	80	41	-	-	14	2.05	16
47.41	238.7	157.4	210.0	238.6	5.3	-2.1	2.2	silty SAND to sandy SILT	120	3.0	52	80	31	82	41	-	-	14	2.03	16
47.57	247.1	162.8	225.5	247.1	6.2	-1.1	2.5	silty SAND to sandy SILT	120	3.0	54	82	33	83	41	-	-	15	2.06	16
47.74	254.2	167.2	234.4	254.2	6.7	1.1	2.7	silty SAND to sandy SILT	120	3.0	56	85	34	84	41	-	-	15	2.07	16
47.90	260.9	171.5	227.7	261.0	6.1	1.8	2.4	silty SAND to sandy SILT	120	3.0	57	87	34	85	41	-	-	14	2.02	16
48.07	253.2	166.2	208.8	253.2	4.9	0.2	2.0	clean SAND to silty SAND	125	5.0	33	51	32	84	41	-	-	12	1.96	16
48.23	246.4	161.6	202.5	246.4	4.6	-0.5	1.9	clean SAND to silty SAND	125	5.0	32	49	31	83	41	-	-	12	1.96	16
48.39	255.4	167.3	226.6	255.4	6.2	-2.0	2.5	silty SAND to sandy SILT	120	3.0	56	85	33	84	41	-	-	14	2.04	16
48.56	290.8	190.2	257.9	290.7	7.8	-2.1	2.7	silty SAND to sandy SILT	120	3.0	63	97	38	88	42	-	-	14	2.04	16
48.72	290.6	189.9	271.3	290.6	8.9	-1.6	3.1	stiff SAND to clayy SAND	115	5.0	38	58	39	88	42	-	-	15	2.09	16
48.89	282.3	184.3	274.9	282.3	9.3	-1.6	3.3	stiff SAND to clayy SAND	115	5.0	37	56	38	87	42	-	-	16	2.12	16
49.05	296.9	193.6	282.0	296.9	9.6	-1.5	3.3	stiff SAND to clayy SAND	115	5.0	39	59	40	89	42	-	-	16	2.10	16
49.22	283.2	184.5	293.7	283.1	10.6	-2.1	3.8	stiff SAND to clayy SAND	115	5.0	37	57	39	87	42	-	-	18	2.17	16
49.38	284.4	185.1	300.3	284.3	11.1	-0.4	4.0	stiff SAND to clayy SAND	115	5.0	37	57	39	87	42	-	-	18	2.18	16
49.54	284.8	185.2	280.9	284.8	9.7	-1.2	3.5	stiff SAND to clayy SAND	115	5.0	37	57	38	87	42	-	-	17	2.13	16
49.71	269.5	175.1	278.3	269.4	9.7	-0.4	3.7	stiff SAND to clayy SAND	115	5.0	35	54	37	85	42	-	-	18	2.17	16
49.87	188.9	122.6	244.1	188.8	7.9	-1.6	4.3	very stiff fine SOIL	120	1.0	100	100	27	-	-	6.6	9.9	23	2.31	30
50.04	119.9	77.7	211.3	119.9	5.8	-1.6	5.0	clayy SILT to silty CLAY	115	2.0	39	60	19	-	-	8.3	9.9	30	2.49	15
50.20	71.9	32.0	-	71.9	4.2	1.5	6.2	silty CLAY to CLAY	115	1.5	21	48	9	-	-	4.9	9.9	47	2.82	15

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

APPENDIX B

LABORATORY TEST RESULTS

Summary of Laboratory Results
Liquid and Plastic Limits Test Report
Particle Size Distribution Report (3)
Direct Shear Test Reports (3)
Corrosivity Tests Summary (2)
R Value Test Reports (2)

SUMMARY OF LABORATORY RESULTS

CLIENT Kaiser Permanente **PROJECT NAME** Kaiser Fresno MOB

PROJECT NUMBER 91-04768-A **PROJECT LOCATION** E. Locust Ave and N. Orchard St, Fresno, CA 93720

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
B-01	1.8	17	9	8				6.4	121.0		
B-01	4.3				9.5	27		6.6	121.8		
B-01	9.3				0.075	6		3.2	105.4		
B-01	14.3							3.2			
B-01	24.3				9.5	2	SP	3.5			
B-01	33.3							7.8			
B-01	44.3							27.0			
B-02	1.8							4.0	115.8		
B-02	6.8							7.1	122.4		
B-02	10.8				0.075	15		4.6			
B-03	1.8							5.2	130.7		
B-03	6.8							6.5	129.8		
B-03	9.3				0.075	65		15.9			
B-04	1.8	16	14	2				3.6	96.0		
B-04	4.3							7.2	120.7		
B-04	6.8							6.3	123.4		
B-04	9.3							10.8	123.3		
B-04	14.3				0.075	7		5.5			
B-05	1.8				0.075	32		4.3	119.2		
B-05	4.0							6.1	110.9		
B-05	9.3							2.1	108.7		
B-05	14.3							2.0	101.8		
B-06	1.8							4.6	102.5		
B-06	4.3	31	13	18				10.8	120.1		
B-11	4.0							7.1			
B-11	6.5				4.75	11		2.1			
B-11	9.0							3.5			
B-11B	4.0							10.2	112.6		
B-12	1.5	17	14	3	0.008			4.1			
B-13	1.5				9.5	52		7.8			
B-13	6.5							25.2			
B-13	9.0							2.9	106.5		
B-14	4.0							6.5			
B-15	4.0				0.008			8.9			
B-16	9.0							1.8			
B-17	9.0				0.008			10.6			
B-18	1.5							3.6	115.5		
B-18	4.0							7.9	120.0		
B-18	6.5							5.8	120.8		
B-18	9.0							8.4	120.6		
B-18	14.0							3.4			
B-18	19.0				4.75	6		3.7	103.1		
B-18	24.0							5.2			

SUMMARY OF LABORATORY RESULTS

CLIENT Kaiser Permanente **PROJECT NAME** Kaiser Fresno MOB

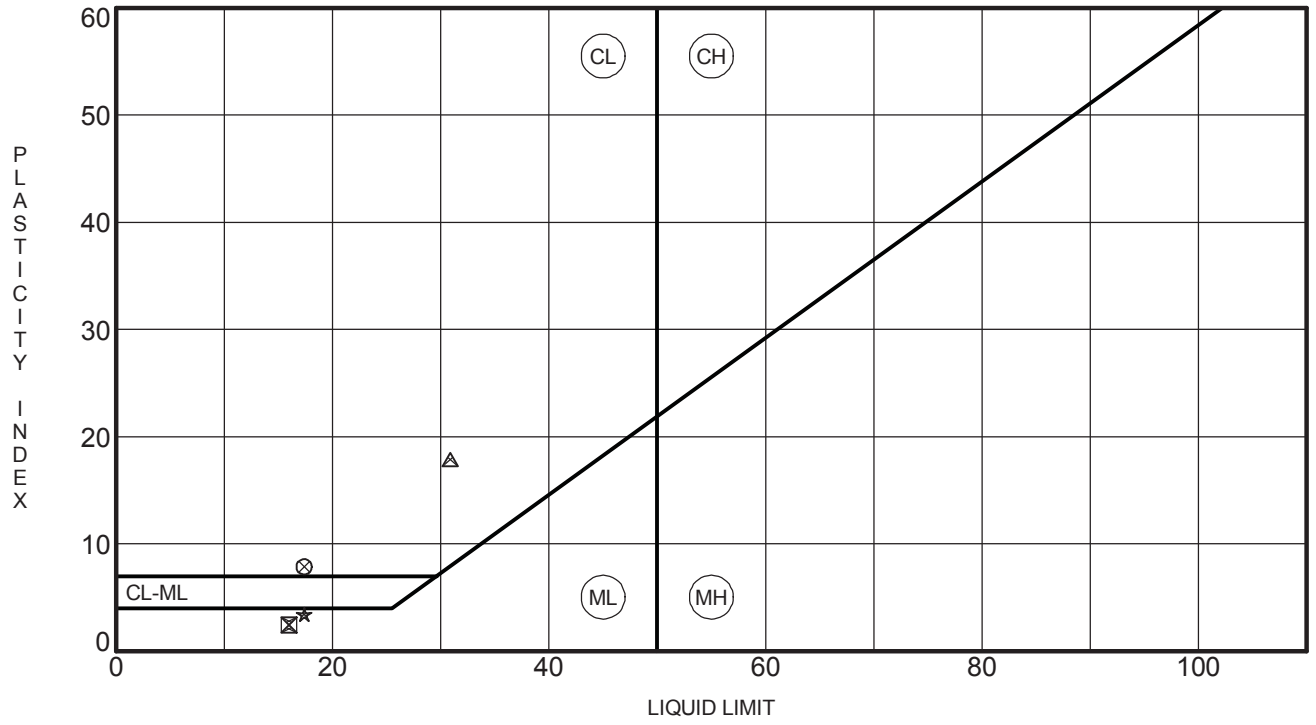
PROJECT NUMBER 91-04768-A **PROJECT LOCATION** E. Locust Ave and N. Orchard St, Fresno, CA 93720

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
B-18	29.0							34.8	85.4		
B-18	34.0							3.9			

ATTERBERG LIMITS RESULTS

CLIENT Kaiser Permanente **PROJECT NAME** Kaiser Fresno MOB

PROJECT NUMBER 91-04768-A **PROJECT LOCATION** E. Locust Ave and N. Orchard St, Fresno, CA 93720

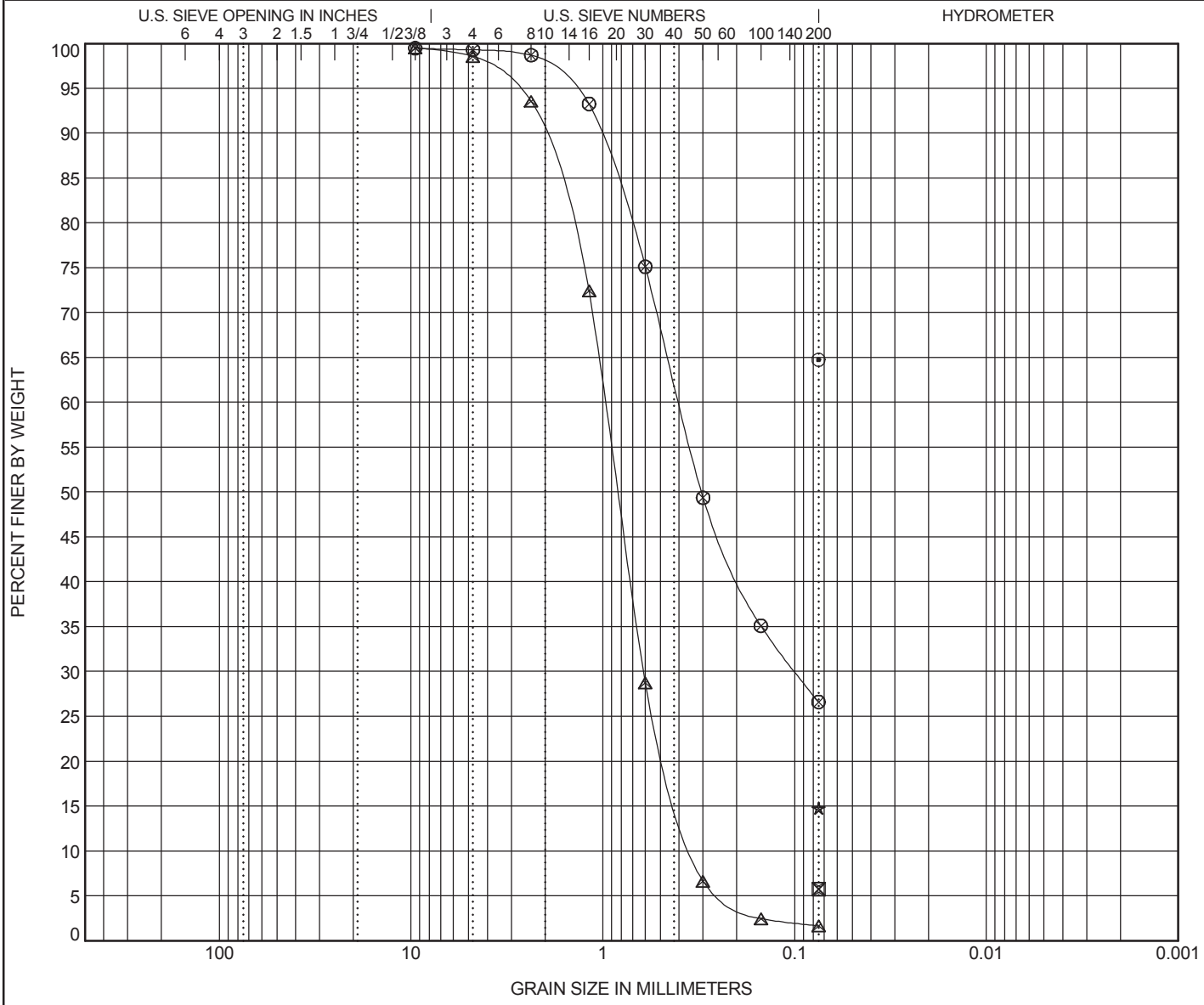


	Specimen Identification		LL	PL	PI	Fines	Classification
⊗	**B-01**	**Depth: 1.8'**	**17**	**9**	**8**		
⊠	**B-04**	**Depth: 1.8'**	**16**	**14**	**2**		
◬	**B-06**	**Depth: 4.3'**	**31**	**13**	**18**		
★	**B-12**	**Depth: 1.5'**	**17**	**14**	**3**		

PARTICLE SIZE DISTRIBUTION

CLIENT Kaiser Permanente **PROJECT NAME** Kaiser Fresno MOB

PROJECT NUMBER 91-04768-A **PROJECT LOCATION** E. Locust Ave and N. Orchard St, Fresno, CA 93720



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

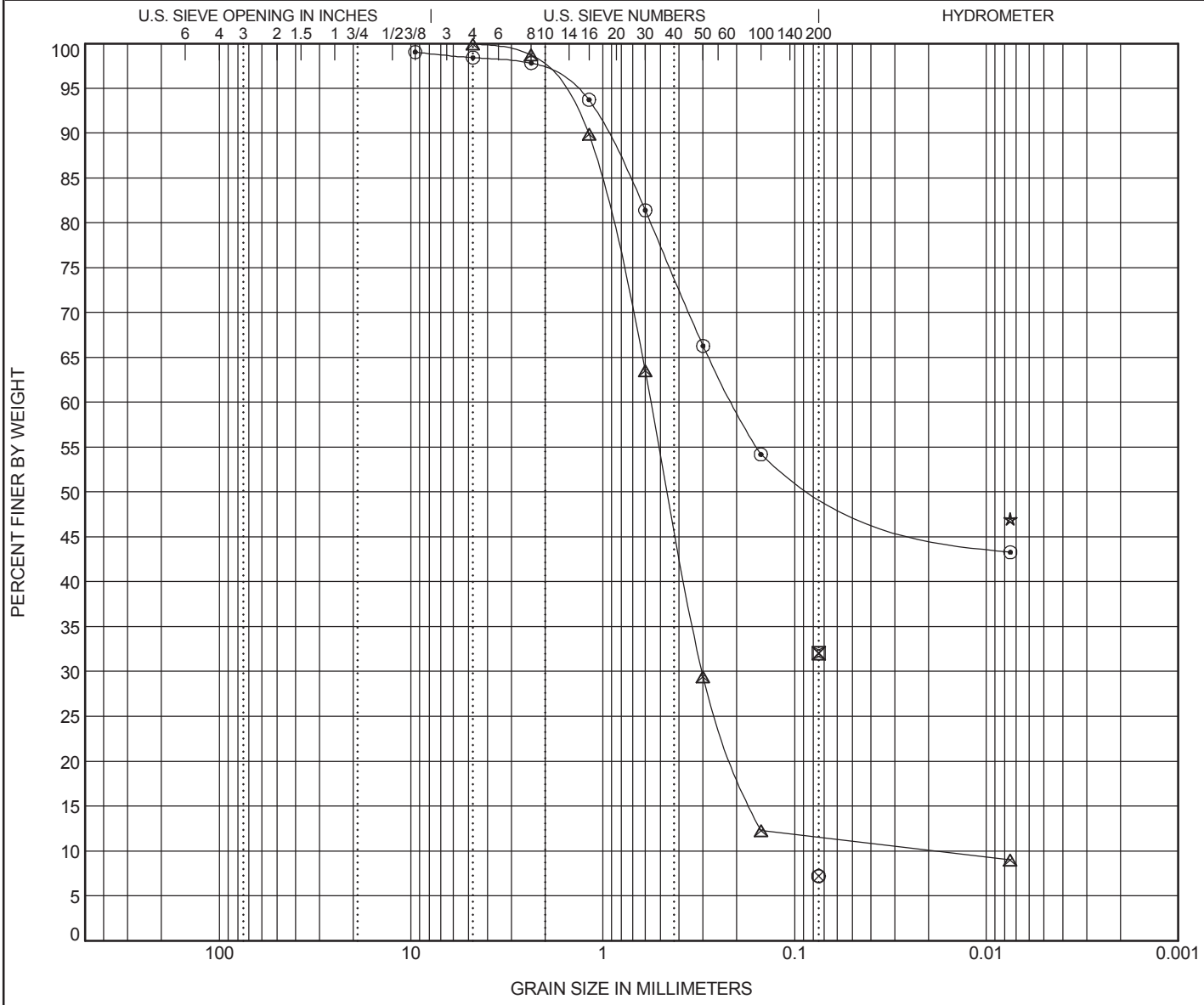
Specimen Identification			Classification	LL	PL	PI	Cc	Cu
⊗	**B-01**	**Depth: 4.3'**						
⊠	**B-01**	**Depth: 9.3'**						
△	**B-01**	**Depth: 24.3'**	**POORLY GRADED SAND(SP)**				**1.15**	**2.92**
★	**B-02**	**Depth: 10.8'**						
⊙	**B-03**	**Depth: 9.3'**						

Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
⊗	**B-01**	**Depth: 4.3'**	**9.5**	**0.4**	**0.099**		**0.2**	**72.7**	**26.6**	
⊠	**B-01**	**Depth: 9.3'**	**0.075**						**5.7**	
△	**B-01**	**Depth: 24.3'**	**9.5**	**0.974**	**0.612**	**0.334**	**0.9**	**96.9**	**1.6**	
★	**B-02**	**Depth: 10.8'**	**0.075**						**14.7**	
⊙	**B-03**	**Depth: 9.3'**	**0.075**						**64.7**	

PARTICLE SIZE DISTRIBUTION

CLIENT Kaiser Permanente **PROJECT NAME** Kaiser Fresno MOB

PROJECT NUMBER 91-04768-A **PROJECT LOCATION** E. Locust Ave and N. Orchard St, Fresno, CA 93720



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

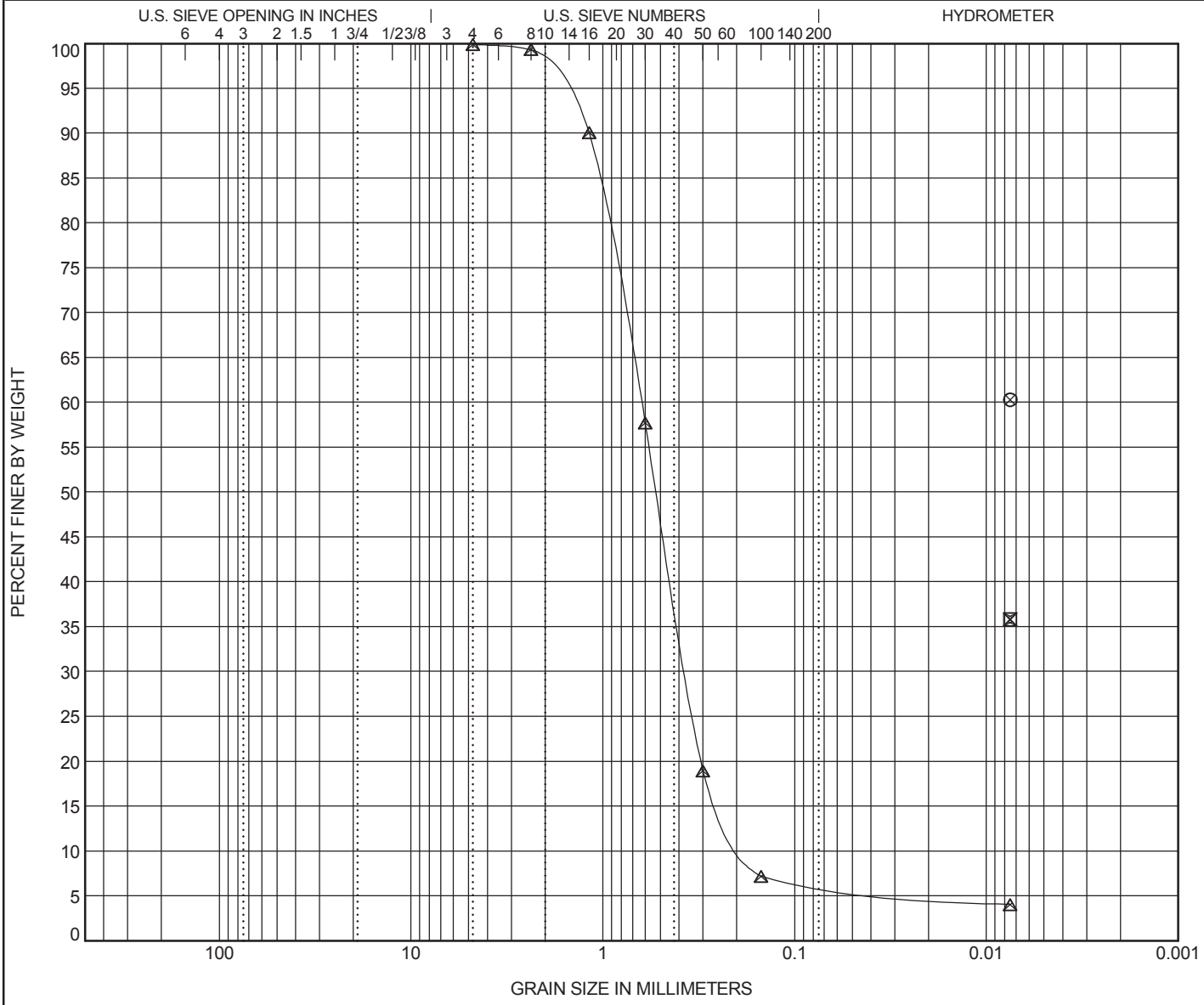
Specimen Identification	Classification	LL	PL	PI	Cc	Cu
⊗ **B-04 Depth: 14.3'**						
⊠ **B-05 Depth: 1.8'**						
△ **B-11 Depth: 6.5'**					**8.65**	**29.30**
★ **B-12 Depth: 1.5'**		**17**	**14**	**3**		
⊙ **B-13 Depth: 1.5'**						

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
⊗ **B-04 Depth: 14.3'**	**0.075**						**7.2**	
⊠ **B-05 Depth: 1.8'**	**0.075**						**32.0**	
△ **B-11 Depth: 6.5'**	**4.75**	**0.559**	**0.304**	**0.019**		**88.4**	**11.5**	
★ **B-12 Depth: 1.5'**	**0.008**							
⊙ **B-13 Depth: 1.5'**	**9.5**	**0.209**			**0.6**	**46.7**	**51.7**	

PARTICLE SIZE DISTRIBUTION

CLIENT Kaiser Permanente **PROJECT NAME** Kaiser Fresno MOB

PROJECT NUMBER 91-04768-A **PROJECT LOCATION** E. Locust Ave and N. Orchard St, Fresno, CA 93720



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
⊗ **B-15 Depth: 4.0'**						
⊠ **B-17 Depth: 9.0'**						
△ **B-18 Depth: 19.0'**					**1.20**	**3.55**

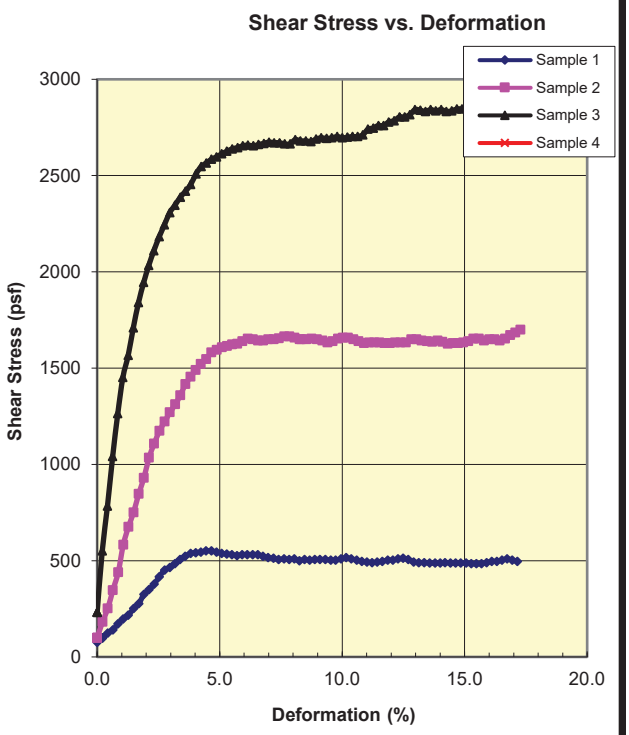
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
⊗ **B-15 Depth: 4.0'**	**0.008**							
⊠ **B-17 Depth: 9.0'**	**0.008**							
△ **B-18 Depth: 19.0'**	**4.75**	**0.63**	**0.366**	**0.177**		**93.4**	**6.4**	

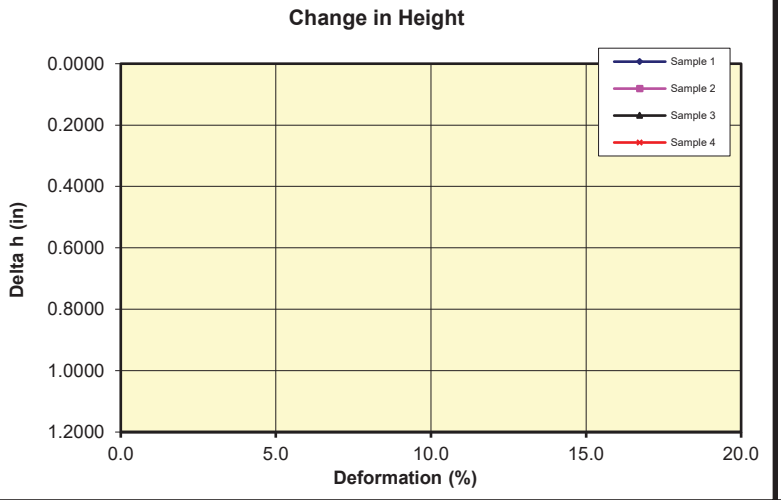
Consolidated Undrained Direct Shear (ASTM D3080M)

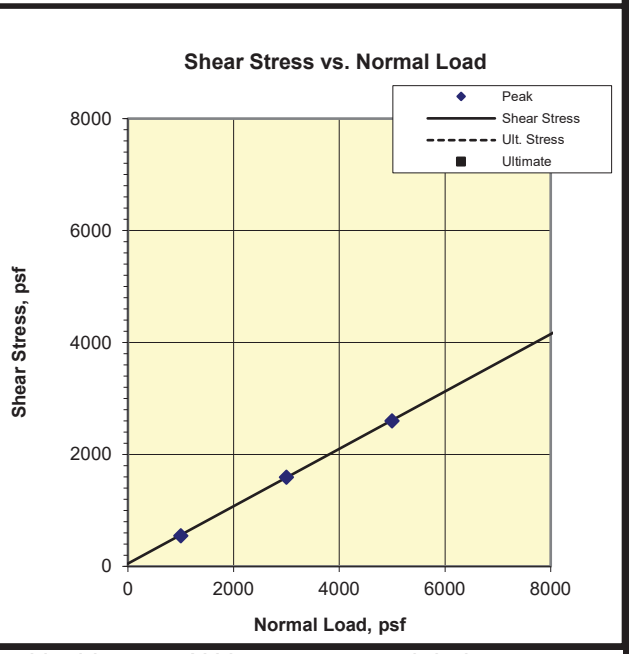
CTL Job #:	724-216	Project #:	91-04768-A	By:	MD
Client:	Geosphere Consultants	Date:	1/31/2020	Checked:	PJ
Project Name:	Kaiser Fresno	Remolding Info:			

Specimen Data				
	1	2	3	4
Boring:	3	3	3	
Sample:	3-3	3-3	3-3	
Depth (ft):	4.5	4.5	4.5	
Visual Description:	Reddish Brown Silty SAND	Reddish Brown Silty SAND	Reddish Brown Silty SAND	
Normal Load (psf)	1000	3000	5000	
Dry Mass of Specimen (g)	136.1	139.2	140.6	
Initial Height (in)	1.00	1.00	1.00	
Initial Diameter (in)	2.40	2.40	2.40	
Initial Void Ratio	0.471	0.438	0.424	
Initial Moisture (%)	3.2	3.3	3.2	
Initial Wet Density (pcf)	118.3	121.0	122.2	
Initial Dry Density (pcf)	114.6	117.2	118.4	
Initial Saturation (%)	18.2	20.1	20.3	
ΔHeight Consol (in)	0.0286	0.0410	0.0475	
At Test Void Ratio	0.429	0.379	0.356	
At Test Moisture (%)	13.1	12.3	11.8	
At Test Wet Density (pcf)	133.5	137.3	139.0	
At Test Dry Density (pcf)	118.0	122.2	124.3	
At Test Saturation (%)	82.7	87.8	89.5	
Strain Rate (%/min)	1.0	1.1	1.1	
Strengths Picked at	5%	5%	5%	
Shear Stress (psf)	544	1595	2597	
ΔHeight (in) at 5%				
Ultimate Stress (psf)				

Phi (deg)	27.1	Ult. Phi (deg)	
Cohesion (psf)	50	Ult. Cohesion (psf)	







Remarks: *DS-CU* A fully undrained condition may not be attained in this test. ΔH is not measured during undrained direct shear tests.

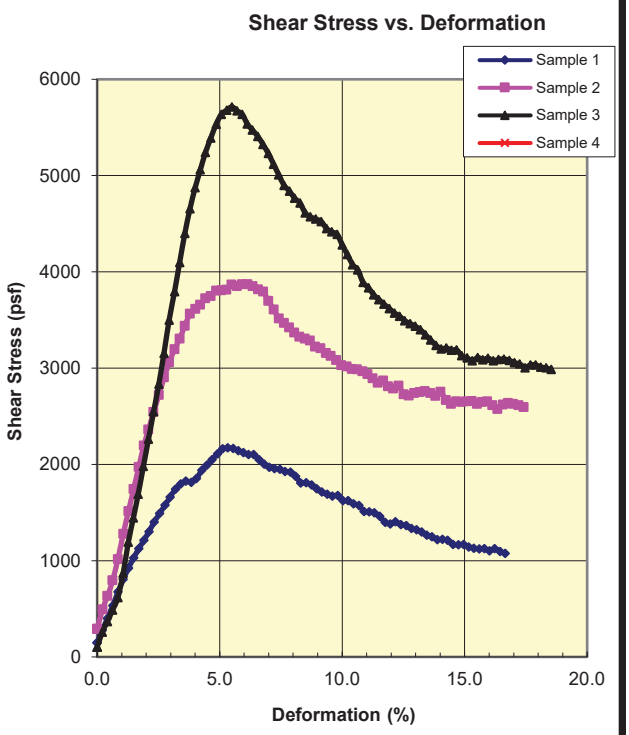
©

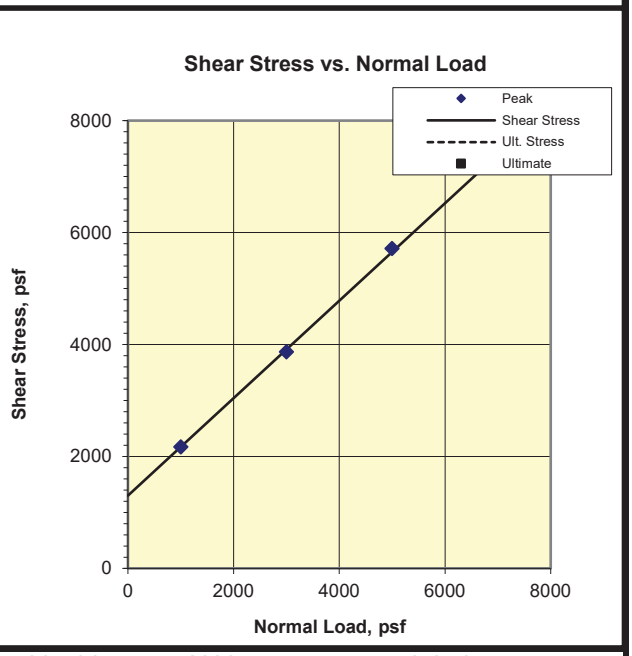
Consolidated Undrained Direct Shear (ASTM D3080M)

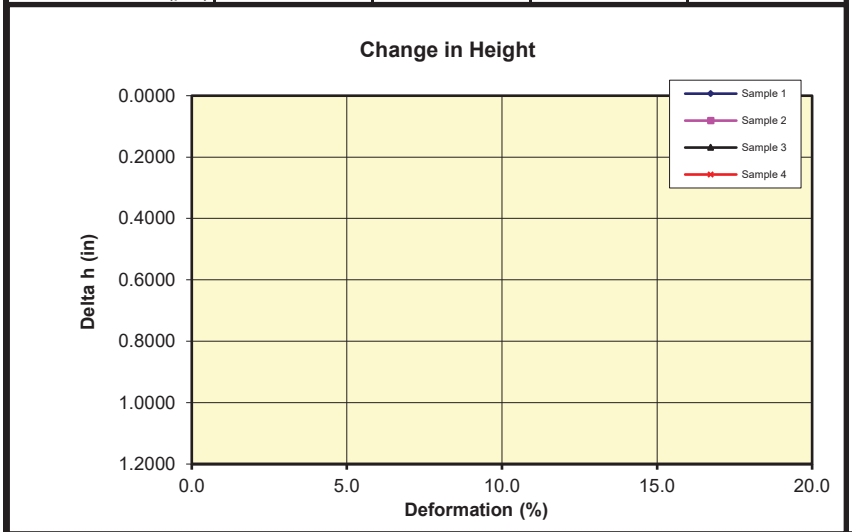
CTL Job #:	724-216	Project #:	91-04768-A	By:	MD
Client:	Geosphere Consultants	Date:	1/31/2020	Checked:	PJ
Project Name:	Kaiser Fresno	Remolding Info:			

Specimen Data				
	1	2	3	4
Boring:	6	6	6	
Sample:	6-5	6-5	6-5	
Depth (ft):	9.5	9.5	9.5	
Visual Description:	Yellowish Brown Silty SAND	Yellowish Brown Silty SAND	Yellowish Brown Silty SAND	
Normal Load (psf)	1000	3000	5000	
Dry Mass of Specimen (g)	133.2	129.8	135.2	
Initial Height (in)	1.00	1.01	1.02	
Initial Diameter (in)	2.40	2.40	2.40	
Initial Void Ratio	0.502	0.552	0.502	
Initial Moisture (%)	4.8	4.4	4.1	
Initial Wet Density (pcf)	117.5	113.3	116.8	
Initial Dry Density (pcf)	112.2	108.6	112.2	
Initial Saturation (%)	25.7	21.3	22.0	
ΔHeight Consol (in)	0.0132	0.0274	0.0338	
At Test Void Ratio	0.483	0.510	0.452	
At Test Moisture (%)	14.8	16.5	14.1	
At Test Wet Density (pcf)	130.5	130.1	132.4	
At Test Dry Density (pcf)	113.7	111.6	116.1	
At Test Saturation (%)	82.9	87.5	84.0	
Strain Rate (%/min)	1.1	1.1	1.2	
Strengths Picked at	Peak	Peak	Peak	
Shear Stress (psf)	2171	3871	5714	
ΔHeight (in) at Peak				
Ultimate Stress (psf)				

Phi (deg)	41.0	Ult. Phi (deg)	
Cohesion (psf)	1300	Ult. Cohesion (psf)	







Remarks: *DS-CU* A fully undrained condition may not be attained in this test. ΔH is not measured during undrained direct shear tests.

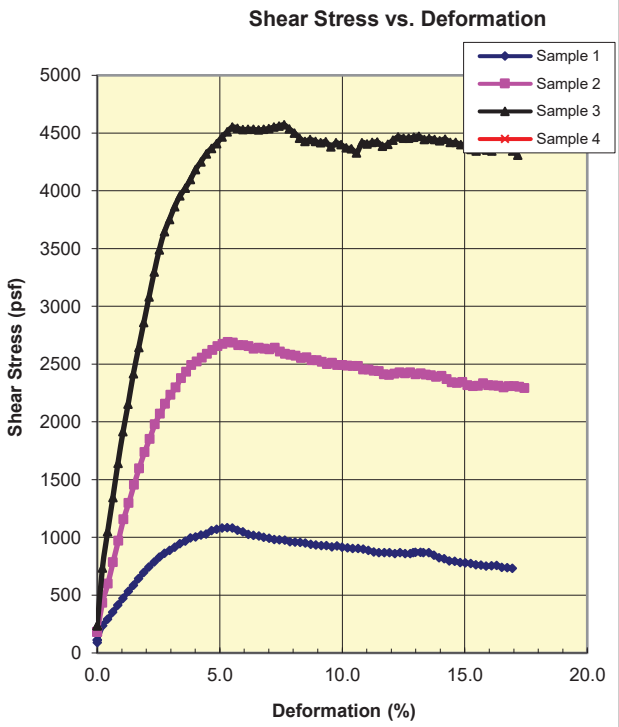
©

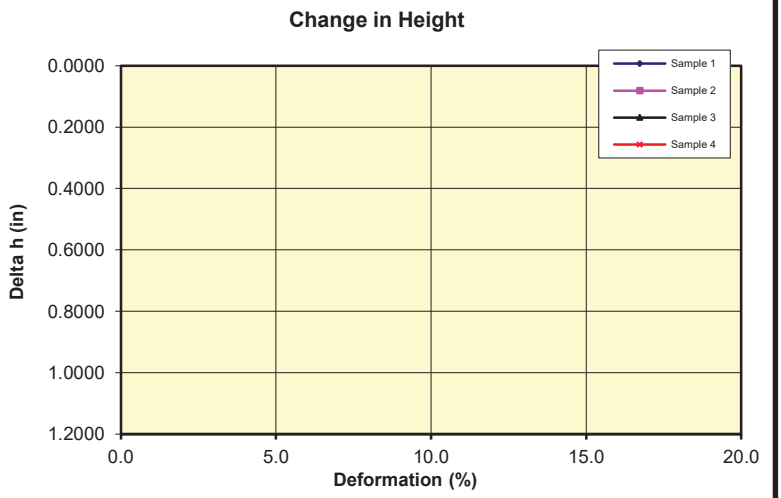
Consolidated Undrained Direct Shear (ASTM D3080M)

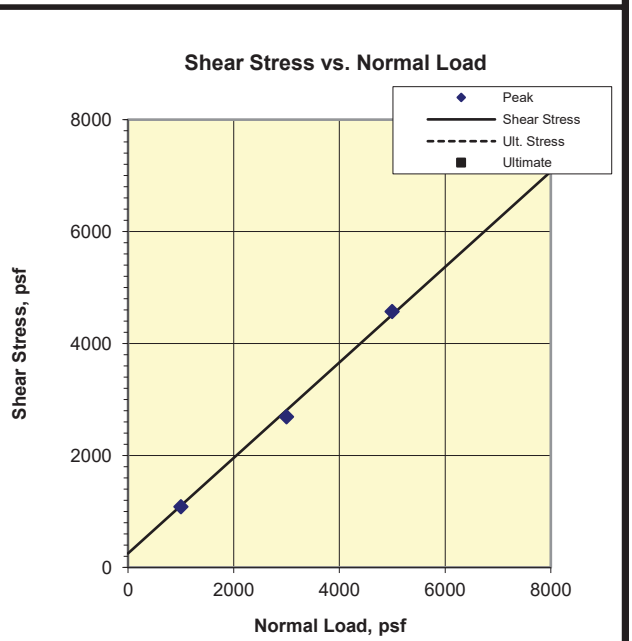
CTL Job #:	724-228	Project #:	91-04768-A	By:	MD
Client:	Geosphere Inc	Date:	6/25/2020	Checked:	PJ
Project Name:	Kaiser Fresno MOB	Remolding Info:			

Specimen Data				
	1	2	3	4
Boring:	B-2B	B-2B	B-2B	
Sample:				
Depth (ft):	8	8	8	
Visual Description:	Yellowish Brown Silty SAND	Yellowish Brown Silty SAND	Yellowish Brown Silty SAND	
Normal Load (psf)	1000	3000	5000	
Dry Mass of Specimen (g)	135.8	136.9	138.7	
Initial Height (in)	1.00	1.00	1.00	
Initial Diameter (in)	2.41	2.41	2.41	
Initial Void Ratio	0.480	0.468	0.449	
Initial Moisture (%)	7.8	6.4	5.8	
Initial Wet Density (pcf)	122.8	122.2	123.0	
Initial Dry Density (pcf)	113.9	114.8	116.3	
Initial Saturation (%)	43.9	37.0	34.7	
ΔHeight Consol (in)	0.0173	0.0317	0.0451	
At Test Void Ratio	0.454	0.421	0.384	
At Test Moisture (%)	14.1	12.4	12.1	
At Test Wet Density (pcf)	132.2	133.3	136.5	
At Test Dry Density (pcf)	115.9	118.6	121.8	
At Test Saturation (%)	83.5	79.4	84.8	
Strain Rate (%/min)	1.1	1.1	1.1	
Strengths Picked at	Peak	Peak	Peak	
Shear Stress (psf)	1084	2691	4571	
ΔHeight (in) at Peak				
Ultimate Stress (psf)				

Phi (deg)	40.5	Ult. Phi (deg)	
Cohesion (psf)	250	Ult. Cohesion (psf)	







Remarks: *DS-CU* A fully undrained condition may not be attained in this test. ΔH is not measured during undrained direct shear tests.

©

Corrosivity Tests Summary

CTL # 724-216 **Date:** 1/30/2020 **Tested By:** PJ **Checked:** PJ
Client: Geosphere Consultants **Project:** Kaiser Fresno **Proj. No:** 91-04768-A
Remarks:

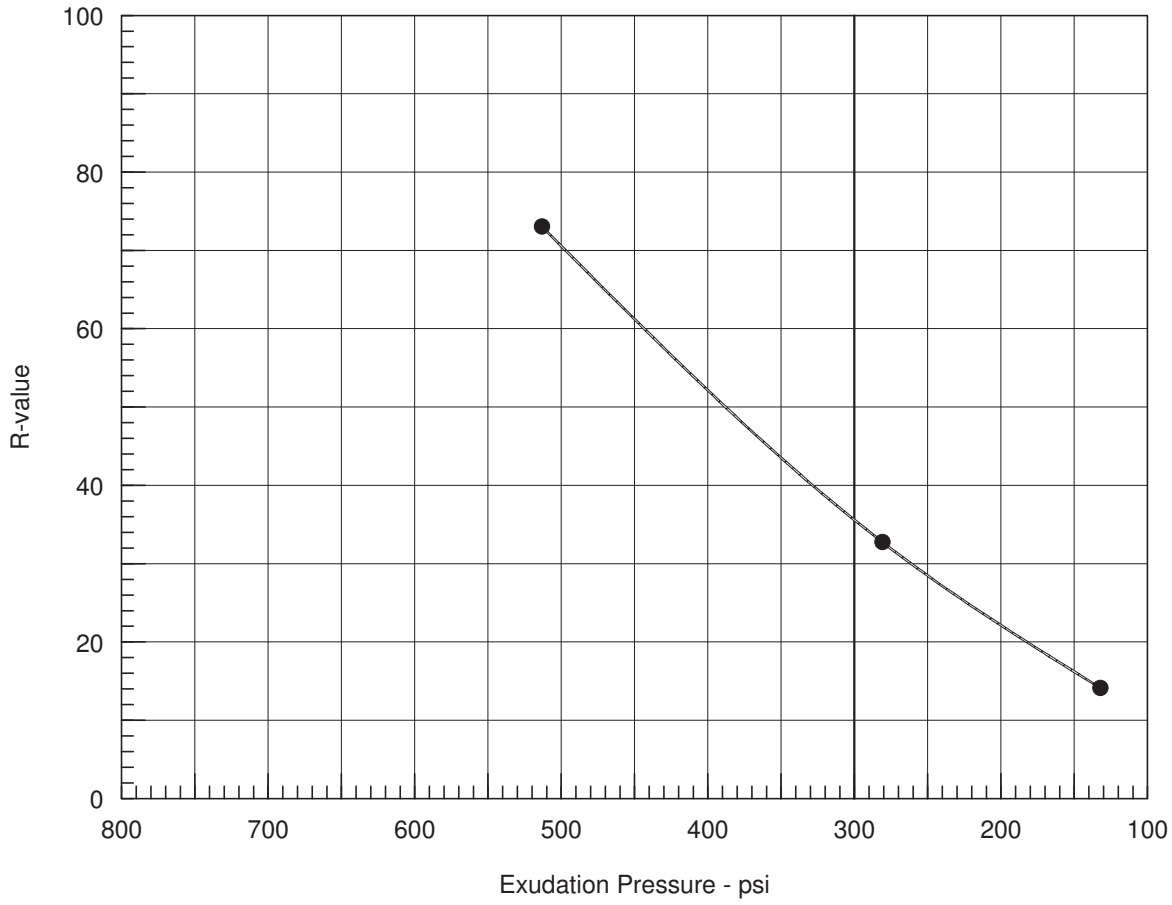
Sample Location or ID			Resistivity @ 15.5 °C (Ohm-cm)			Chloride	Sulfate		pH	ORP (Redox)		Sulfide	Moisture	Soil Visual Description
			As Rec.	Min	Sat.	mg/kg	mg/kg	%				Qualitative	At Test	
						Dry Wt.	Dry Wt.	Dry Wt.		E_H (mv)	At Test	by Lead	%	
Boring	Sample, No.	Depth, ft.	ASTM G57	Cal 643	ASTM G57	ASTM D4327	ASTM D4327	ASTM D4327	ASTM G51	ASTM G200	Temp °C	Acetate Paper	ASTM D2216	
1	1-1	0-5	-	-	6,825	11	88	0.0088	6.6	483	20	Negative	9.2	Dark Reddish Brown Clayey SAND
4	4-1	0-5	-	-	5,072	7	145	0.0145	6.9	504	20	Negative	9.3	Dark Reddish Brown Clayey SAND

Corrosivity Tests Summary

CTL # 724-228 **Date:** 6/25/2020 **Tested By:** PJ **Checked:** PJ
Client: Geosphere **Project:** Kaiser Fresno MOB **Proj. No:** 91-04768-A
Remarks:

Sample Location or ID			Resistivity @ 15.5 °C (Ohm-cm)			Chloride	Sulfate		pH	ORP (Redox)		Sulfide	Moisture	Soil Visual Description
			As Rec.	Min	Sat.	mg/kg	mg/kg	%				Qualitative	At Test	
						Dry Wt.	Dry Wt.	Dry Wt.		E_H (mv)	At Test	by Lead	%	
Boring	Sample, No.	Depth, ft.	ASTM G57	Cal 643	ASTM G57	ASTM D4327	ASTM D4327	ASTM D4327	ASTM G51	ASTM G200	Temp °C	Acetate Paper	ASTM D2216	
B-12	-	0-5	-	-	6,067	2	84	0.0084	7.7	426	23	Negative	1.9	Yellowish Brown Sandy CLAY w/ Gravel

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	100	131.7	9.1	0.00	126	2.45	132	14	14
2	200	131.8	8.2	0.00	88	2.50	281	33	33
3	350	134.0	7.3	0.00	34	2.55	513	73	73

Test Results	Material Description
R-value at 300 psi exudation pressure = 36	Orangish Brown Silty Sand

Project No.: 9104768A
Project: Kaiser Fresno MOB (GES)
Location: B-7 / B-8 / Native
Sample Number: 10S200130-5
Date: 1/30/2020

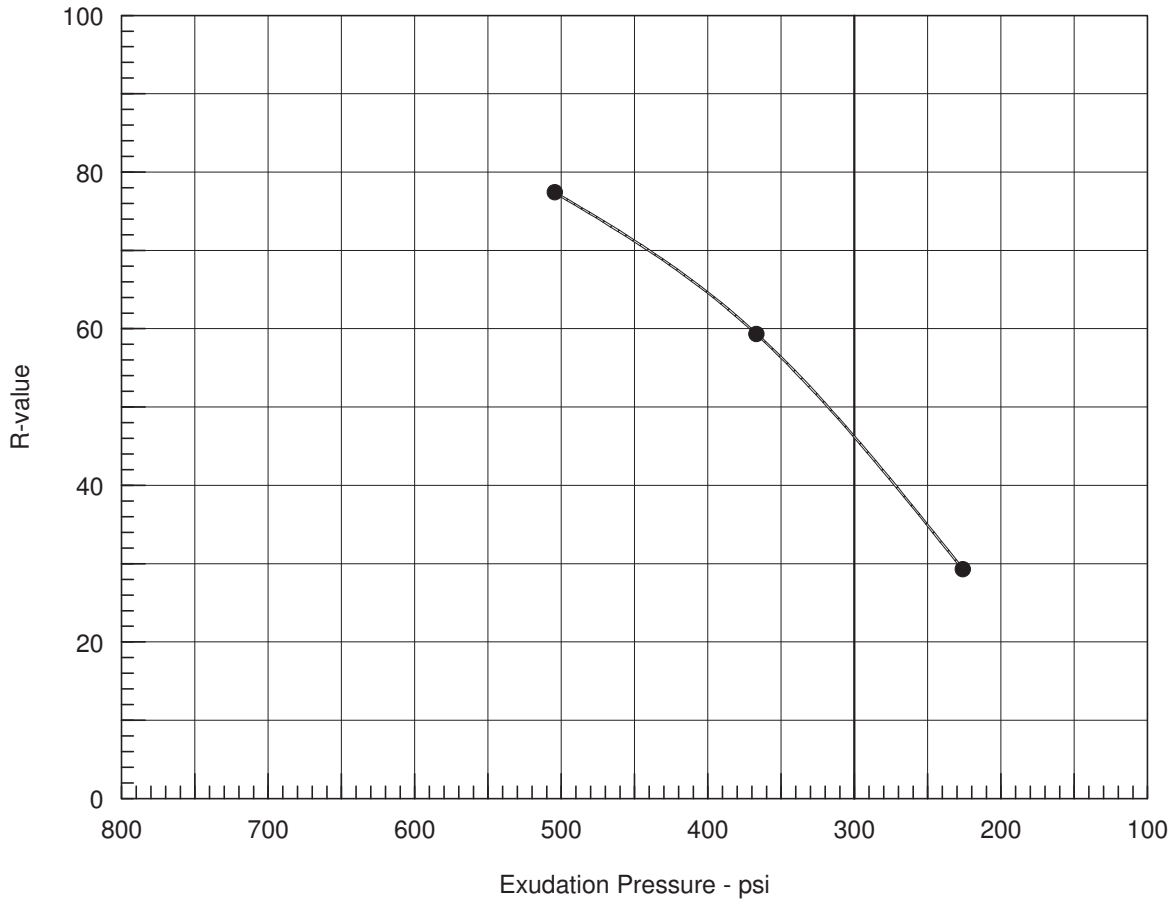
Tested by: MT
Checked by: KC
Remarks:

R-VALUE TEST REPORT

CONSOLIDATED ENGINEERING LABORATORIES

Figure 10S200130-5

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	130	130.6	8.2	0.00	97	2.45	226	29	29
2	250	132.1	7.4	0.00	49	2.45	367	59	59
3	300	132.3	6.9	0.00	30	2.45	505	77	77

Test Results	Material Description
R-value at 300 psi exudation pressure = 46	Orangish Brown Silty Sand

Project No.: 9104768A
Project: Kaiser Fresno MOB (GES)
Location: B-9/B-10 @ 5' Composite / Native
Sample Number: 10S200130-4
Date: 1/31/2020

Tested by: MT
Checked by: KC
Remarks:

R-VALUE TEST REPORT

CONSOLIDATED ENGINEERING LABORATORIES

Figure 10S200130-4

APPENDIX C

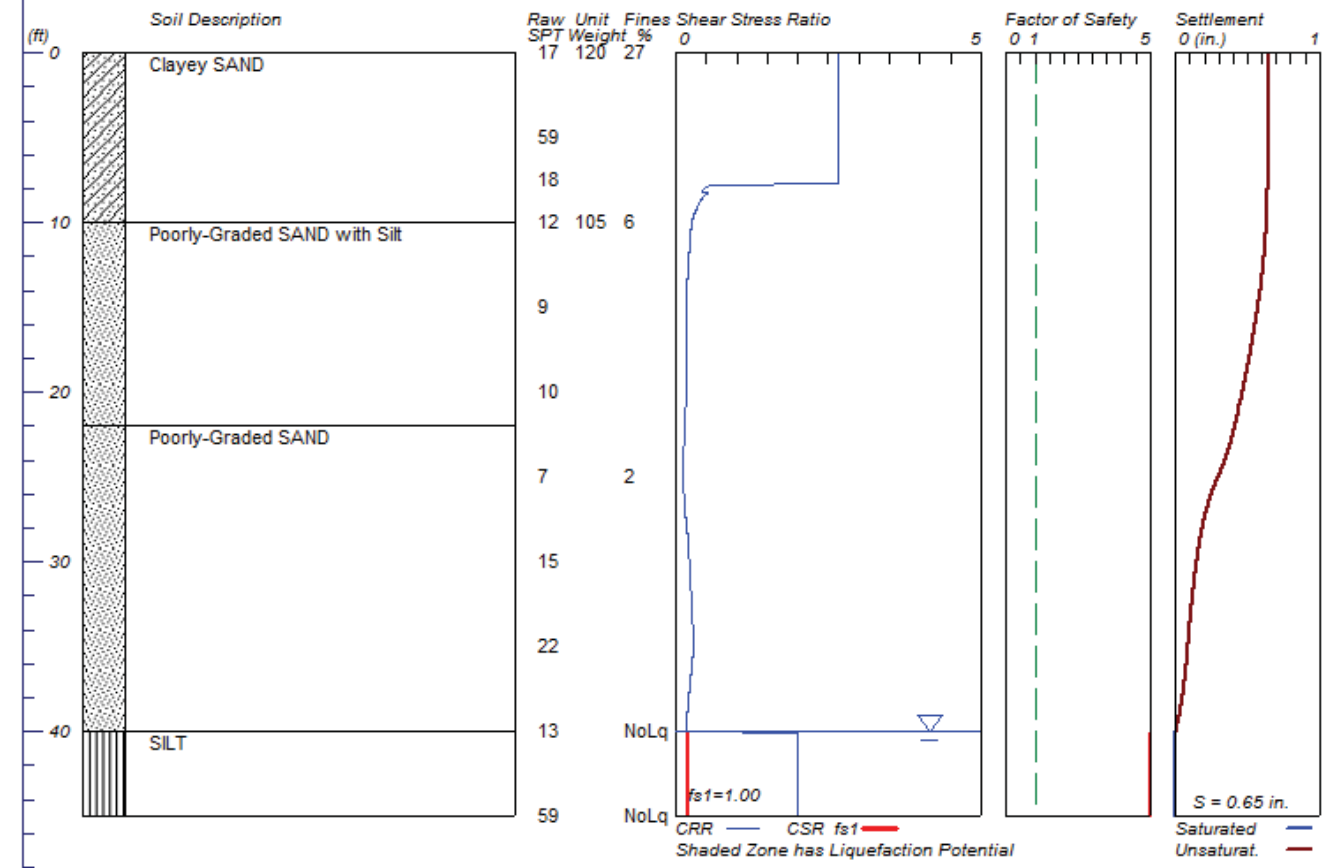
SEISMIC SETTLEMENT ANALYSIS RESULTS

LIQUEFACTION ANALYSIS

Kaiser Fresno MOB

Hole No.=B-1 Water Depth=40 ft

Magnitude=6.7
Acceleration=0.345g



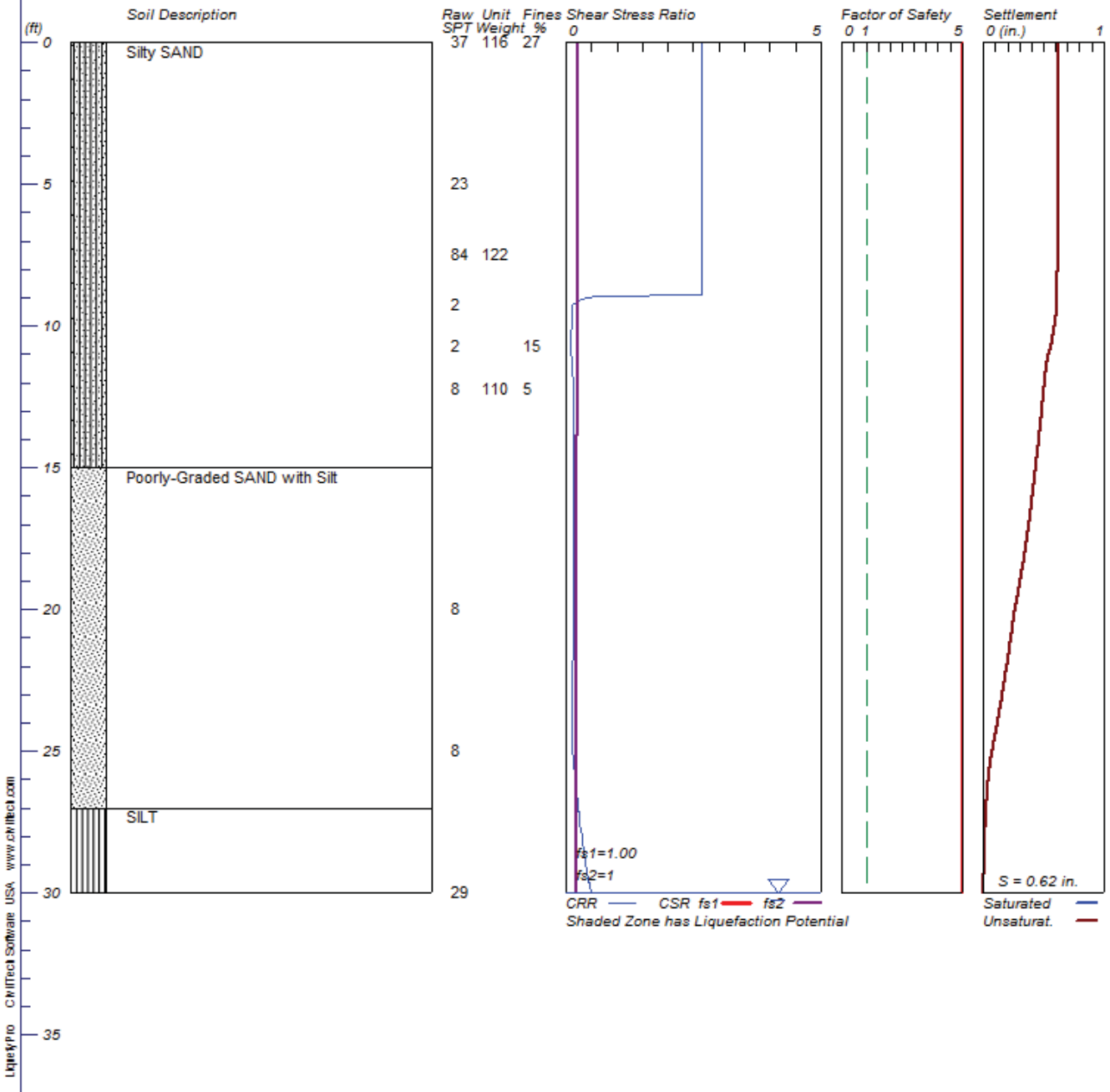
LiquefyPro CivilTech Software USA www.civiltech.com

LIQUEFACTION ANALYSIS

Kaiser Fresno MOB

Hole No.=B-2 Water Depth=30 ft

Magnitude=6.7
Acceleration=0.345g

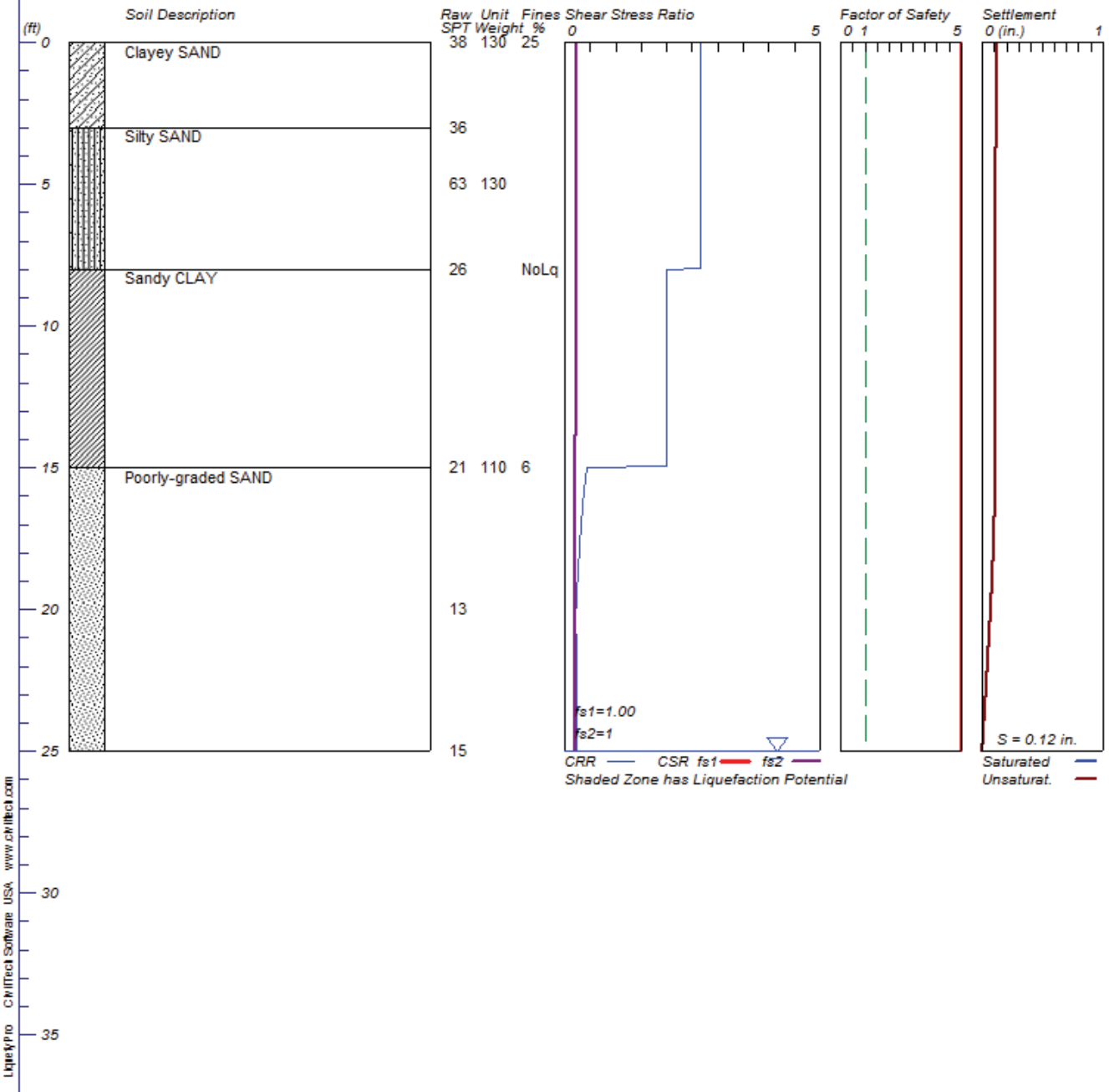


LIQUEFACTION ANALYSIS

Kaiser Fresno MOB

Hole No.=B-3 Water Depth=25 ft

Magnitude=6.7
Acceleration=0.345g

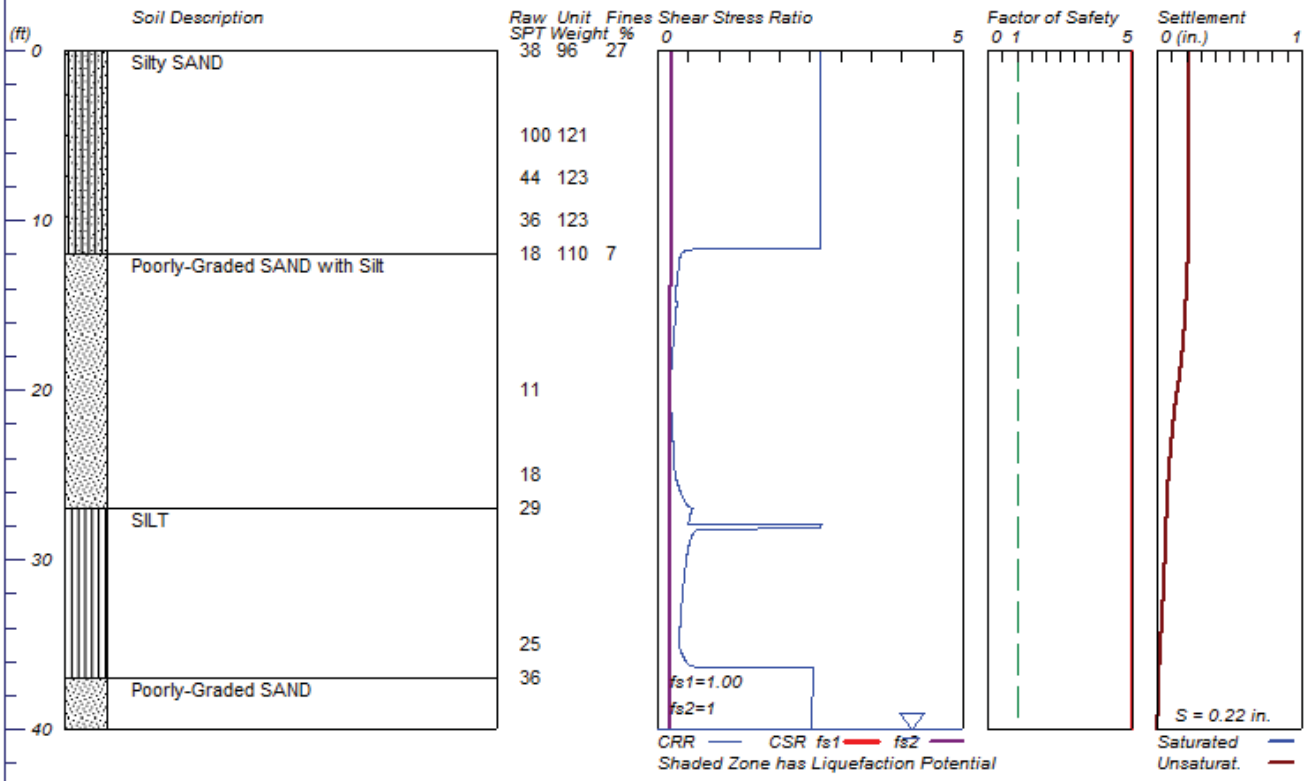


LIQUEFACTION ANALYSIS

Kaiser Fresno MOB

Hole No.=B-4 Water Depth=40 ft

Magnitude=6.7
Acceleration=0.345g



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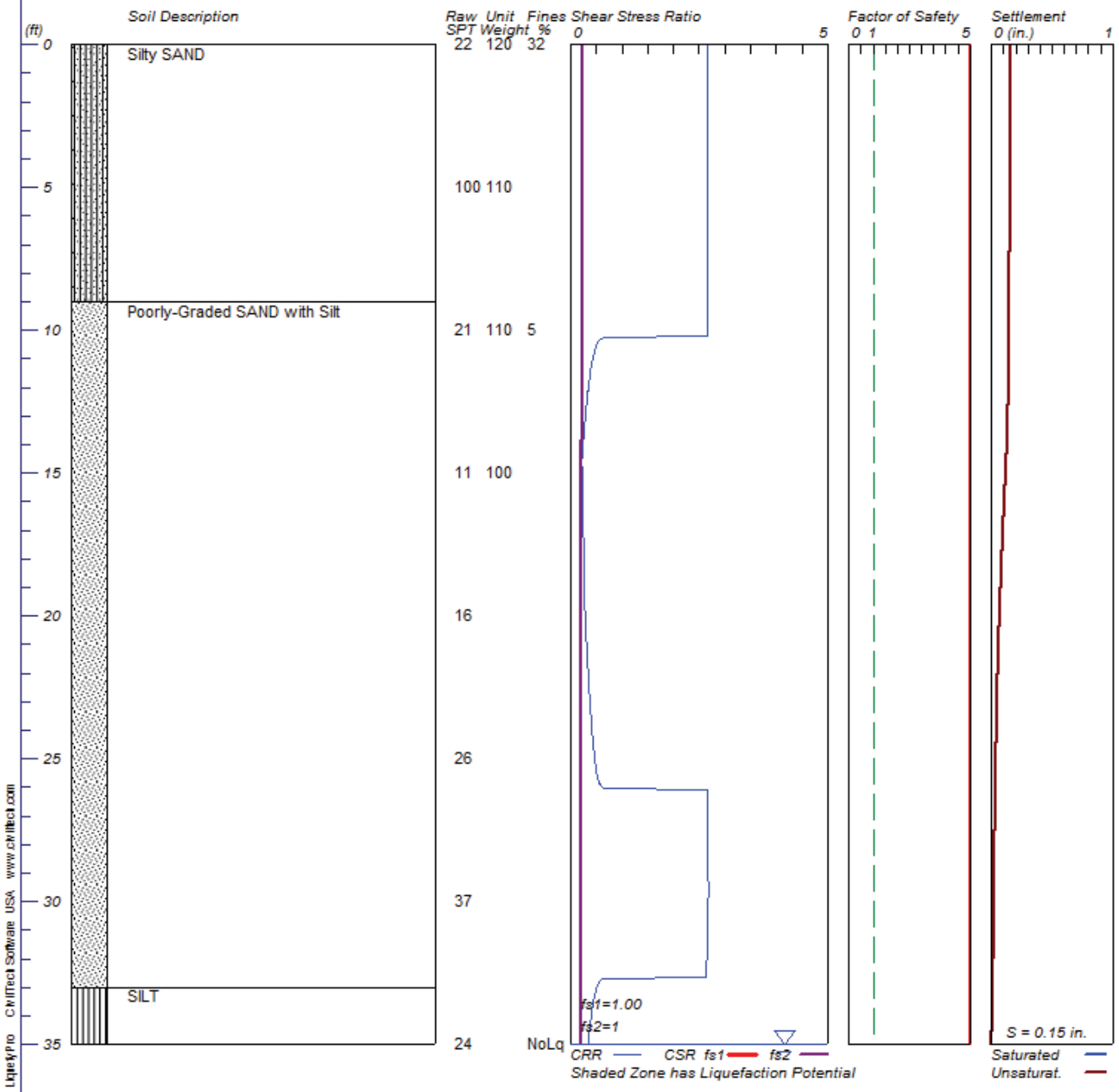
LIQUEFACTION ANALYSIS

Kaiser Fresno MOB

Hole No.=B-5 Water Depth=35 ft

Magnitude=6.7
Acceleration=0.345g

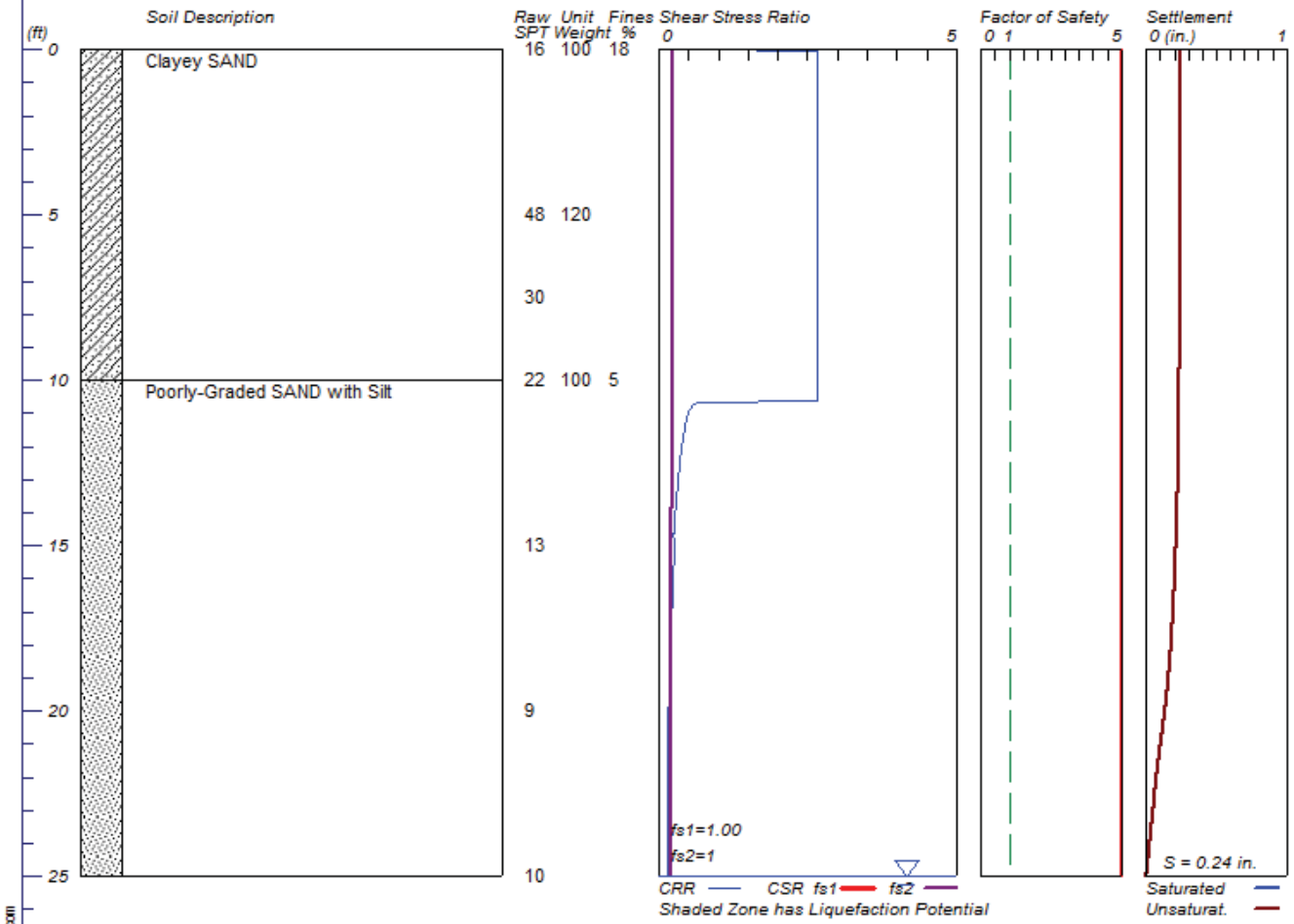


LIQUEFACTION ANALYSIS

Kaiser Fresno MOB

Hole No.=B-6 Water Depth=25 ft

Magnitude=6.7
Acceleration=0.345g



LiquefyPro CivilTech Software USA www.civiltech.com

TABLE OF CONTENTS

CPT-02 results
Summary data report 1
Vertical settlements summary report 8
Vertical settlements data report 9

CPT-04 results
Summary data report 16
Vertical settlements summary report 23
Vertical settlements data report 24

CPT-05 results
Summary data report 31
Vertical settlements summary report 38
Vertical settlements data report 39

CPT-06 results
Summary data report 46
Vertical settlements summary report 53
Vertical settlements data report 54

CPT-07 results
Summary data report 61
Vertical settlements summary report 68
Vertical settlements data report 69

CPT-08 results
Summary data report 76
Vertical settlements summary report 83
Vertical settlements data report 84

GEOLOGISMIKI Geotechnical Software

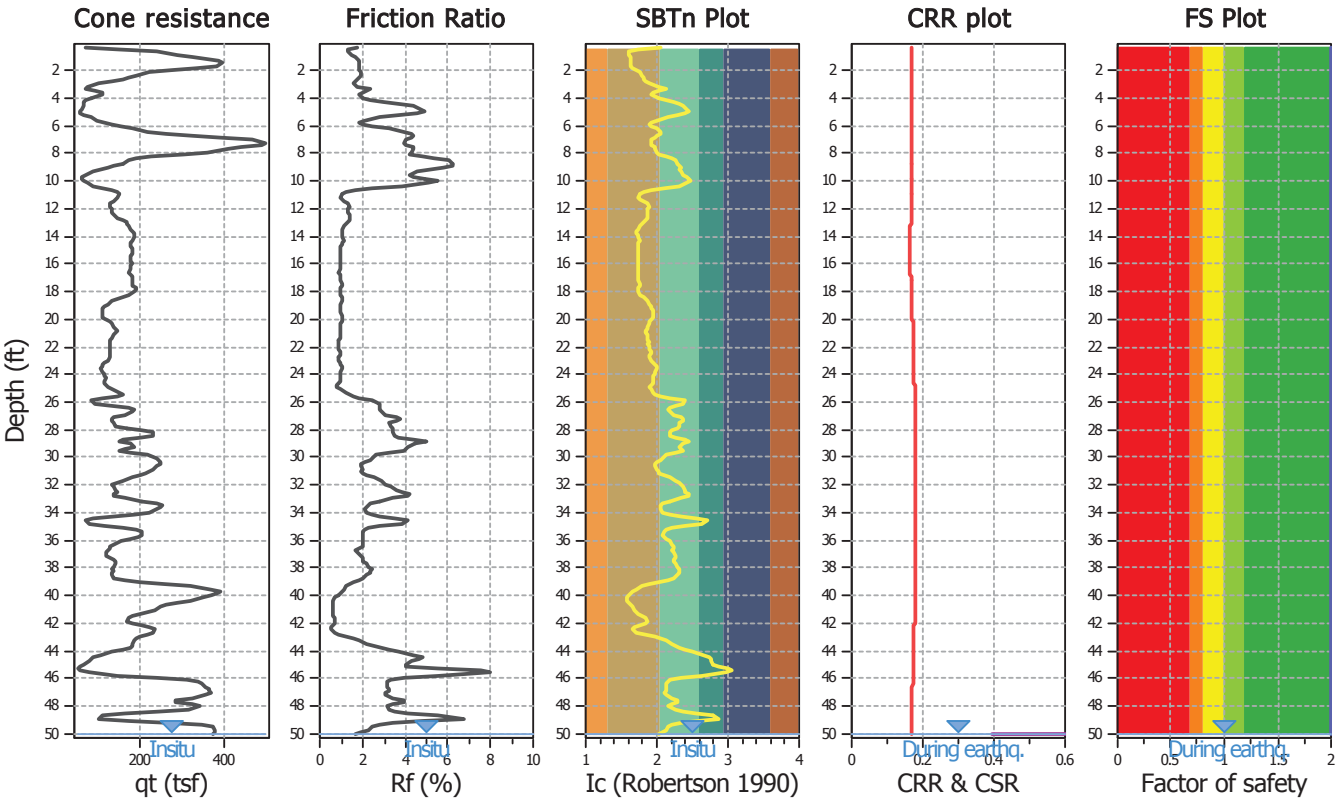
LIQUEFACTION ANALYSIS REPORT

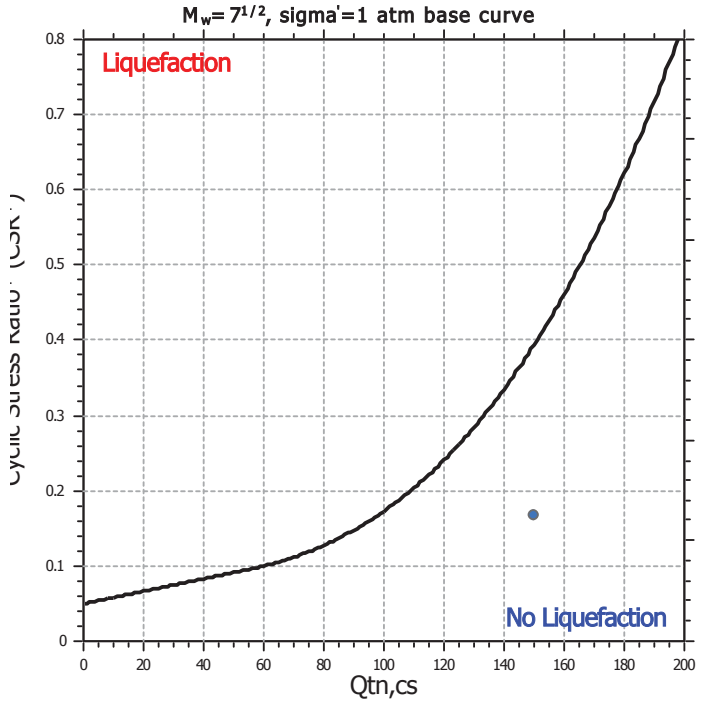
Project title : Kaiser Fresno MOB **Location : Fresno, CA**

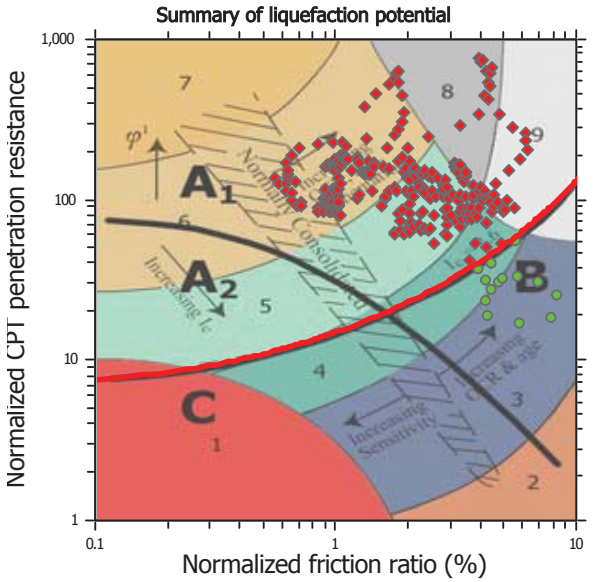
CPT file : CPT-02

Input parameters and analysis data

Analysis method:	NCEER (1998)	**G.W.T. (in-situ):**	50.00 ft	**Use fill:**	No	**Clay like behavior applied:**	Sands only
Fines correction method:	NCEER (1998)	**G.W.T. (earthq.):**	50.00 ft	**Fill height:**	N/A		
Points to test:	Based on Ic value	**Average results interva:**	3	**Fill weight:**	N/A	**Limit depth applie:**	No
Earthquake magnitude M_w:	6.70	**Ic cut-off value:**	2.60	**Trans. detect. applied:**	No	**Limit depth:**	N/A
Peak ground acceleration:	0.35	**Unit weight calculation:**	Based on SBT	**K_σ applied:**	Yes	**MSF method:**	Method based

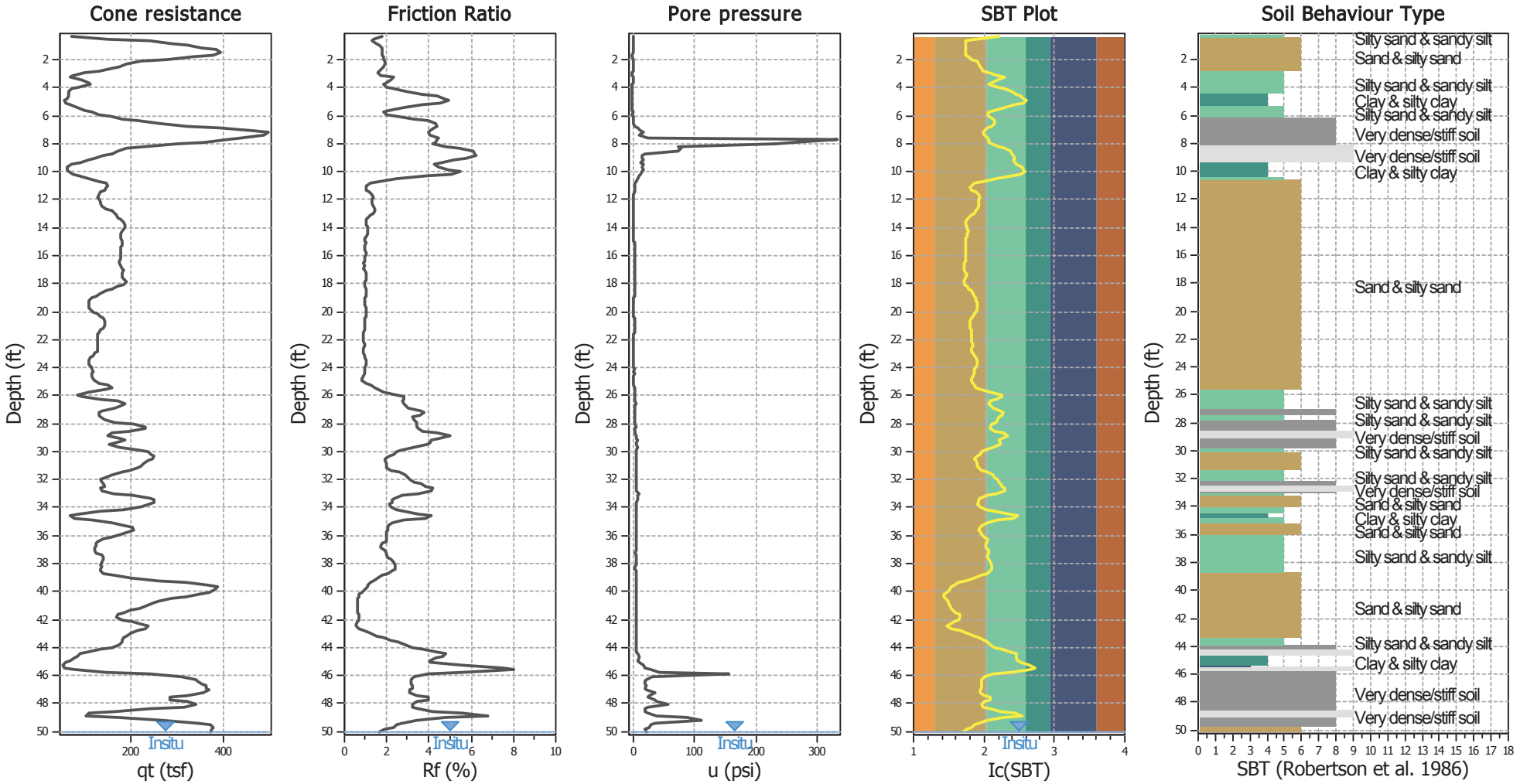






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



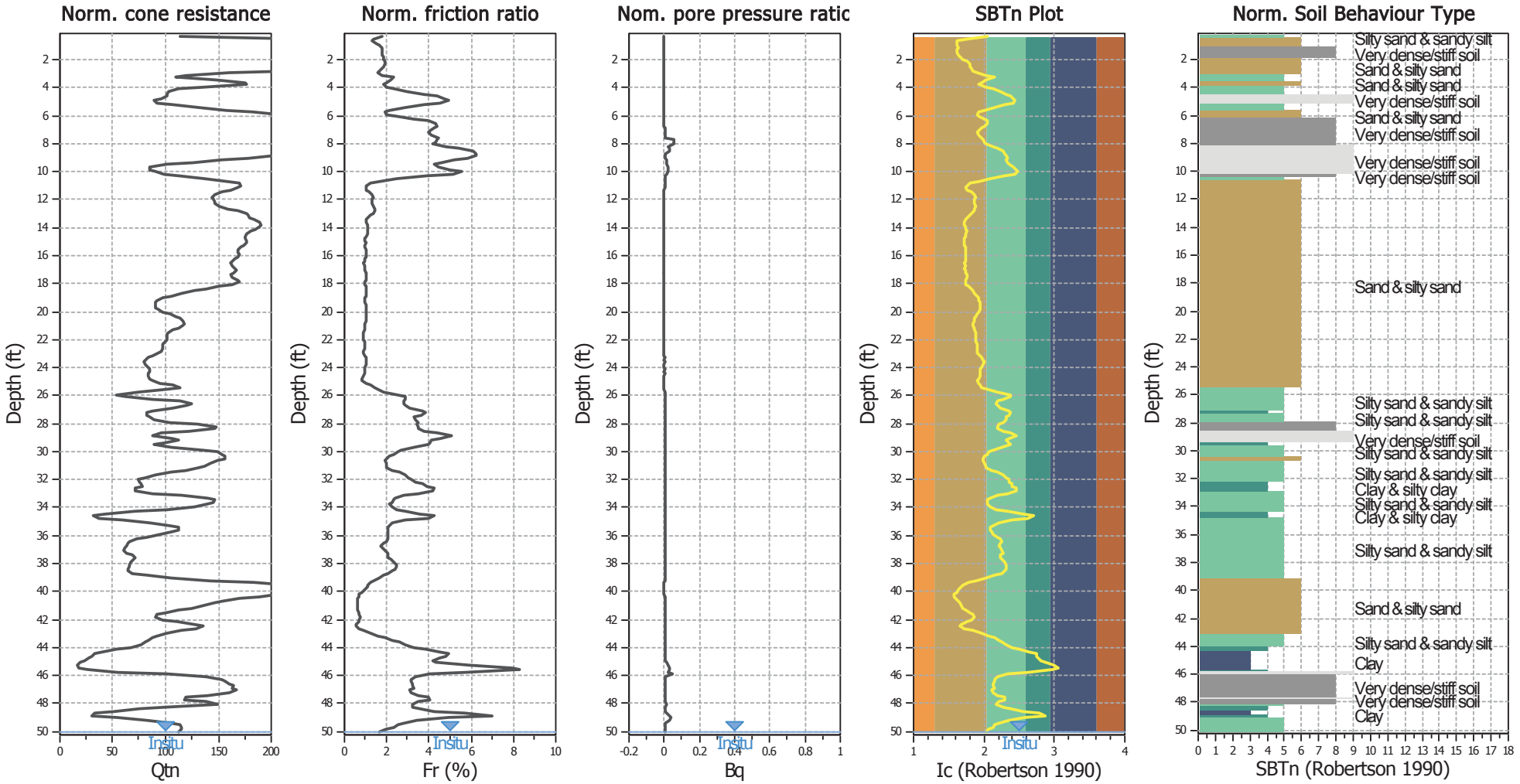
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



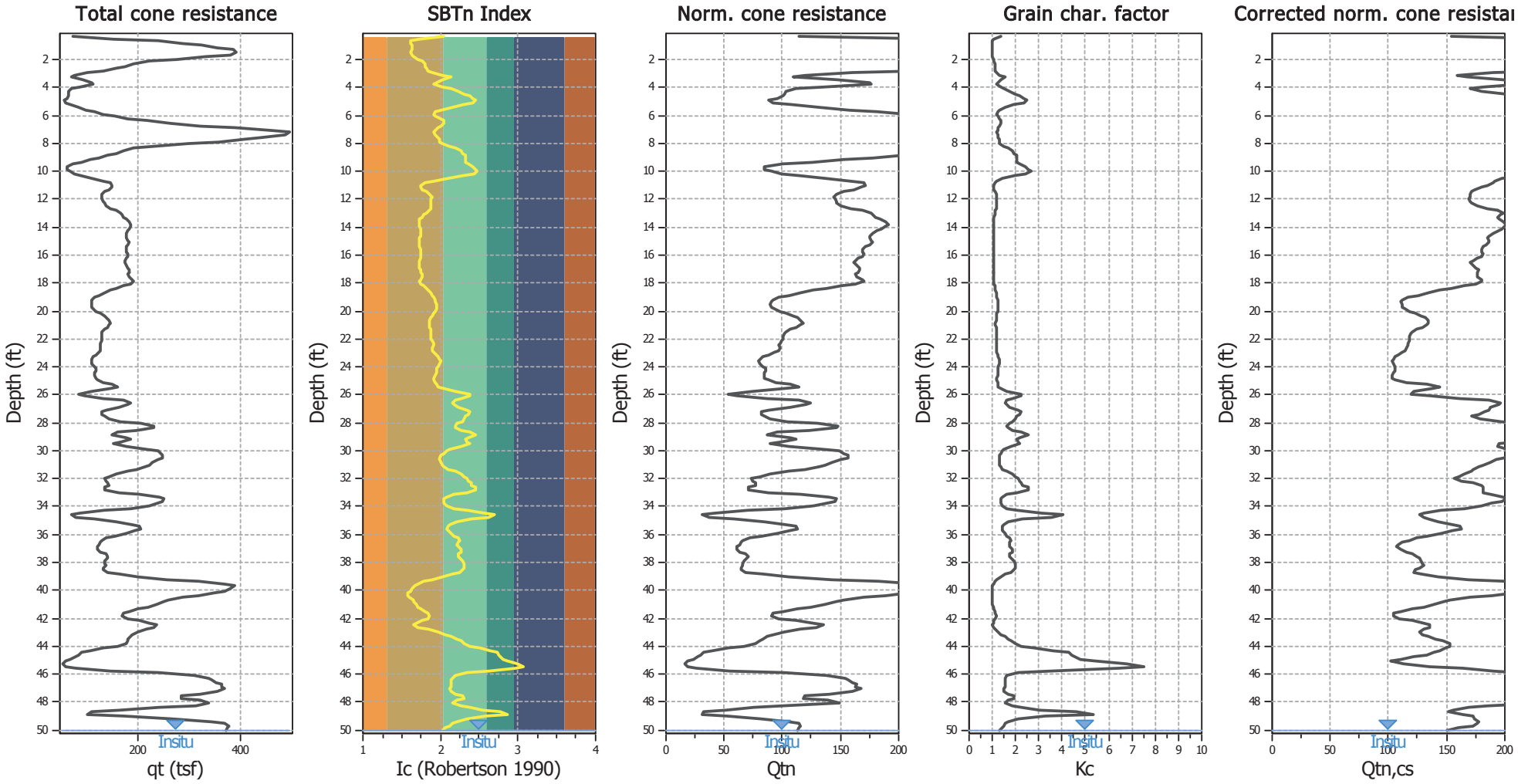
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

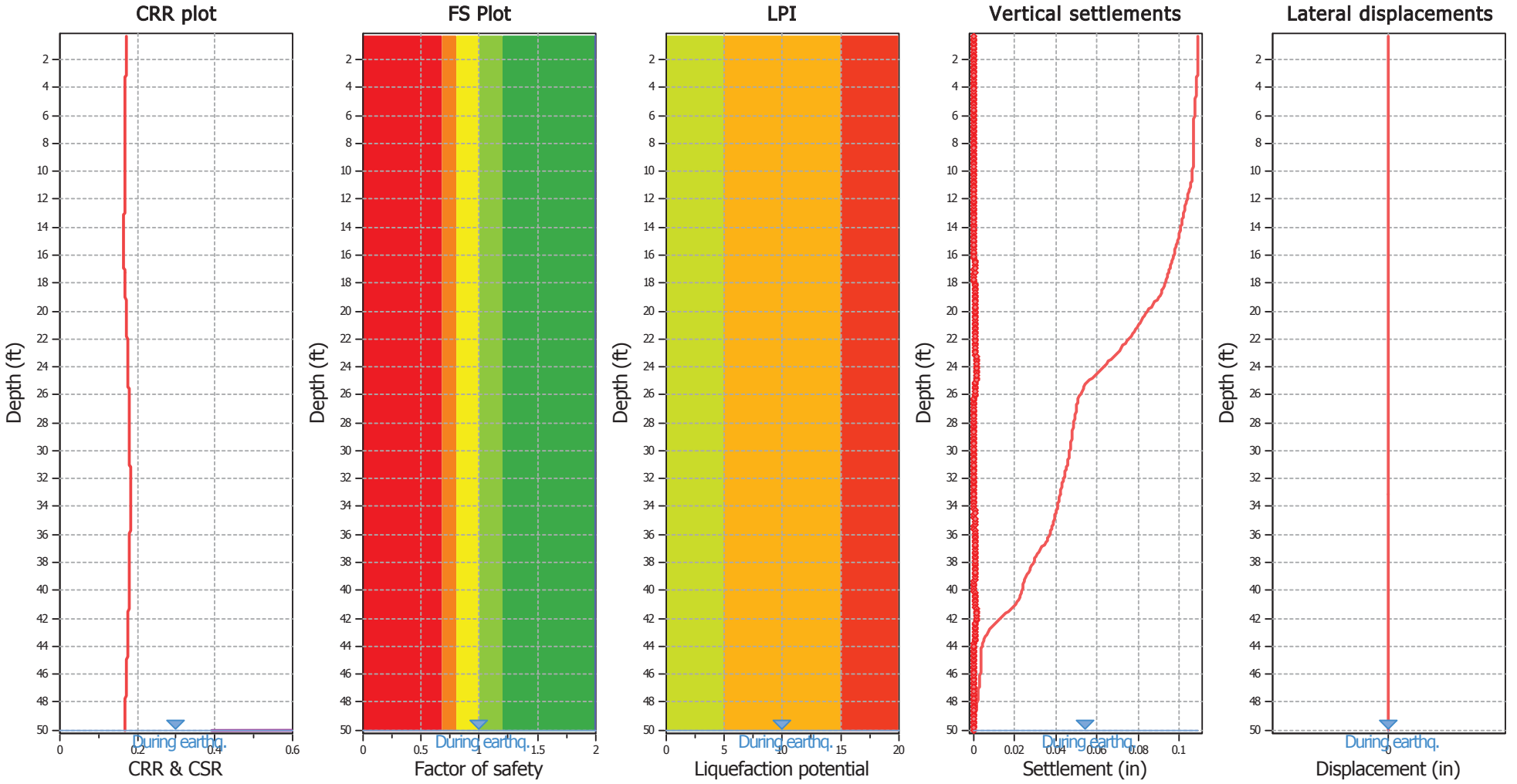
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

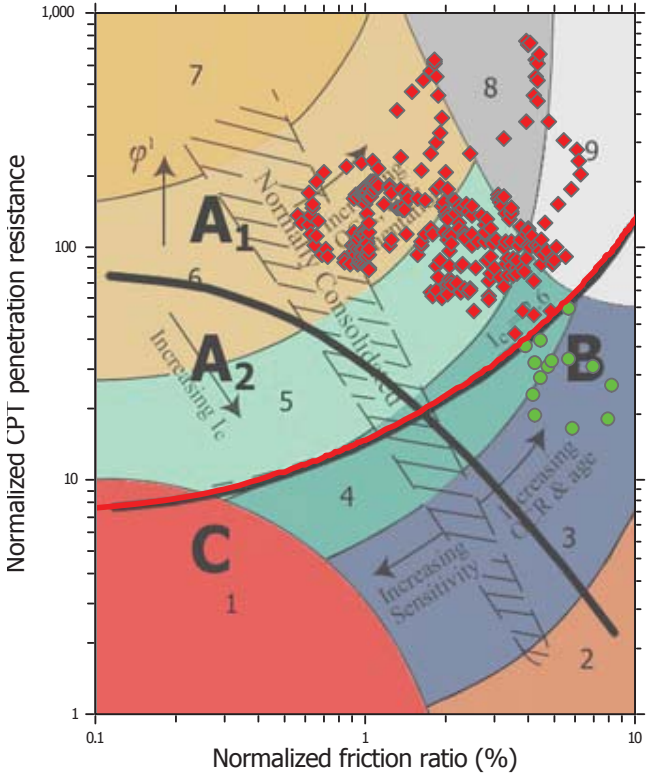
F.S. color scheme

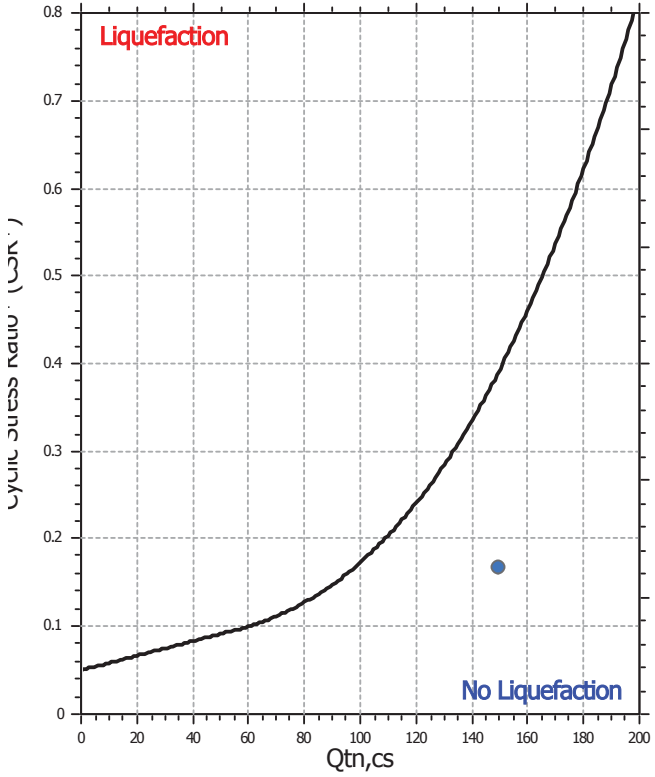
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

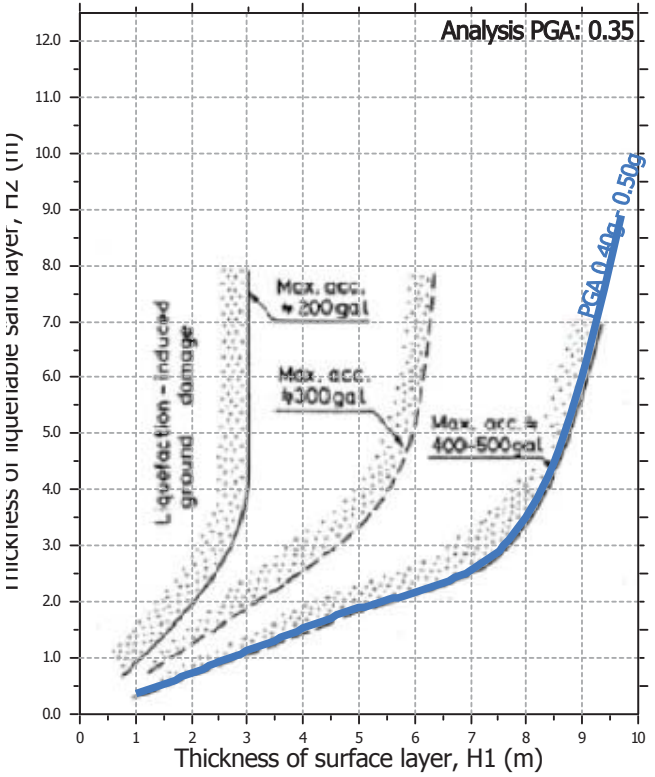
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



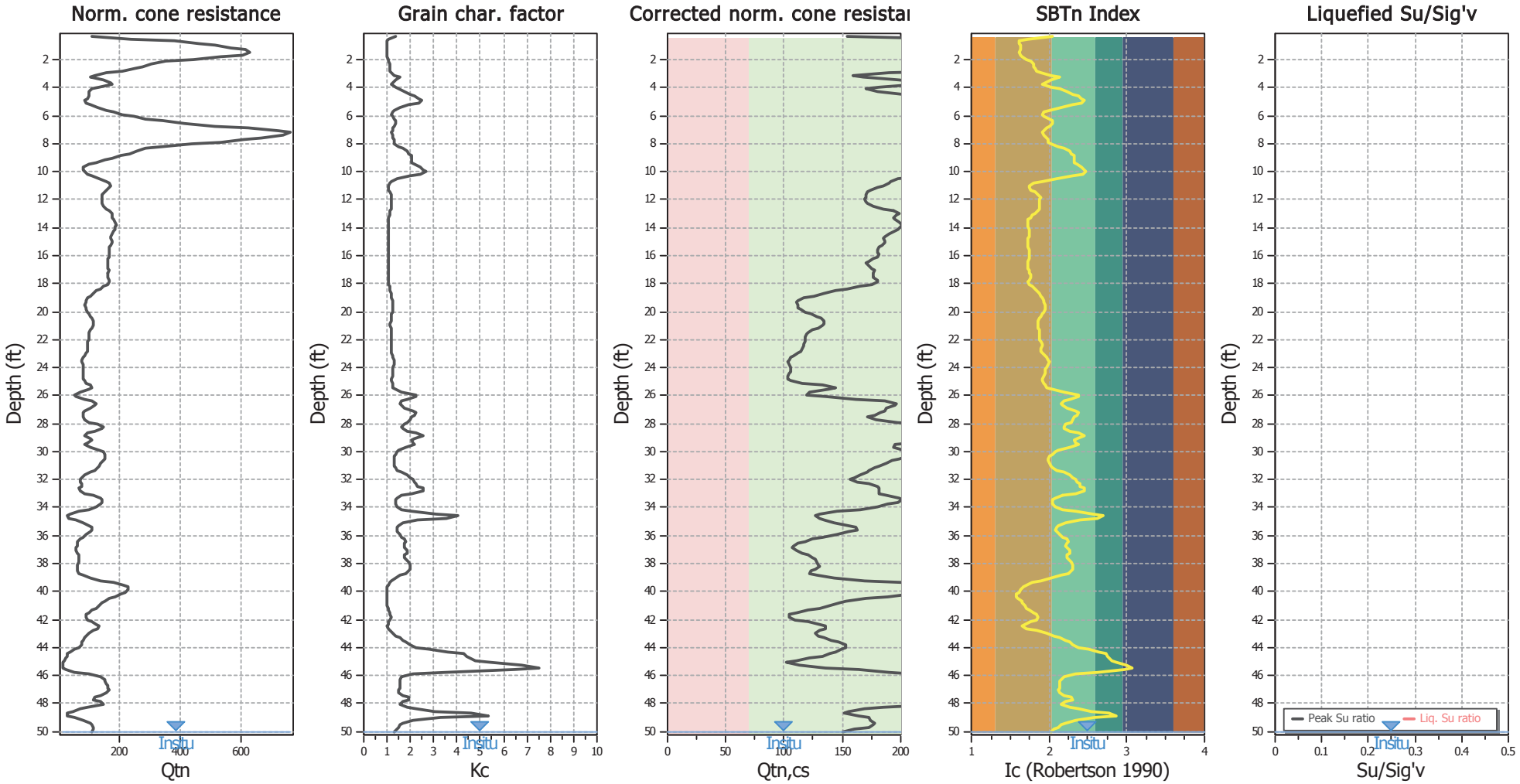




Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

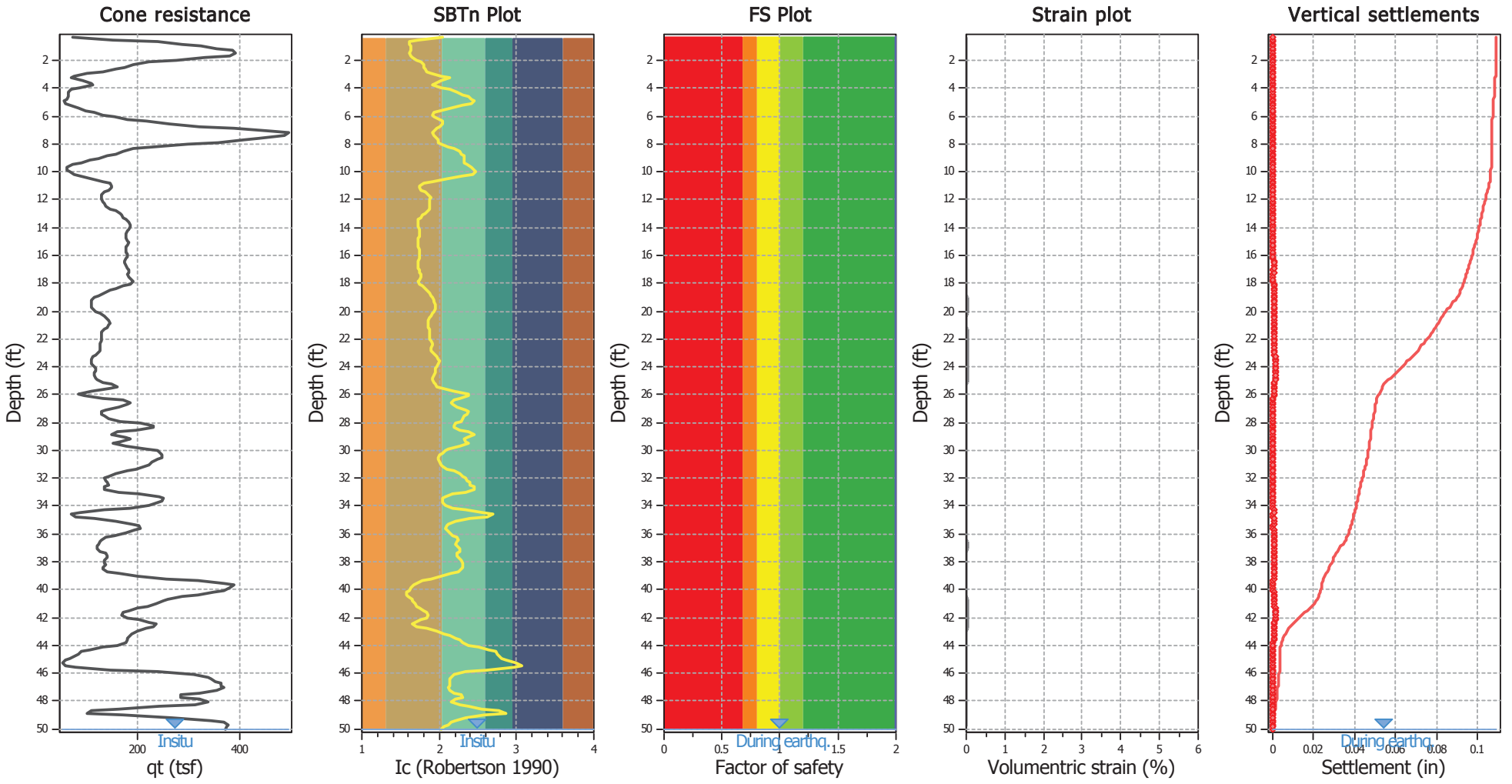
Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement of dry sands ::

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
0.33	2.04	114.09	1.36	154.66	33	846	0.17	0.001	0.00	8.63	0.00	0.000
0.49	1.73	241.59	1.06	256.27	48	1216	0.17	0.001	0.00	8.63	0.00	0.000
0.66	1.61	384.83	1.00	384.83	70	1649	0.17	0.001	0.00	8.63	0.00	0.000
0.82	1.61	462.63	1.00	462.63	84	1983	0.17	0.001	0.00	8.63	0.00	0.000
0.98	1.62	518.26	1.00	518.26	94	2272	0.17	0.001	0.00	8.63	0.00	0.000
1.15	1.63	568.32	1.00	568.32	104	2512	0.17	0.001	0.00	8.63	0.00	0.000
1.31	1.62	617.99	1.00	617.99	112	2709	0.17	0.001	0.00	8.63	0.00	0.000
1.48	1.62	629.70	1.00	629.70	114	2755	0.17	0.001	0.00	8.63	0.00	0.000
1.64	1.63	608.63	1.00	608.63	111	2678	0.17	0.001	0.00	8.63	0.00	0.000
1.80	1.66	534.81	1.01	539.71	99	2446	0.17	0.001	0.00	8.63	0.00	0.000
1.97	1.71	442.73	1.04	461.05	86	2149	0.17	0.001	0.00	8.63	0.00	0.000
2.13	1.77	354.36	1.08	383.51	73	1857	0.17	0.002	0.00	8.63	0.00	0.000
2.30	1.79	305.07	1.10	336.07	65	1655	0.17	0.002	0.00	8.63	0.00	0.000
2.46	1.80	277.58	1.11	307.95	60	1527	0.17	0.003	0.00	8.63	0.00	0.000
2.62	1.81	252.29	1.12	281.77	55	1405	0.17	0.003	0.00	8.63	0.00	0.000
2.79	1.83	210.60	1.13	238.47	47	1203	0.17	0.004	0.00	8.63	0.00	0.000
2.95	1.90	160.07	1.19	190.25	38	994	0.17	0.005	0.00	8.63	0.00	0.000
3.12	2.02	119.30	1.33	158.40	33	863	0.17	0.006	0.00	8.63	0.00	0.000
3.28	2.14	109.28	1.53	167.53	37	921	0.17	0.006	0.00	8.63	0.00	0.000
3.45	2.03	147.93	1.35	199.21	42	1089	0.17	0.005	0.00	8.63	0.00	0.000
3.61	1.96	175.27	1.25	218.60	45	1170	0.17	0.005	0.00	8.63	0.00	0.000
3.77	1.92	176.37	1.21	213.23	43	1125	0.17	0.006	0.00	8.63	0.00	0.000
3.94	2.03	135.97	1.34	181.63	38	991	0.17	0.007	0.00	8.63	0.00	0.000
4.10	2.13	111.69	1.52	169.71	37	933	0.17	0.008	0.00	8.63	0.00	0.000
4.27	2.23	102.69	1.76	180.33	41	975	0.17	0.008	0.00	8.63	0.00	0.000
4.43	2.31	101.82	1.99	202.74	48	1067	0.17	0.007	0.00	8.63	0.00	0.000
4.59	2.37	101.16	2.19	221.92	54	1139	0.17	0.007	0.00	8.63	0.00	0.000
4.76	2.41	96.05	2.35	225.93	56	1138	0.17	0.007	0.00	8.63	0.00	0.000
4.92	2.45	88.65	2.51	222.64	56	1100	0.17	0.008	0.00	8.63	0.00	0.000
5.09	2.41	91.84	2.34	215.30	53	1085	0.17	0.008	0.00	8.63	0.00	0.000
5.25	2.30	107.19	1.95	208.92	49	1105	0.17	0.008	0.00	8.63	0.00	0.000
5.41	2.15	131.55	1.56	204.75	45	1124	0.17	0.008	0.00	8.63	0.00	0.000
5.58	2.00	157.24	1.30	204.80	43	1111	0.17	0.009	0.00	8.63	0.00	0.000
5.74	1.92	181.54	1.21	220.22	45	1164	0.17	0.008	0.00	8.63	0.00	0.000
5.91	1.90	209.74	1.19	250.22	50	1310	0.17	0.007	0.00	8.63	0.00	0.000
6.07	1.93	247.97	1.22	303.21	62	1608	0.17	0.006	0.00	8.63	0.00	0.000
6.23	2.01	288.82	1.31	377.80	79	2052	0.17	0.005	0.00	8.63	0.00	0.000
6.40	2.04	344.35	1.36	468.04	99	2561	0.17	0.004	0.00	8.63	0.00	0.000
6.56	2.04	417.57	1.36	567.41	120	3105	0.17	0.003	0.00	8.63	0.00	0.000
6.73	2.01	515.88	1.31	676.00	141	3674	0.17	0.003	0.00	8.63	0.00	0.000
6.89	1.97	626.07	1.26	789.21	162	4240	0.17	0.002	0.00	8.63	0.00	0.000
7.05	1.92	726.53	1.21	880.38	178	4762	0.17	0.002	0.00	8.63	0.00	0.000
7.22	1.91	763.30	1.20	915.32	184	5018	0.17	0.002	0.00	8.63	0.00	0.000
7.38	1.93	741.85	1.21	900.88	182	5019	0.17	0.002	0.00	8.63	0.00	0.000
7.55	1.98	665.86	1.27	845.26	174	4797	0.17	0.002	0.00	8.63	0.00	0.000
7.71	1.98	612.92	1.28	783.62	162	4510	0.17	0.003	0.00	8.63	0.00	0.000
7.87	2.00	535.00	1.30	693.25	144	4045	0.17	0.003	0.00	8.63	0.00	0.000
8.04	2.02	441.72	1.32	585.02	123	3461	0.17	0.004	0.00	8.63	0.00	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
8.20	2.12	339.46	1.50	507.68	111	2992	0.17	0.004	0.00	8.63	0.00	0.000
8.37	2.20	286.04	1.67	477.05	108	2772	0.17	0.005	0.00	8.63	0.00	0.000
8.53	2.27	257.67	1.85	477.30	111	2716	0.17	0.005	0.00	8.63	0.00	0.000
8.69	2.29	233.96	1.93	451.80	106	2569	0.17	0.005	0.00	8.63	0.00	0.000
8.86	2.33	204.54	2.03	415.71	99	2354	0.17	0.006	0.00	8.63	0.00	0.000
9.02	2.33	177.55	2.05	363.48	87	2082	0.17	0.007	0.00	8.63	0.00	0.000
9.19	2.32	153.09	2.03	310.97	74	1813	0.17	0.008	0.00	8.63	0.00	0.000
9.35	2.33	125.63	2.05	257.52	61	1516	0.17	0.011	0.00	8.63	0.00	0.000
9.51	2.36	100.74	2.16	217.63	53	1272	0.17	0.013	0.00	8.63	0.00	0.000
9.68	2.43	84.39	2.42	204.15	51	1157	0.17	0.015	0.00	8.63	0.00	0.000
9.84	2.46	84.76	2.58	218.35	55	1222	0.17	0.014	0.00	8.63	0.00	0.000
10.01	2.48	90.20	2.68	241.33	62	1349	0.17	0.013	0.00	8.63	0.00	0.000
10.17	2.43	99.00	2.44	241.28	60	1417	0.17	0.012	0.00	8.63	0.00	0.000
10.34	2.30	112.78	1.96	220.77	52	1423	0.17	0.013	0.00	8.63	0.00	0.000
10.50	2.10	136.33	1.45	197.61	43	1387	0.17	0.013	0.01	8.63	0.00	0.000
10.66	1.92	158.42	1.21	191.41	39	1337	0.17	0.014	0.01	8.63	0.00	0.000
10.83	1.81	170.45	1.11	189.52	37	1280	0.17	0.015	0.01	8.63	0.01	0.000
10.99	1.75	171.74	1.07	184.54	35	1225	0.17	0.016	0.01	8.63	0.01	0.000
11.16	1.74	168.23	1.07	179.57	34	1196	0.17	0.017	0.01	8.63	0.01	0.000
11.32	1.76	161.59	1.08	174.27	33	1178	0.17	0.018	0.01	8.63	0.01	0.000
11.48	1.82	153.05	1.12	171.73	33	1205	0.17	0.017	0.01	8.63	0.01	0.000
11.65	1.87	146.39	1.16	169.63	34	1224	0.17	0.017	0.01	8.63	0.01	0.000
11.81	1.89	144.43	1.18	170.55	34	1252	0.17	0.017	0.01	8.63	0.01	0.000
11.98	1.87	145.26	1.16	169.10	34	1242	0.17	0.018	0.01	8.63	0.01	0.000
12.14	1.87	146.48	1.16	170.34	34	1260	0.17	0.017	0.01	8.63	0.01	0.000
12.30	1.87	147.00	1.16	171.13	34	1276	0.17	0.017	0.01	8.63	0.01	0.000
12.47	1.88	150.66	1.17	176.10	35	1327	0.17	0.017	0.01	8.63	0.01	0.000
12.63	1.87	159.35	1.16	185.55	37	1405	0.17	0.016	0.01	8.63	0.01	0.000
12.80	1.85	169.07	1.15	194.06	38	1468	0.17	0.015	0.01	8.63	0.01	0.000
12.96	1.82	176.39	1.12	198.39	39	1491	0.17	0.015	0.01	8.63	0.01	0.000
13.12	1.79	177.86	1.10	195.71	38	1455	0.17	0.016	0.01	8.63	0.01	0.000
13.29	1.76	179.74	1.08	193.25	37	1419	0.17	0.017	0.01	8.63	0.01	0.000
13.45	1.73	183.68	1.06	194.83	37	1422	0.17	0.017	0.01	8.63	0.01	0.000
13.62	1.72	188.54	1.05	198.36	37	1447	0.17	0.017	0.01	8.63	0.01	0.000
13.78	1.72	190.81	1.05	200.95	38	1476	0.17	0.016	0.01	8.63	0.01	0.000
13.94	1.73	189.04	1.06	200.26	38	1488	0.17	0.016	0.01	8.63	0.01	0.000
14.11	1.74	185.61	1.07	197.81	37	1487	0.17	0.017	0.01	8.63	0.01	0.000
14.27	1.75	181.20	1.07	194.72	37	1484	0.17	0.017	0.01	8.63	0.01	0.000
14.44	1.75	177.36	1.07	190.00	36	1453	0.17	0.018	0.01	8.63	0.01	0.000
14.60	1.74	175.21	1.06	186.37	35	1424	0.17	0.018	0.01	8.63	0.01	0.000
14.76	1.72	175.47	1.05	184.94	35	1409	0.17	0.019	0.01	8.63	0.01	0.000
14.93	1.72	176.43	1.05	186.04	35	1427	0.17	0.019	0.01	8.63	0.01	0.000
15.09	1.73	177.03	1.06	186.90	35	1443	0.17	0.019	0.01	8.63	0.01	0.000
15.26	1.73	174.63	1.06	184.47	35	1433	0.17	0.019	0.01	8.63	0.01	0.000
15.42	1.73	171.04	1.06	181.29	34	1421	0.16	0.019	0.01	8.63	0.01	0.000
15.58	1.74	168.77	1.06	179.64	34	1421	0.16	0.020	0.01	8.63	0.01	0.000
15.75	1.74	168.58	1.07	179.98	34	1436	0.16	0.020	0.01	8.63	0.01	0.000
15.91	1.74	169.84	1.07	181.27	34	1454	0.16	0.019	0.01	8.63	0.01	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
16.08	1.74	168.50	1.07	179.55	34	1446	0.16	0.020	0.01	8.63	0.01	0.000
16.24	1.74	165.76	1.06	176.27	33	1424	0.16	0.020	0.01	8.63	0.01	0.000
16.40	1.73	162.96	1.06	172.96	33	1402	0.16	0.021	0.01	8.63	0.01	0.000
16.57	1.72	161.99	1.05	170.80	32	1383	0.17	0.022	0.01	8.63	0.01	0.000
16.73	1.73	163.44	1.06	172.93	33	1412	0.17	0.021	0.01	8.63	0.01	0.000
16.90	1.72	166.07	1.05	175.12	33	1432	0.17	0.021	0.01	8.63	0.01	0.000
17.06	1.74	167.03	1.06	177.53	34	1471	0.17	0.021	0.01	8.63	0.01	0.000
17.23	1.75	164.73	1.07	176.48	34	1482	0.17	0.021	0.01	8.63	0.01	0.000
17.39	1.77	162.16	1.08	175.86	34	1502	0.17	0.021	0.01	8.63	0.01	0.000
17.55	1.76	163.44	1.08	176.53	34	1510	0.17	0.021	0.01	8.63	0.01	0.000
17.72	1.74	168.38	1.07	179.61	34	1524	0.17	0.021	0.01	8.63	0.01	0.000
17.88	1.73	170.17	1.06	179.99	34	1521	0.17	0.021	0.01	8.63	0.01	0.000
18.05	1.75	163.23	1.07	174.67	33	1502	0.17	0.021	0.01	8.63	0.01	0.000
18.21	1.78	151.30	1.09	164.80	32	1450	0.17	0.023	0.01	8.63	0.01	0.000
18.37	1.81	138.08	1.12	154.00	30	1394	0.17	0.024	0.01	8.63	0.01	0.000
18.54	1.84	126.96	1.14	144.60	28	1341	0.17	0.026	0.02	8.63	0.01	0.001
18.70	1.87	115.75	1.16	134.52	27	1275	0.17	0.028	0.02	8.63	0.02	0.001
18.87	1.90	105.24	1.19	124.89	25	1208	0.17	0.031	0.02	8.63	0.02	0.001
19.03	1.91	96.98	1.20	116.64	24	1143	0.17	0.034	0.03	8.63	0.02	0.001
19.19	1.93	92.12	1.22	111.98	23	1110	0.17	0.035	0.03	8.63	0.02	0.001
19.36	1.94	90.51	1.23	110.90	23	1110	0.17	0.036	0.03	8.63	0.02	0.001
19.52	1.95	90.04	1.24	111.32	23	1125	0.17	0.035	0.03	8.63	0.02	0.001
19.69	1.95	90.71	1.24	112.39	23	1143	0.17	0.035	0.03	8.63	0.02	0.001
19.85	1.94	92.81	1.23	114.29	23	1164	0.17	0.034	0.03	8.63	0.02	0.001
20.01	1.93	97.67	1.21	118.60	24	1204	0.17	0.033	0.03	8.63	0.02	0.001
20.18	1.90	103.61	1.19	123.57	25	1246	0.17	0.031	0.02	8.63	0.02	0.001
20.34	1.89	109.13	1.18	128.31	26	1286	0.17	0.030	0.02	8.63	0.02	0.001
20.51	1.87	113.38	1.16	131.58	26	1312	0.17	0.030	0.02	8.63	0.02	0.001
20.67	1.86	115.98	1.15	133.80	26	1333	0.17	0.029	0.02	8.63	0.02	0.001
20.83	1.85	117.40	1.15	134.61	27	1340	0.17	0.029	0.02	8.63	0.02	0.001
21.00	1.85	115.78	1.15	132.79	26	1328	0.17	0.030	0.02	8.63	0.02	0.001
21.16	1.86	111.71	1.15	128.72	25	1298	0.17	0.031	0.02	8.63	0.02	0.001
21.33	1.87	106.55	1.16	123.92	25	1265	0.17	0.033	0.03	8.63	0.02	0.001
21.49	1.88	102.98	1.17	120.15	24	1235	0.17	0.034	0.03	8.63	0.02	0.001
21.65	1.88	101.35	1.17	119.00	24	1235	0.17	0.035	0.03	8.63	0.02	0.001
21.82	1.88	101.17	1.17	118.09	23	1225	0.17	0.035	0.03	8.63	0.02	0.001
21.98	1.88	100.92	1.17	118.52	24	1241	0.17	0.035	0.03	8.63	0.02	0.001
22.15	1.89	99.83	1.18	117.72	24	1242	0.17	0.035	0.03	8.63	0.02	0.001
22.31	1.91	97.81	1.20	117.03	24	1253	0.17	0.035	0.03	8.63	0.02	0.001
22.47	1.91	97.32	1.20	116.62	23	1255	0.17	0.035	0.03	8.63	0.02	0.001
22.64	1.90	97.59	1.19	115.99	23	1247	0.17	0.036	0.03	8.63	0.02	0.001
22.80	1.90	96.45	1.19	114.48	23	1234	0.17	0.037	0.03	8.63	0.02	0.001
22.97	1.91	92.72	1.20	111.33	22	1215	0.17	0.038	0.03	8.63	0.03	0.001
23.13	1.94	87.88	1.23	108.28	22	1207	0.17	0.039	0.03	8.63	0.03	0.001
23.30	1.97	83.29	1.27	105.51	22	1199	0.17	0.039	0.04	8.63	0.03	0.001
23.46	1.99	80.38	1.29	103.80	22	1195	0.18	0.040	0.04	8.63	0.03	0.001
23.62	2.00	79.62	1.30	103.27	21	1196	0.18	0.040	0.04	8.63	0.03	0.001
23.79	1.99	81.15	1.28	103.99	22	1203	0.18	0.040	0.04	8.63	0.03	0.001

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
23.95	1.97	83.57	1.26	105.25	22	1212	0.18	0.040	0.04	8.63	0.03	0.001
24.12	1.95	85.21	1.25	106.09	22	1220	0.18	0.040	0.04	8.63	0.03	0.001
24.28	1.95	85.53	1.24	106.18	22	1223	0.18	0.040	0.04	8.63	0.03	0.001
24.44	1.95	84.19	1.24	104.56	21	1210	0.18	0.041	0.04	8.63	0.03	0.001
24.61	1.94	83.94	1.22	102.82	21	1184	0.18	0.043	0.04	8.63	0.03	0.001
24.77	1.92	85.07	1.21	102.70	21	1176	0.18	0.043	0.04	8.63	0.03	0.001
24.94	1.90	88.29	1.19	105.36	21	1200	0.18	0.042	0.04	8.63	0.03	0.001
25.10	1.93	94.25	1.22	115.13	23	1339	0.18	0.036	0.03	8.63	0.02	0.001
25.26	1.95	106.99	1.24	132.78	27	1566	0.18	0.029	0.02	8.63	0.02	0.001
25.43	1.97	113.67	1.26	143.59	30	1718	0.18	0.026	0.02	8.63	0.01	0.001
25.59	2.04	101.88	1.36	138.41	29	1712	0.18	0.026	0.02	8.63	0.01	0.000
25.76	2.19	74.20	1.63	121.18	27	1540	0.18	0.030	0.02	8.63	0.02	0.001
25.92	2.38	53.23	2.25	119.57	29	1474	0.18	0.032	0.02	8.63	0.02	0.001
26.08	2.38	61.01	2.22	135.39	33	1681	0.18	0.027	0.01	8.63	0.01	0.000
26.25	2.27	87.40	1.85	161.40	37	2066	0.18	0.021	0.01	8.63	0.01	0.000
26.41	2.19	114.00	1.63	185.96	42	2406	0.18	0.017	0.01	8.63	0.01	0.000
26.58	2.16	124.26	1.58	196.07	44	2547	0.18	0.016	0.01	8.63	0.01	0.000
26.74	2.18	119.99	1.62	194.97	44	2546	0.18	0.017	0.01	8.63	0.01	0.000
26.90	2.23	107.17	1.75	187.93	43	2461	0.18	0.017	0.01	8.63	0.01	0.000
27.07	2.35	87.95	2.11	185.86	45	2397	0.18	0.018	0.01	8.63	0.01	0.000
27.23	2.38	81.75	2.23	182.68	45	2346	0.18	0.019	0.01	8.63	0.01	0.000
27.40	2.37	81.55	2.18	177.46	43	2301	0.18	0.019	0.01	8.63	0.01	0.000
27.56	2.32	84.79	2.03	171.74	41	2260	0.18	0.020	0.01	8.63	0.01	0.000
27.72	2.31	89.47	1.99	178.27	42	2362	0.18	0.019	0.01	8.63	0.01	0.000
27.89	2.28	104.48	1.89	197.38	46	2643	0.18	0.017	0.01	8.63	0.00	0.000
28.05	2.22	130.42	1.71	223.46	51	3023	0.18	0.014	0.00	8.63	0.00	0.000
28.22	2.19	147.77	1.64	242.55	54	3297	0.18	0.013	0.00	8.63	0.00	0.000
28.38	2.19	146.64	1.65	242.21	54	3307	0.18	0.013	0.00	8.63	0.00	0.000
28.54	2.26	122.57	1.84	225.51	52	3082	0.18	0.014	0.00	8.63	0.00	0.000
28.71	2.39	95.72	2.25	215.83	53	2892	0.18	0.015	0.00	8.63	0.00	0.000
28.87	2.46	87.48	2.56	223.62	56	2947	0.18	0.015	0.00	8.63	0.00	0.000
29.04	2.37	106.46	2.18	231.68	56	3151	0.18	0.014	0.00	8.63	0.00	0.000
29.20	2.32	111.94	2.02	226.13	54	3119	0.18	0.014	0.00	8.63	0.00	0.000
29.36	2.35	98.53	2.12	209.17	50	2880	0.18	0.016	0.01	8.63	0.00	0.000
29.53	2.37	89.07	2.19	195.51	47	2693	0.18	0.017	0.01	8.63	0.00	0.000
29.69	2.26	106.00	1.83	193.95	45	2734	0.18	0.017	0.01	8.63	0.00	0.000
29.86	2.12	135.15	1.50	202.57	44	2851	0.18	0.016	0.01	8.63	0.00	0.000
30.02	2.07	149.26	1.41	210.17	45	2932	0.18	0.016	0.01	8.63	0.00	0.000
30.19	2.05	153.17	1.37	209.17	44	2902	0.18	0.016	0.01	8.63	0.00	0.000
30.35	2.01	156.59	1.31	205.66	43	2820	0.18	0.017	0.01	8.63	0.01	0.000
30.51	1.98	155.97	1.28	198.93	41	2696	0.18	0.018	0.01	8.63	0.01	0.000
30.68	1.99	149.93	1.28	192.34	40	2625	0.18	0.018	0.01	8.63	0.01	0.000
30.84	2.01	142.38	1.31	187.06	39	2593	0.18	0.019	0.01	8.63	0.01	0.000
31.01	2.02	137.10	1.33	181.79	38	2540	0.18	0.019	0.01	8.63	0.01	0.000
31.17	2.04	131.50	1.35	177.76	38	2512	0.18	0.020	0.01	8.63	0.01	0.000
31.33	2.10	118.98	1.45	173.08	37	2507	0.18	0.020	0.01	8.63	0.01	0.000
31.50	2.18	105.18	1.63	171.38	38	2529	0.18	0.020	0.01	8.63	0.01	0.000
31.66	2.26	90.05	1.84	165.75	38	2455	0.18	0.020	0.01	8.63	0.01	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
31.83	2.31	80.72	1.98	159.87	38	2366	0.18	0.022	0.01	8.63	0.01	0.000
31.99	2.35	73.81	2.12	156.47	38	2309	0.18	0.022	0.01	8.63	0.01	0.000
32.15	2.36	75.11	2.17	163.11	39	2410	0.18	0.021	0.01	8.63	0.01	0.000
32.32	2.39	76.41	2.27	173.12	42	2555	0.18	0.020	0.01	8.63	0.01	0.000
32.48	2.40	77.47	2.33	180.43	44	2664	0.18	0.019	0.01	8.63	0.01	0.000
32.65	2.46	71.24	2.55	181.91	46	2662	0.18	0.019	0.01	8.63	0.01	0.000
32.81	2.45	71.42	2.53	180.91	46	2661	0.18	0.019	0.01	8.63	0.01	0.000
32.97	2.33	88.25	2.06	181.53	43	2753	0.18	0.018	0.01	8.63	0.01	0.000
33.14	2.18	115.28	1.63	187.37	42	2869	0.18	0.018	0.01	8.63	0.01	0.000
33.30	2.08	139.91	1.42	198.65	43	2985	0.18	0.017	0.01	8.63	0.01	0.000
33.47	2.05	146.16	1.38	201.02	43	3000	0.18	0.017	0.01	8.63	0.01	0.000
33.63	2.05	144.99	1.36	197.76	42	2952	0.18	0.017	0.01	8.63	0.01	0.000
33.79	2.04	139.13	1.36	189.21	40	2831	0.18	0.018	0.01	8.63	0.01	0.000
33.96	2.08	127.23	1.42	180.57	39	2751	0.18	0.019	0.01	8.63	0.01	0.000
34.12	2.18	101.99	1.61	164.60	37	2574	0.18	0.021	0.01	8.63	0.01	0.000
34.29	2.33	70.68	2.06	145.79	35	2281	0.18	0.024	0.01	8.63	0.01	0.000
34.45	2.56	42.38	3.08	130.59	35	1943	0.18	0.030	0.02	8.63	0.01	0.000
34.61	2.70	31.40	4.03	126.56	0	0	0.18	0.000	0.00	0.00	0.00	0.000
34.78	2.63	37.03	3.51	130.03	0	0	0.18	0.000	0.00	0.00	0.00	0.000
34.94	2.39	58.75	2.28	133.79	33	2102	0.18	0.027	0.02	8.63	0.01	0.000
35.11	2.21	84.37	1.69	142.38	32	2279	0.18	0.025	0.01	8.63	0.01	0.000
35.27	2.12	103.66	1.49	154.67	34	2448	0.18	0.023	0.01	8.63	0.01	0.000
35.43	2.09	112.01	1.44	161.43	35	2542	0.18	0.022	0.01	8.63	0.01	0.000
35.60	2.09	113.00	1.43	162.15	35	2559	0.18	0.022	0.01	8.63	0.01	0.000
35.76	2.10	106.78	1.46	155.44	34	2470	0.18	0.023	0.01	8.63	0.01	0.000
35.93	2.14	95.06	1.52	144.96	32	2334	0.18	0.024	0.01	8.63	0.01	0.000
36.09	2.18	81.89	1.63	133.10	30	2168	0.18	0.027	0.02	8.63	0.01	0.000
36.26	2.22	72.00	1.72	124.14	28	2037	0.18	0.029	0.02	8.63	0.02	0.001
36.42	2.25	66.22	1.78	118.15	27	1946	0.18	0.031	0.02	8.63	0.02	0.001
36.58	2.23	64.69	1.74	112.35	26	1856	0.18	0.033	0.02	8.63	0.02	0.001
36.75	2.22	63.40	1.71	108.49	25	1797	0.18	0.035	0.03	8.63	0.02	0.001
36.91	2.23	61.03	1.75	107.08	24	1781	0.18	0.036	0.03	8.63	0.02	0.001
37.08	2.26	60.39	1.84	110.94	26	1852	0.18	0.034	0.02	8.63	0.02	0.001
37.24	2.26	63.15	1.84	116.05	27	1943	0.18	0.032	0.02	8.63	0.02	0.001
37.40	2.23	68.89	1.76	121.00	28	2031	0.18	0.030	0.02	8.63	0.02	0.001
37.57	2.23	71.01	1.75	124.42	28	2095	0.18	0.029	0.02	8.63	0.01	0.001
37.73	2.26	69.42	1.82	126.32	29	2135	0.18	0.028	0.02	8.63	0.01	0.001
37.90	2.29	66.70	1.91	127.45	30	2161	0.18	0.028	0.02	8.63	0.01	0.001
38.06	2.31	65.45	1.98	129.52	31	2200	0.18	0.027	0.02	8.63	0.01	0.000
38.22	2.31	66.17	1.97	130.04	31	2217	0.18	0.027	0.02	8.63	0.01	0.000
38.39	2.31	64.37	1.98	127.14	30	2174	0.18	0.028	0.02	8.63	0.01	0.001
38.55	2.29	64.22	1.92	123.23	29	2116	0.18	0.029	0.02	8.63	0.01	0.001
38.72	2.25	68.26	1.79	122.01	28	2102	0.18	0.029	0.02	8.63	0.02	0.001
38.88	2.15	82.87	1.55	128.05	28	2183	0.18	0.028	0.02	8.63	0.01	0.001
39.04	2.03	105.83	1.35	142.41	30	2332	0.18	0.026	0.02	8.63	0.01	0.000
39.21	1.89	142.57	1.18	168.35	34	2512	0.18	0.024	0.01	8.63	0.01	0.000
39.37	1.78	182.99	1.09	199.95	38	2706	0.18	0.022	0.01	8.63	0.01	0.000
39.54	1.70	217.47	1.04	225.53	42	2828	0.18	0.021	0.01	8.63	0.01	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
39.70	1.67	231.04	1.02	234.98	43	2873	0.18	0.020	0.01	8.63	0.01	0.000
39.86	1.64	229.12	1.00	229.12	42	2717	0.18	0.022	0.01	8.63	0.01	0.000
40.03	1.61	220.19	1.00	220.19	40	2522	0.18	0.024	0.01	8.63	0.01	0.000
40.19	1.57	208.76	1.00	208.76	37	2274	0.18	0.027	0.01	8.63	0.01	0.000
40.36	1.58	188.81	1.00	188.81	34	2097	0.18	0.030	0.02	8.63	0.01	0.001
40.52	1.60	170.01	1.00	170.01	31	1940	0.18	0.034	0.02	8.63	0.02	0.001
40.68	1.64	153.20	1.00	152.93	28	1848	0.18	0.036	0.02	8.63	0.02	0.001
40.85	1.66	146.01	1.01	147.42	27	1812	0.18	0.037	0.03	8.63	0.02	0.001
41.01	1.68	136.29	1.02	139.67	26	1755	0.18	0.039	0.03	8.63	0.02	0.001
41.18	1.71	124.71	1.04	130.02	24	1679	0.18	0.042	0.03	8.63	0.03	0.001
41.34	1.75	112.57	1.07	120.27	23	1616	0.18	0.044	0.04	8.63	0.03	0.001
41.50	1.80	100.41	1.10	110.80	21	1567	0.18	0.046	0.04	8.63	0.03	0.001
41.67	1.84	91.91	1.14	104.81	21	1556	0.18	0.047	0.05	8.63	0.04	0.001
41.83	1.86	90.50	1.15	104.29	21	1572	0.18	0.046	0.04	8.63	0.04	0.001
42.00	1.83	97.15	1.13	109.81	21	1618	0.18	0.045	0.04	8.63	0.03	0.001
42.16	1.76	111.43	1.08	120.23	23	1658	0.18	0.043	0.04	8.63	0.03	0.001
42.32	1.68	127.03	1.03	130.25	24	1664	0.18	0.043	0.03	8.63	0.03	0.001
42.49	1.65	135.40	1.00	136.01	25	1693	0.18	0.042	0.03	8.63	0.03	0.001
42.65	1.72	129.13	1.05	135.48	25	1799	0.18	0.039	0.03	8.63	0.02	0.001
42.82	1.84	114.91	1.14	130.52	26	1956	0.18	0.034	0.03	8.63	0.02	0.001
42.98	1.96	101.53	1.25	127.28	26	2120	0.18	0.031	0.02	8.63	0.02	0.001
43.15	2.06	92.37	1.39	128.68	27	2284	0.18	0.028	0.02	8.63	0.02	0.001
43.31	2.14	87.10	1.53	133.69	29	2451	0.18	0.026	0.02	8.63	0.01	0.000
43.47	2.21	83.02	1.69	140.27	32	2618	0.17	0.024	0.01	8.63	0.01	0.000
43.64	2.26	80.64	1.82	147.15	34	2768	0.17	0.022	0.01	8.63	0.01	0.000
43.80	2.31	77.28	1.98	152.97	36	2889	0.17	0.021	0.01	8.63	0.01	0.000
43.97	2.39	67.55	2.26	152.94	37	2882	0.17	0.021	0.01	8.63	0.01	0.000
44.13	2.51	53.35	2.80	149.19	39	2769	0.17	0.023	0.01	8.63	0.01	0.000
44.29	2.65	39.77	3.62	144.13	0	0	0.17	0.000	0.00	0.00	0.00	0.000
44.46	2.74	32.32	4.30	139.09	0	0	0.17	0.000	0.00	0.00	0.00	0.000
44.62	2.75	30.27	4.39	132.85	0	0	0.17	0.000	0.00	0.00	0.00	0.000
44.79	2.77	27.10	4.51	122.29	0	0	0.17	0.000	0.00	0.00	0.00	0.000
44.95	2.80	23.11	4.77	110.31	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.11	2.87	18.92	5.42	102.48	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.28	3.00	16.64	6.76	112.58	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.44	3.06	18.08	7.49	135.46	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.61	2.97	25.49	6.45	164.29	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.77	2.63	54.16	3.51	189.99	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.93	2.34	100.91	2.09	210.43	50	4119	0.17	0.014	0.00	8.63	0.00	0.000
46.10	2.19	138.50	1.64	227.80	51	4422	0.17	0.013	0.00	8.63	0.00	0.000
46.26	2.15	153.77	1.55	237.76	52	4575	0.17	0.013	0.00	8.63	0.00	0.000
46.43	2.14	156.35	1.53	239.83	53	4619	0.17	0.013	0.00	8.63	0.00	0.000
46.59	2.14	160.26	1.53	245.53	54	4739	0.17	0.012	0.00	8.63	0.00	0.000
46.75	2.14	163.96	1.53	250.77	55	4850	0.17	0.012	0.00	8.63	0.00	0.000
46.92	2.14	163.27	1.54	251.08	55	4875	0.17	0.012	0.00	8.63	0.00	0.000
47.08	2.12	167.52	1.49	248.96	54	4802	0.17	0.012	0.00	8.63	0.00	0.000
47.25	2.13	159.71	1.51	241.88	53	4703	0.17	0.013	0.00	8.63	0.00	0.000
47.41	2.20	140.23	1.67	234.32	53	4656	0.17	0.013	0.00	8.63	0.00	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
47.57	2.29	119.27	1.93	230.00	54	4631	0.17	0.013	0.00	8.63	0.00	0.000
47.74	2.30	118.34	1.94	230.12	54	4647	0.17	0.013	0.00	8.63	0.00	0.000
47.90	2.21	138.87	1.68	233.65	53	4683	0.17	0.013	0.00	8.63	0.00	0.000
48.07	2.16	148.89	1.58	234.75	52	4667	0.17	0.013	0.00	8.63	0.00	0.000
48.23	2.27	98.97	1.87	185.13	43	4982	0.17	0.012	0.00	8.63	0.00	0.000
48.39	2.38	75.61	2.24	169.11	41	4369	0.17	0.014	0.01	8.63	0.00	0.000
48.56	2.55	50.76	3.06	155.32	41	3668	0.17	0.017	0.01	8.63	0.01	0.000
48.72	2.78	32.87	4.60	151.20	0	0	0.17	0.000	0.00	0.00	0.00	0.000
48.89	2.86	30.62	5.34	163.60	0	0	0.17	0.000	0.00	0.00	0.00	0.000
49.05	2.59	52.78	3.26	172.15	46	4027	0.17	0.015	0.01	8.63	0.00	0.000
49.22	2.35	82.18	2.11	173.46	42	4633	0.17	0.013	0.01	8.63	0.00	0.000
49.38	2.21	105.73	1.68	177.81	40	5000	0.17	0.012	0.01	8.63	0.00	0.000
49.54	2.15	113.73	1.55	176.53	39	5025	0.17	0.012	0.01	8.63	0.00	0.000
49.71	2.12	115.45	1.49	172.52	38	4938	0.17	0.012	0.01	8.63	0.00	0.000
49.87	2.07	114.61	1.40	160.44	34	4599	0.17	0.013	0.01	8.63	0.01	0.000

Total estimated settlement: 0.11

Abbreviations

Q_{tn}: Equivalent clean sand normalized cone resistance
K_c: Fines correction factor
$Q_{tn,cs}$: Post-liquefaction volumentric strain
G_{max}: Small strain shear modulus
CSR: Soil cyclic stress ratio
γ: Cyclic shear strain
$e_{vol(15)}$: Volumetric strain after 15 cycles
N_c: Equivalent number of cycles
e_v: Volumetric strain
Settle.: Calculated settlement

:: Post-earthquake settlement due to soil liquefaction ::

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
50.04	149.77	2.00	0.00	1.00	0.00						

Total estimated settlement: 0.00

Abbreviations

$Q_{tn,cs}$: Equivalent clean sand normalized cone resistance
FS: Factor of safety against liquefaction
e_v (%): Post-liquefaction volumentric strain
DF: e_v depth weighting factor
Settlement: Calculated settlement

GEOLOGISMIKI Geotechnical Software

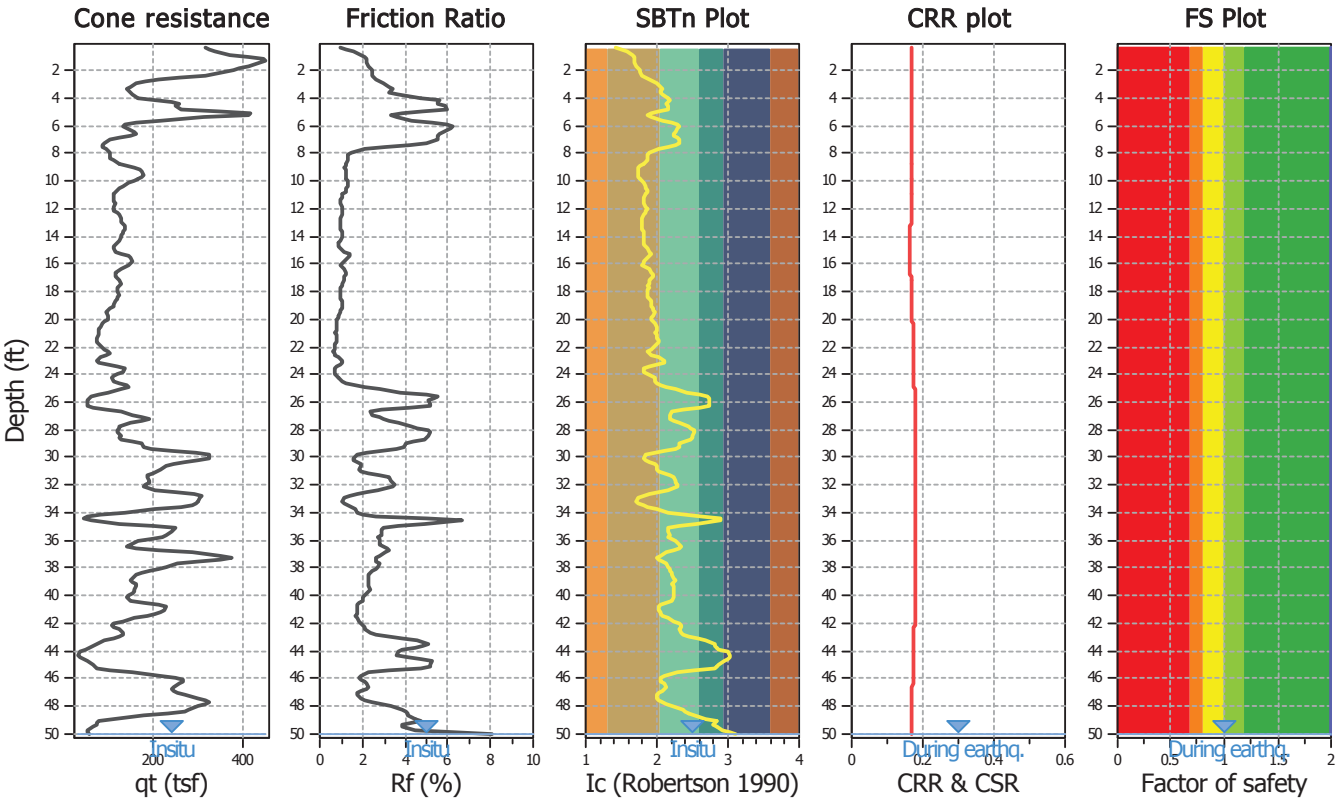
LIQUEFACTION ANALYSIS REPORT

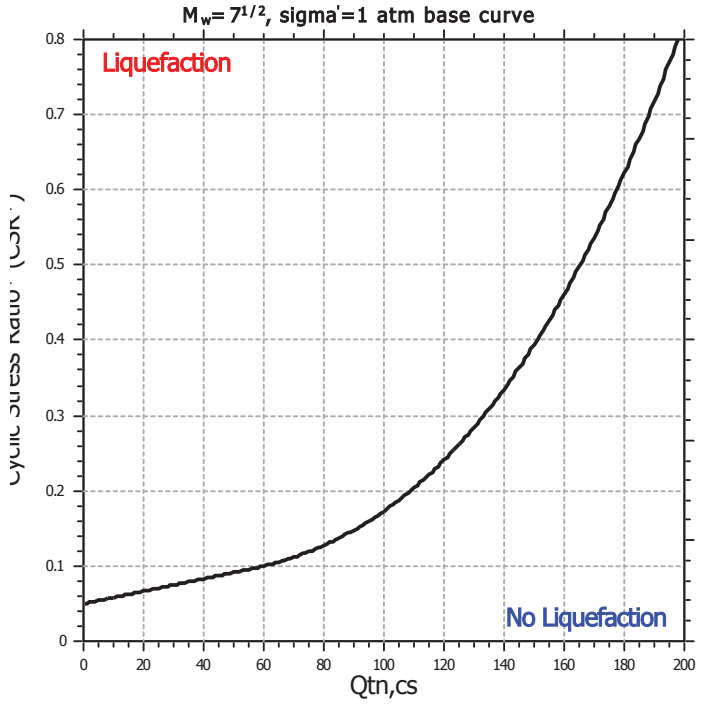
Project title : Kaiser Fresno MOB **Location : Fresno, CA**

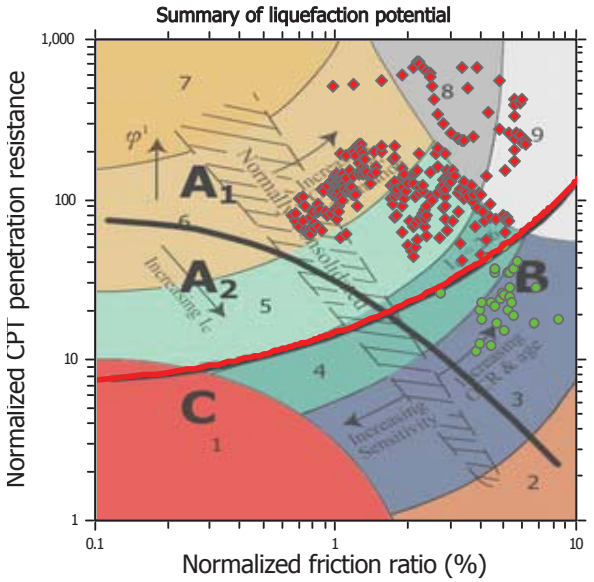
CPT file : CPT-04

Input parameters and analysis data

Analysis method:	NCEER (1998)	**G.W.T. (in-situ):**	50.00 ft	**Use fill:**	No	**Clay like behavior applied:**	Sands only
Fines correction method:	NCEER (1998)	**G.W.T. (earthq.):**	50.00 ft	**Fill height:**	N/A		
Points to test:	Based on Ic value	**Average results interva:**	3	**Fill weight:**	N/A	**Limit depth applie:**	No
Earthquake magnitude M_w:	6.70	**Ic cut-off value:**	2.60	**Trans. detect. applied:**	No	**Limit depth:**	N/A
Peak ground acceleration:	0.35	**Unit weight calculation:**	Based on SBT	**K_σ applied:**	Yes	**MSF method:**	Method based

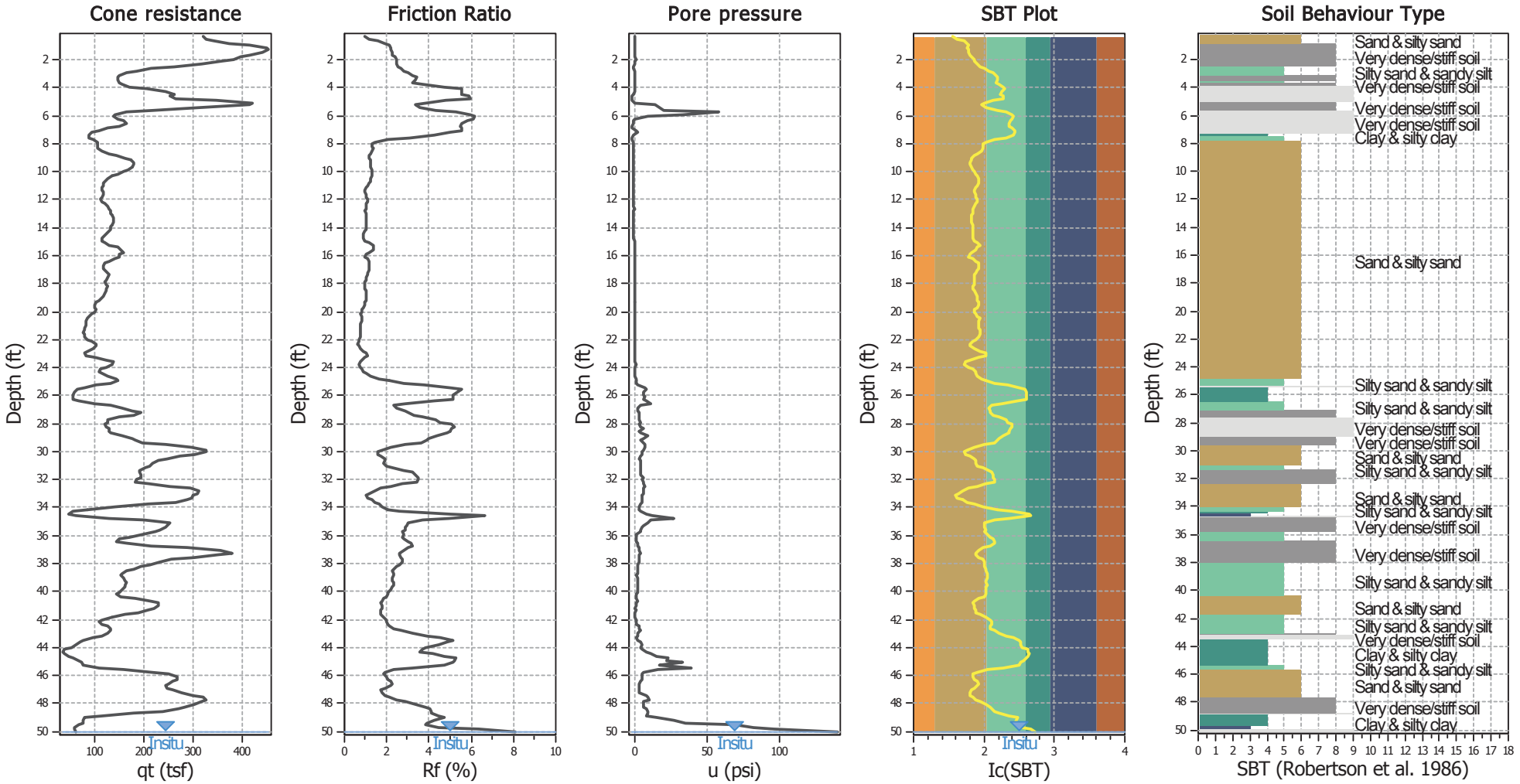






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



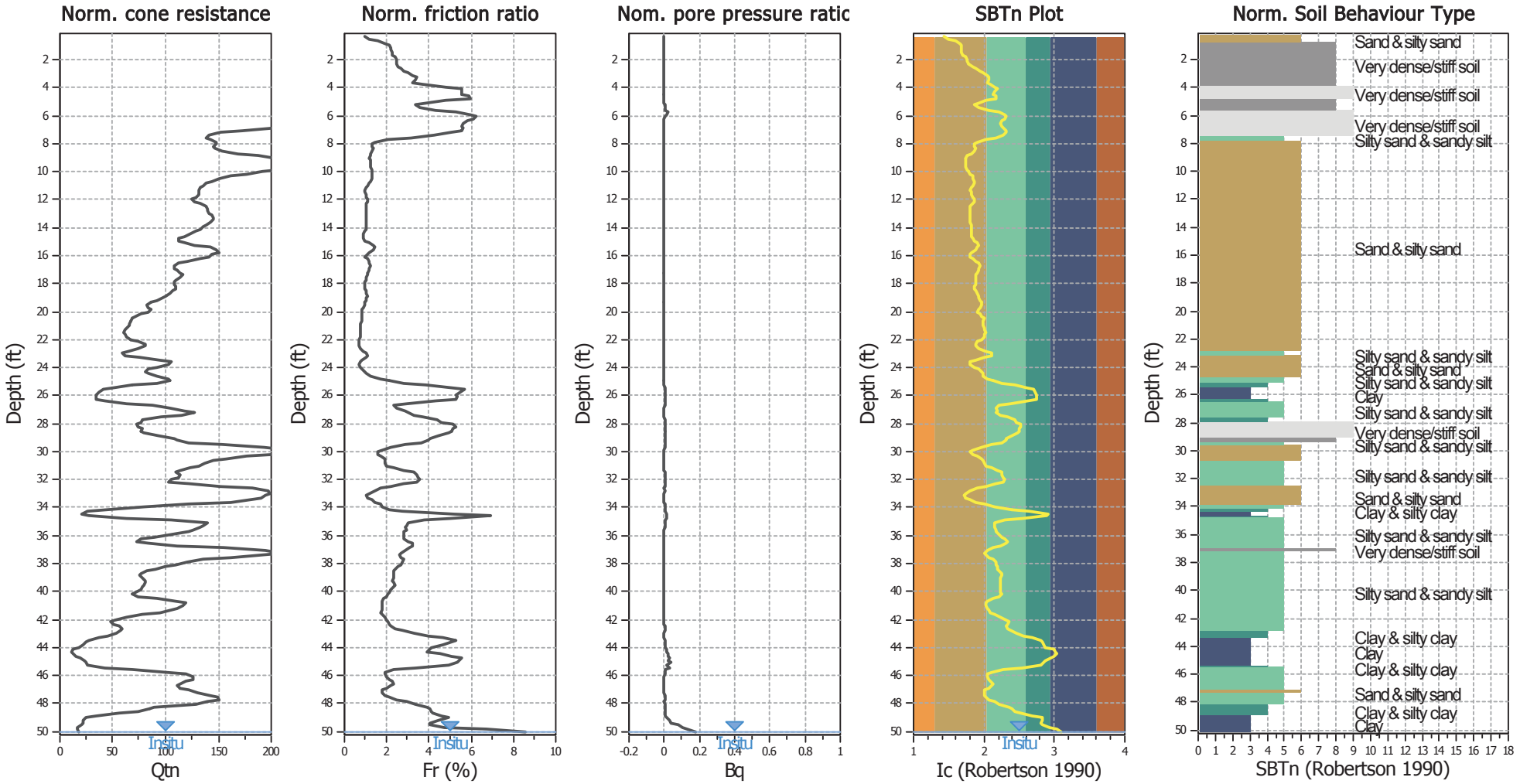
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



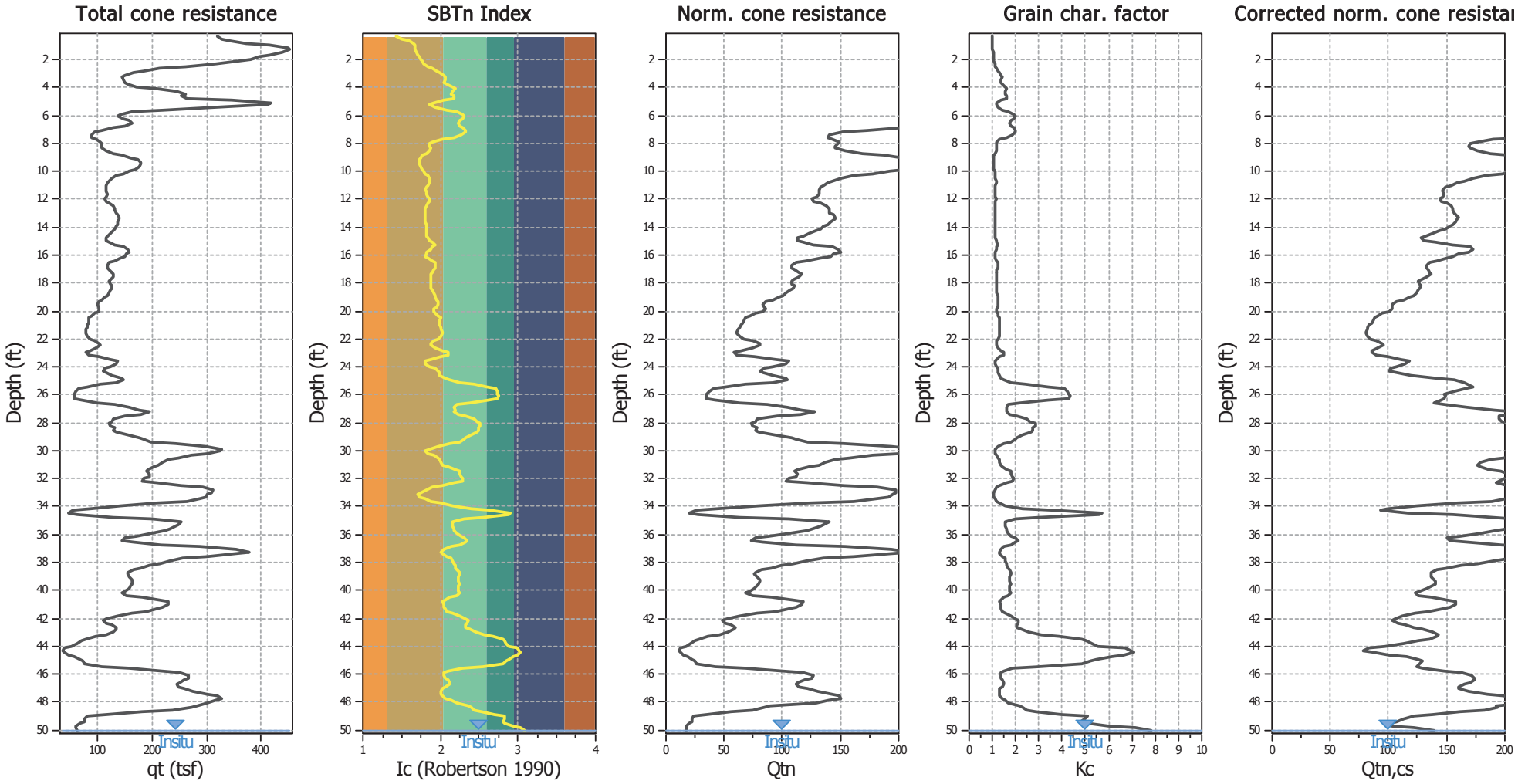
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

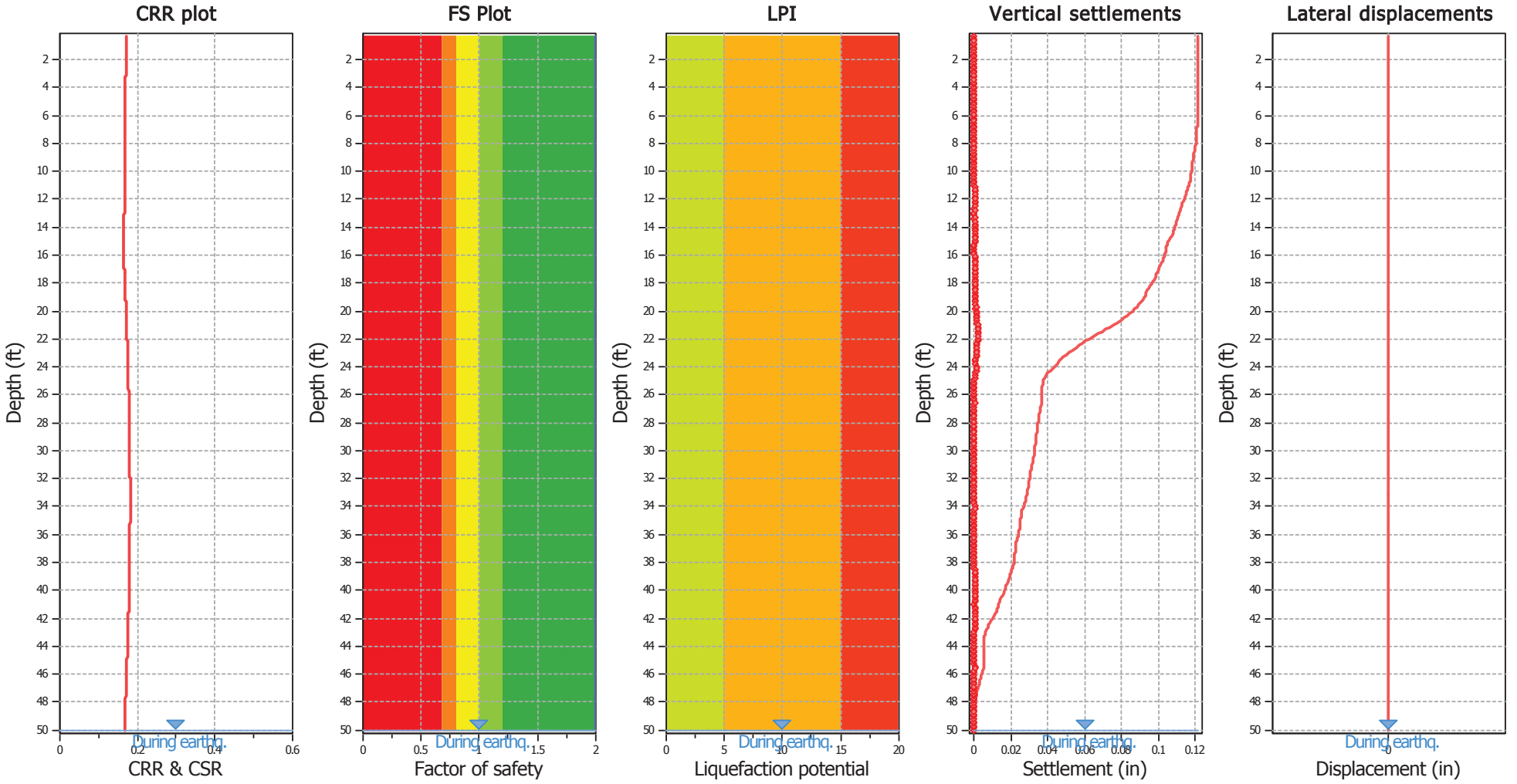
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

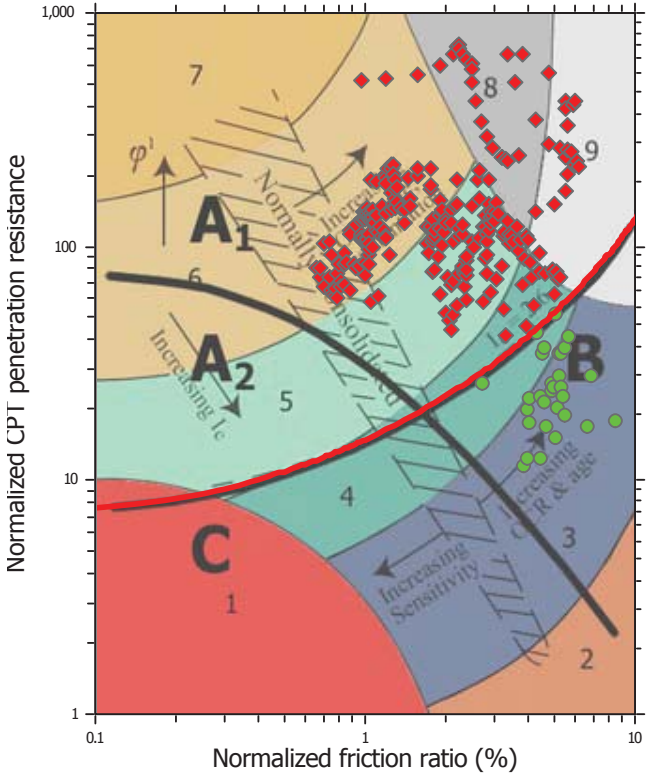
F.S. color scheme

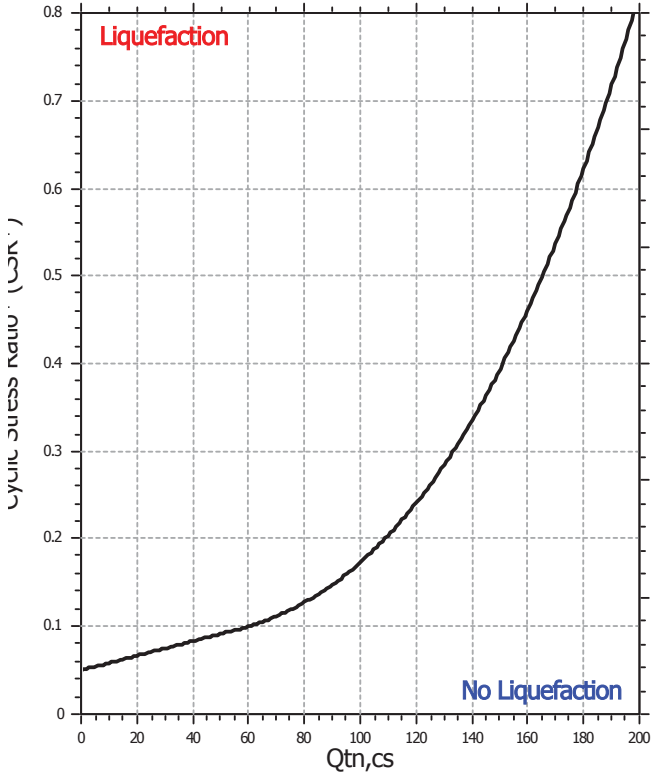
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

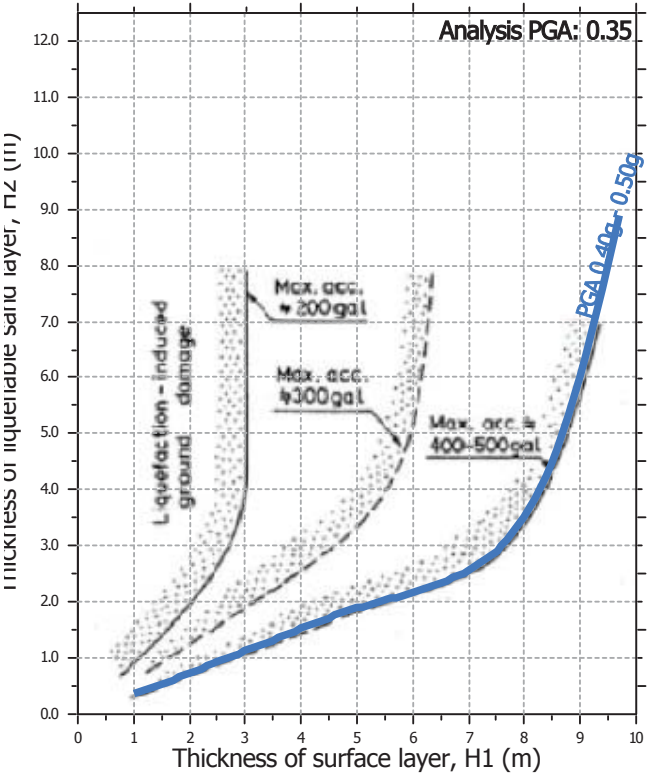
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



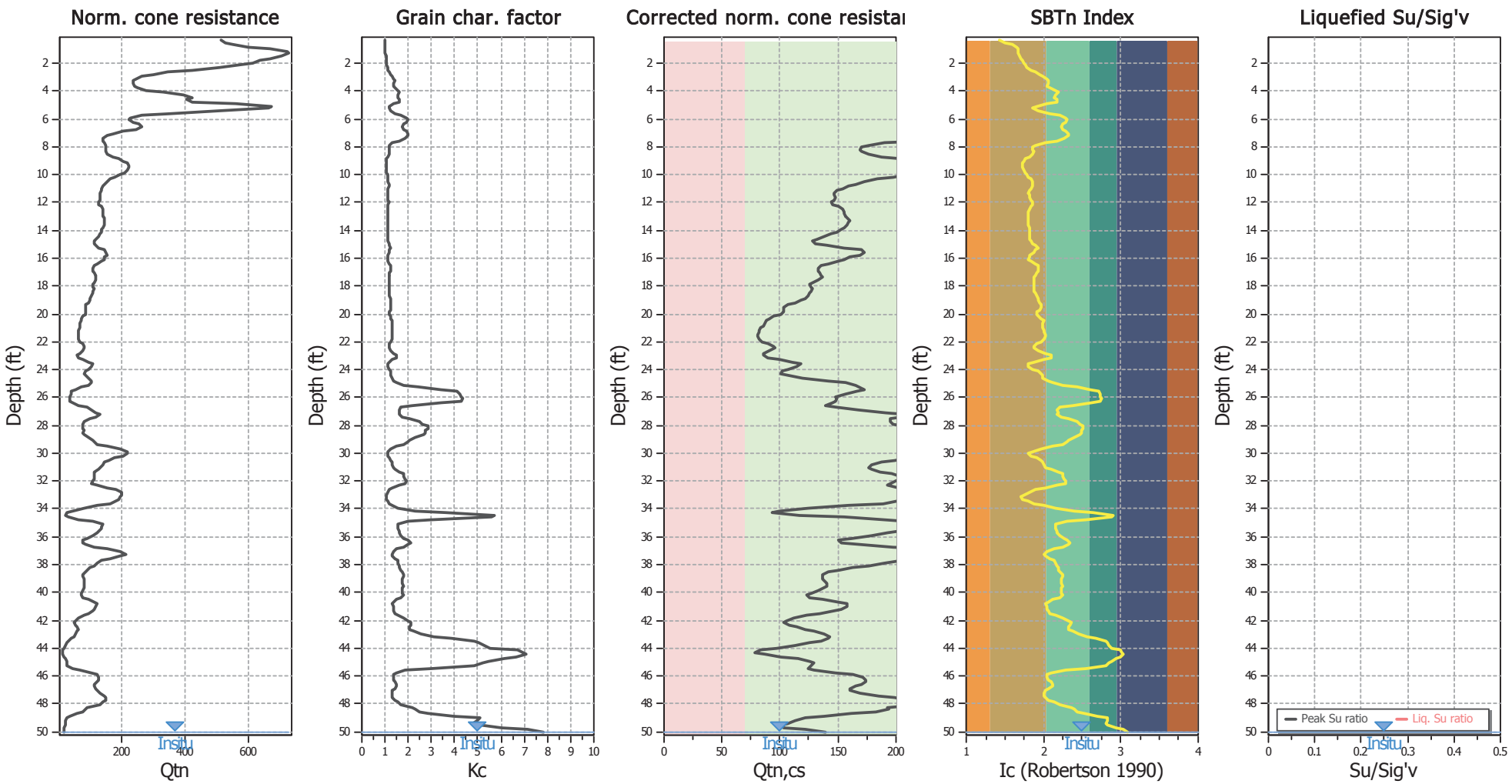




Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

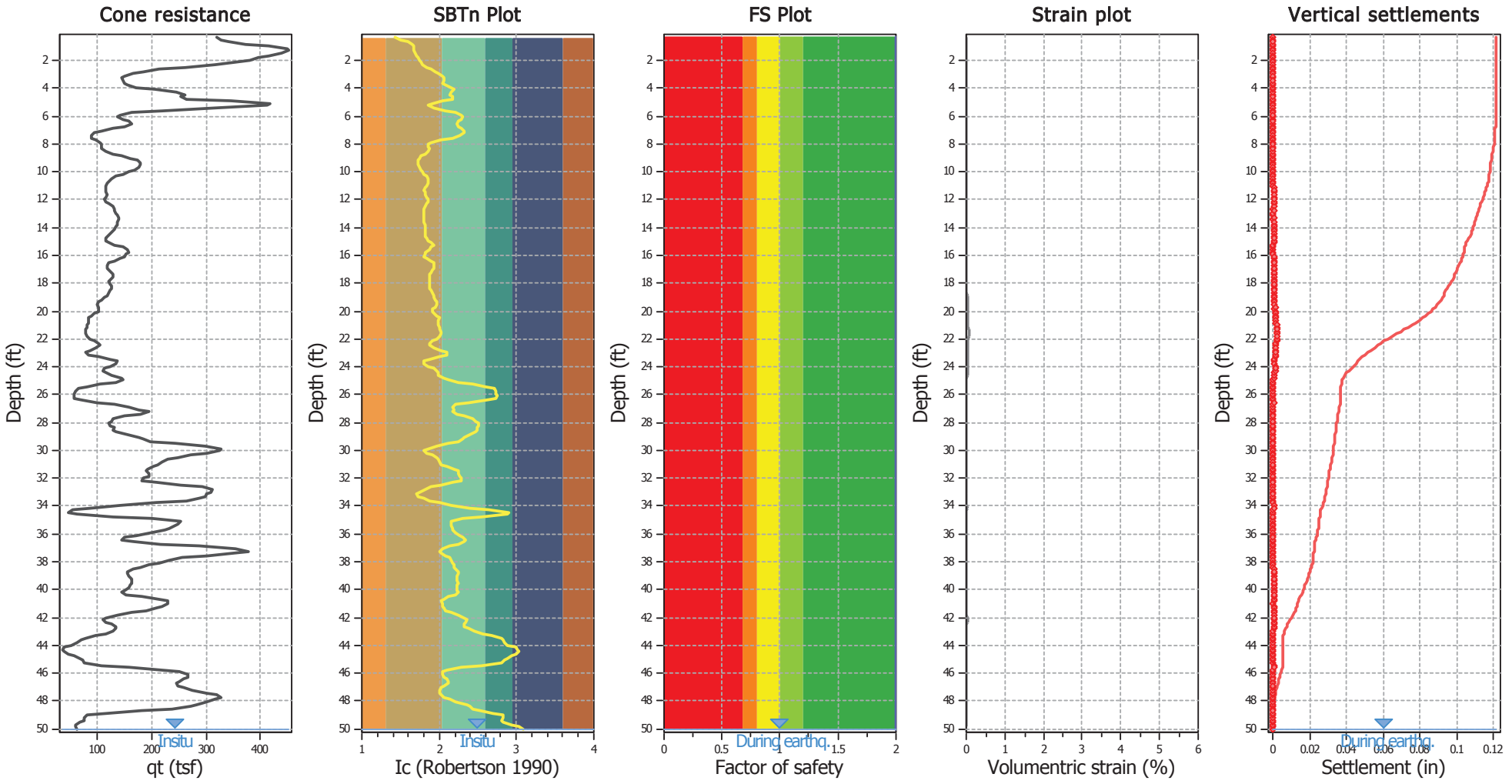
Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement of dry sands ::

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
0.33	1.43	512.32	1.00	512.32	87	1749	0.17	0.000	0.00	8.63	0.00	0.000
0.49	1.50	523.82	1.00	523.82	91	1951	0.17	0.000	0.00	8.63	0.00	0.000
0.66	1.59	546.99	1.00	546.99	98	2297	0.17	0.000	0.00	8.63	0.00	0.000
0.82	1.65	599.08	1.00	601.87	110	2718	0.17	0.000	0.00	8.63	0.00	0.000
0.98	1.67	665.52	1.02	678.90	126	3105	0.17	0.000	0.00	8.63	0.00	0.000
1.15	1.67	722.27	1.02	736.15	136	3364	0.17	0.001	0.00	8.63	0.00	0.000
1.31	1.68	725.84	1.02	743.18	138	3410	0.17	0.001	0.00	8.63	0.00	0.000
1.48	1.69	704.67	1.03	724.93	135	3341	0.17	0.001	0.00	8.63	0.00	0.000
1.64	1.71	666.90	1.04	694.46	130	3237	0.17	0.001	0.00	8.63	0.00	0.000
1.80	1.73	635.40	1.06	672.18	127	3182	0.17	0.001	0.00	8.63	0.00	0.000
1.97	1.75	610.69	1.07	655.38	125	3147	0.17	0.001	0.00	8.63	0.00	0.000
2.13	1.76	576.82	1.08	623.89	119	3019	0.17	0.001	0.00	8.63	0.00	0.000
2.30	1.79	508.46	1.10	558.49	108	2743	0.17	0.001	0.00	8.63	0.00	0.000
2.46	1.83	419.74	1.13	475.32	93	2399	0.17	0.002	0.00	8.63	0.00	0.000
2.62	1.89	344.16	1.18	407.07	81	2120	0.17	0.002	0.00	8.63	0.00	0.000
2.79	1.95	295.95	1.24	365.80	75	1950	0.17	0.002	0.00	8.63	0.00	0.000
2.95	1.99	263.76	1.29	340.56	71	1844	0.17	0.003	0.00	8.63	0.00	0.000
3.12	2.04	241.35	1.36	327.69	69	1793	0.17	0.003	0.00	8.63	0.00	0.000
3.28	2.07	233.35	1.40	326.97	70	1795	0.17	0.003	0.00	8.63	0.00	0.000
3.45	2.06	236.01	1.39	327.16	70	1795	0.17	0.003	0.00	8.63	0.00	0.000
3.61	2.04	240.76	1.36	327.42	69	1792	0.17	0.003	0.00	8.63	0.00	0.000
3.77	2.09	247.54	1.43	354.45	76	1949	0.17	0.003	0.00	8.63	0.00	0.000
3.94	2.16	273.29	1.58	430.76	96	2362	0.17	0.003	0.00	8.63	0.00	0.000
4.10	2.19	329.07	1.63	536.96	120	2934	0.17	0.002	0.00	8.63	0.00	0.000
4.27	2.15	392.02	1.56	611.01	135	3354	0.17	0.002	0.00	8.63	0.00	0.000
4.43	2.14	419.67	1.53	641.48	141	3526	0.17	0.002	0.00	8.63	0.00	0.000
4.59	2.17	403.90	1.59	643.31	143	3525	0.17	0.002	0.00	8.63	0.00	0.000
4.76	2.17	421.87	1.59	672.39	150	3684	0.17	0.002	0.00	8.63	0.00	0.000
4.92	2.04	556.93	1.35	751.82	159	4110	0.17	0.002	0.00	8.63	0.00	0.000
5.09	1.92	671.86	1.20	808.85	163	4257	0.17	0.002	0.00	8.63	0.00	0.000
5.25	1.86	662.89	1.16	766.75	152	3934	0.17	0.002	0.00	8.63	0.00	0.000
5.41	1.93	503.21	1.22	613.91	124	3253	0.17	0.003	0.00	8.63	0.00	0.000
5.58	2.07	349.46	1.41	491.85	105	2702	0.17	0.003	0.00	8.63	0.00	0.000
5.74	2.21	262.69	1.68	442.42	100	2407	0.17	0.004	0.00	8.63	0.00	0.000
5.91	2.29	225.74	1.91	431.00	101	2291	0.17	0.004	0.00	8.63	0.00	0.000
6.07	2.31	219.81	1.97	433.86	102	2288	0.17	0.004	0.00	8.63	0.00	0.000
6.23	2.29	233.41	1.92	447.27	105	2375	0.17	0.004	0.00	8.63	0.00	0.000
6.40	2.25	253.87	1.81	458.62	106	2466	0.17	0.004	0.00	8.63	0.00	0.000
6.56	2.23	261.34	1.75	456.82	104	2471	0.17	0.004	0.00	8.63	0.00	0.000
6.73	2.24	241.34	1.78	429.61	99	2316	0.17	0.005	0.00	8.63	0.00	0.000
6.89	2.28	204.34	1.90	387.45	91	2062	0.17	0.006	0.00	8.63	0.00	0.000
7.05	2.32	172.11	2.01	346.20	82	1818	0.17	0.007	0.00	8.63	0.00	0.000
7.22	2.32	151.53	2.00	303.16	72	1594	0.17	0.008	0.00	8.63	0.00	0.000
7.38	2.27	140.61	1.87	262.58	61	1402	0.17	0.009	0.00	8.63	0.00	0.000
7.55	2.17	138.71	1.60	221.29	49	1241	0.17	0.011	0.00	8.63	0.00	0.000
7.71	2.03	142.69	1.33	190.43	40	1120	0.17	0.013	0.01	8.63	0.00	0.000
7.87	1.90	148.54	1.19	176.59	35	1041	0.17	0.014	0.01	8.63	0.01	0.000
8.04	1.86	147.87	1.15	170.52	34	1007	0.17	0.015	0.01	8.63	0.01	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
8.20	1.87	145.87	1.16	168.88	33	1009	0.17	0.016	0.01	8.63	0.01	0.000
8.37	1.88	145.94	1.17	170.48	34	1034	0.17	0.015	0.01	8.63	0.01	0.000
8.53	1.86	153.46	1.15	176.45	35	1074	0.17	0.015	0.01	8.63	0.01	0.000
8.69	1.81	168.60	1.12	188.08	37	1139	0.17	0.014	0.01	8.63	0.01	0.000
8.86	1.77	187.23	1.08	202.79	39	1219	0.17	0.013	0.01	8.63	0.00	0.000
9.02	1.74	204.25	1.06	217.20	41	1302	0.17	0.012	0.01	8.63	0.00	0.000
9.19	1.73	216.92	1.06	229.51	43	1384	0.17	0.012	0.00	8.63	0.00	0.000
9.35	1.73	222.84	1.06	235.91	44	1436	0.17	0.011	0.00	8.63	0.00	0.000
9.51	1.73	222.44	1.06	235.99	45	1451	0.17	0.011	0.00	8.63	0.00	0.000
9.68	1.74	215.49	1.07	229.63	43	1429	0.17	0.012	0.00	8.63	0.00	0.000
9.84	1.76	205.29	1.08	221.27	42	1400	0.17	0.012	0.01	8.63	0.00	0.000
10.01	1.78	192.21	1.09	210.27	40	1357	0.17	0.013	0.01	8.63	0.00	0.000
10.17	1.81	177.22	1.11	197.29	38	1299	0.17	0.014	0.01	8.63	0.01	0.000
10.34	1.83	162.05	1.13	183.38	36	1231	0.17	0.015	0.01	8.63	0.01	0.000
10.50	1.85	150.81	1.15	172.75	34	1177	0.17	0.017	0.01	8.63	0.01	0.000
10.66	1.86	143.30	1.15	165.25	33	1140	0.17	0.018	0.01	8.63	0.01	0.000
10.83	1.86	138.81	1.15	159.57	31	1108	0.17	0.019	0.01	8.63	0.01	0.000
10.99	1.84	135.15	1.14	153.53	30	1067	0.17	0.020	0.01	8.63	0.01	0.000
11.16	1.82	132.39	1.12	148.89	29	1037	0.17	0.021	0.01	8.63	0.01	0.000
11.32	1.81	131.08	1.11	146.06	28	1018	0.17	0.022	0.01	8.63	0.01	0.000
11.48	1.82	131.48	1.12	146.98	29	1034	0.17	0.022	0.01	8.63	0.01	0.000
11.65	1.82	131.18	1.12	147.43	29	1049	0.17	0.022	0.01	8.63	0.01	0.000
11.81	1.84	128.84	1.14	146.58	29	1060	0.17	0.022	0.01	8.63	0.01	0.000
11.98	1.86	125.34	1.15	144.14	28	1057	0.17	0.022	0.01	8.63	0.01	0.000
12.14	1.85	126.99	1.15	145.81	29	1076	0.17	0.022	0.01	8.63	0.01	0.000
12.30	1.83	132.48	1.13	149.90	29	1104	0.17	0.022	0.01	8.63	0.01	0.000
12.47	1.81	138.45	1.11	154.31	30	1132	0.17	0.021	0.01	8.63	0.01	0.000
12.63	1.80	140.36	1.11	155.33	30	1141	0.17	0.021	0.01	8.63	0.01	0.000
12.80	1.80	140.24	1.11	155.04	30	1146	0.17	0.021	0.01	8.63	0.01	0.000
12.96	1.80	140.80	1.11	155.98	30	1162	0.17	0.021	0.01	8.63	0.01	0.000
13.12	1.79	143.58	1.10	158.35	31	1184	0.17	0.021	0.01	8.63	0.01	0.000
13.29	1.79	145.34	1.10	160.04	31	1203	0.17	0.021	0.01	8.63	0.01	0.000
13.45	1.79	144.77	1.10	159.47	31	1207	0.17	0.021	0.01	8.63	0.01	0.000
13.62	1.80	141.85	1.11	157.36	30	1206	0.17	0.021	0.01	8.63	0.01	0.000
13.78	1.82	138.65	1.12	155.08	30	1204	0.17	0.022	0.01	8.63	0.01	0.000
13.94	1.82	135.89	1.12	152.35	30	1192	0.17	0.022	0.01	8.63	0.01	0.000
14.11	1.82	132.74	1.13	149.36	29	1180	0.17	0.023	0.01	8.63	0.01	0.000
14.27	1.82	129.21	1.12	144.59	28	1144	0.17	0.024	0.02	8.63	0.01	0.000
14.44	1.82	123.58	1.12	138.42	27	1103	0.17	0.026	0.02	8.63	0.01	0.001
14.60	1.82	117.59	1.12	131.97	26	1059	0.17	0.028	0.02	8.63	0.02	0.001
14.76	1.84	112.55	1.13	127.73	25	1040	0.17	0.029	0.02	8.63	0.02	0.001
14.93	1.86	112.66	1.15	130.10	26	1080	0.17	0.028	0.02	8.63	0.02	0.001
15.09	1.90	118.13	1.19	140.51	28	1195	0.17	0.024	0.02	8.63	0.01	0.000
15.26	1.93	127.08	1.22	154.80	31	1342	0.17	0.021	0.01	8.63	0.01	0.000
15.42	1.90	143.06	1.19	169.76	34	1461	0.16	0.019	0.01	8.63	0.01	0.000
15.58	1.88	147.69	1.17	172.37	34	1477	0.16	0.019	0.01	8.63	0.01	0.000
15.75	1.82	150.36	1.12	168.65	33	1410	0.16	0.020	0.01	8.63	0.01	0.000
15.91	1.81	143.57	1.11	160.07	31	1339	0.16	0.022	0.01	8.63	0.01	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
16.08	1.79	141.40	1.10	155.76	30	1296	0.16	0.023	0.01	8.63	0.01	0.000
16.24	1.84	132.51	1.14	150.45	29	1293	0.16	0.023	0.01	8.63	0.01	0.000
16.40	1.89	120.98	1.18	142.21	28	1261	0.16	0.025	0.02	8.63	0.01	0.000
16.57	1.93	111.81	1.21	135.70	27	1233	0.17	0.026	0.02	8.63	0.01	0.001
16.73	1.94	108.54	1.22	132.82	27	1218	0.17	0.026	0.02	8.63	0.01	0.001
16.90	1.93	108.35	1.22	132.51	27	1222	0.17	0.026	0.02	8.63	0.01	0.001
17.06	1.92	110.77	1.21	133.76	27	1233	0.17	0.026	0.02	8.63	0.01	0.001
17.23	1.90	114.35	1.19	135.76	27	1246	0.17	0.026	0.02	8.63	0.01	0.001
17.39	1.88	116.59	1.17	136.99	27	1255	0.17	0.026	0.02	8.63	0.01	0.001
17.55	1.88	114.14	1.17	133.13	26	1220	0.17	0.028	0.02	8.63	0.02	0.001
17.72	1.88	109.49	1.17	128.57	26	1190	0.17	0.029	0.02	8.63	0.02	0.001
17.88	1.88	107.82	1.17	125.88	25	1166	0.17	0.030	0.02	8.63	0.02	0.001
18.05	1.88	108.42	1.17	126.86	25	1183	0.17	0.030	0.02	8.63	0.02	0.001
18.21	1.87	110.02	1.16	127.75	25	1191	0.17	0.030	0.02	8.63	0.02	0.001
18.37	1.87	109.07	1.16	127.02	25	1192	0.17	0.030	0.02	8.63	0.02	0.001
18.54	1.89	106.61	1.18	126.05	25	1203	0.17	0.030	0.02	8.63	0.02	0.001
18.70	1.91	103.43	1.20	123.95	25	1199	0.17	0.031	0.02	8.63	0.02	0.001
18.87	1.93	100.01	1.22	121.74	25	1195	0.17	0.031	0.02	8.63	0.02	0.001
19.03	1.93	96.82	1.22	118.14	24	1167	0.17	0.032	0.03	8.63	0.02	0.001
19.19	1.95	91.62	1.24	113.35	23	1133	0.17	0.034	0.03	8.63	0.02	0.001
19.36	1.96	85.85	1.25	107.38	22	1085	0.17	0.037	0.03	8.63	0.03	0.001
19.52	1.96	82.61	1.26	103.67	21	1054	0.17	0.039	0.04	8.63	0.03	0.001
19.69	1.94	84.17	1.23	103.57	21	1048	0.17	0.040	0.04	8.63	0.03	0.001
19.85	1.92	85.73	1.21	103.55	21	1041	0.17	0.041	0.04	8.63	0.03	0.001
20.01	1.91	83.59	1.20	100.44	20	1011	0.17	0.043	0.04	8.63	0.03	0.001
20.18	1.94	77.16	1.23	94.67	19	970	0.17	0.047	0.05	8.63	0.04	0.002
20.34	1.97	71.53	1.26	90.37	19	943	0.17	0.050	0.05	8.63	0.04	0.002
20.51	2.00	68.26	1.30	88.48	18	938	0.17	0.051	0.06	8.63	0.04	0.002
20.67	1.99	67.05	1.29	86.71	18	922	0.17	0.053	0.06	8.63	0.05	0.002
20.83	1.99	66.15	1.29	85.10	18	907	0.17	0.055	0.06	8.63	0.05	0.002
21.00	1.99	65.08	1.28	83.37	17	892	0.17	0.058	0.07	8.63	0.05	0.002
21.16	2.00	63.18	1.30	82.26	17	889	0.17	0.059	0.07	8.63	0.06	0.002
21.33	2.01	61.85	1.32	81.47	17	888	0.17	0.059	0.07	8.63	0.06	0.002
21.49	2.02	60.82	1.33	80.86	17	888	0.17	0.060	0.07	8.63	0.06	0.002
21.65	2.02	61.24	1.32	80.99	17	892	0.17	0.060	0.07	8.63	0.06	0.002
21.82	2.00	62.88	1.30	81.76	17	899	0.17	0.060	0.07	8.63	0.06	0.002
21.98	1.96	67.15	1.25	84.06	17	913	0.17	0.058	0.07	8.63	0.05	0.002
22.15	1.91	74.17	1.20	89.17	18	950	0.17	0.055	0.06	8.63	0.05	0.002
22.31	1.88	80.61	1.17	94.08	19	984	0.17	0.052	0.06	8.63	0.04	0.002
22.47	1.88	81.23	1.17	95.24	19	1004	0.17	0.050	0.05	8.63	0.04	0.002
22.64	1.93	74.47	1.22	90.90	18	991	0.17	0.052	0.06	8.63	0.04	0.002
22.80	2.03	64.46	1.34	86.18	18	982	0.17	0.053	0.06	8.63	0.05	0.002
22.97	2.11	58.23	1.47	85.44	19	996	0.17	0.052	0.06	8.63	0.04	0.002
23.13	2.11	61.16	1.47	89.68	19	1050	0.17	0.048	0.05	8.63	0.04	0.001
23.30	2.01	75.61	1.31	99.00	21	1135	0.17	0.043	0.04	8.63	0.03	0.001
23.46	1.88	94.52	1.17	110.90	22	1198	0.17	0.039	0.03	8.63	0.03	0.001
23.62	1.81	105.45	1.11	117.42	23	1211	0.17	0.039	0.03	8.63	0.03	0.001
23.79	1.81	102.95	1.11	114.33	22	1180	0.18	0.041	0.04	8.63	0.03	0.001

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
23.95	1.86	92.25	1.15	106.37	21	1145	0.18	0.043	0.04	8.63	0.03	0.001
24.12	1.92	83.95	1.21	101.68	21	1144	0.18	0.044	0.04	8.63	0.03	0.001
24.28	1.96	80.65	1.25	101.16	21	1167	0.18	0.043	0.04	8.63	0.03	0.001
24.44	1.98	83.82	1.27	106.72	22	1245	0.18	0.039	0.03	8.63	0.03	0.001
24.61	1.99	92.26	1.29	119.25	25	1407	0.18	0.032	0.03	8.63	0.02	0.001
24.77	2.05	103.15	1.38	142.12	30	1720	0.18	0.025	0.02	8.63	0.01	0.000
24.94	2.12	104.60	1.49	156.26	34	1926	0.18	0.022	0.01	8.63	0.01	0.000
25.10	2.25	92.08	1.80	165.75	38	2048	0.18	0.020	0.01	8.63	0.01	0.000
25.26	2.43	68.76	2.44	167.79	42	1986	0.18	0.021	0.01	8.63	0.01	0.000
25.43	2.61	51.09	3.39	173.00	0	0	0.18	0.000	0.00	0.00	0.00	0.000
25.59	2.71	40.74	4.10	166.83	0	0	0.18	0.000	0.00	0.00	0.00	0.000
25.76	2.73	36.76	4.25	156.17	0	0	0.18	0.000	0.00	0.00	0.00	0.000
25.92	2.74	34.51	4.30	148.26	0	0	0.18	0.000	0.00	0.00	0.00	0.000
26.08	2.74	34.41	4.32	148.74	0	0	0.18	0.000	0.00	0.00	0.00	0.000
26.25	2.74	34.47	4.30	148.25	0	0	0.18	0.000	0.00	0.00	0.00	0.000
26.41	2.62	42.62	3.42	145.82	0	0	0.18	0.000	0.00	0.00	0.00	0.000
26.58	2.37	63.65	2.19	139.66	34	1756	0.18	0.026	0.01	8.63	0.01	0.000
26.74	2.21	87.38	1.69	147.31	33	1915	0.18	0.023	0.01	8.63	0.01	0.000
26.90	2.17	104.55	1.60	167.38	37	2185	0.18	0.020	0.01	8.63	0.01	0.000
27.07	2.19	117.20	1.63	191.48	43	2513	0.18	0.017	0.01	8.63	0.01	0.000
27.23	2.18	127.97	1.62	206.95	46	2728	0.18	0.015	0.01	8.63	0.00	0.000
27.40	2.24	115.74	1.76	203.43	47	2690	0.18	0.016	0.01	8.63	0.00	0.000
27.56	2.33	95.73	2.04	195.46	47	2558	0.18	0.017	0.01	8.63	0.00	0.000
27.72	2.44	78.70	2.48	195.09	49	2486	0.18	0.018	0.01	8.63	0.00	0.000
27.89	2.46	76.40	2.59	197.97	50	2515	0.18	0.017	0.01	8.63	0.00	0.000
28.05	2.51	72.91	2.84	206.88	54	2595	0.18	0.017	0.01	8.63	0.00	0.000
28.22	2.52	74.01	2.85	211.16	55	2660	0.18	0.016	0.00	8.63	0.00	0.000
28.38	2.50	77.65	2.75	213.20	55	2720	0.18	0.016	0.00	8.63	0.00	0.000
28.54	2.49	76.67	2.73	209.62	54	2689	0.18	0.016	0.01	8.63	0.00	0.000
28.71	2.48	79.10	2.65	209.97	54	2723	0.18	0.016	0.01	8.63	0.00	0.000
28.87	2.39	93.79	2.28	214.06	52	2863	0.18	0.015	0.00	8.63	0.00	0.000
29.04	2.32	107.66	2.03	218.62	52	2987	0.18	0.015	0.00	8.63	0.00	0.000
29.20	2.31	111.63	1.97	220.15	52	3032	0.18	0.015	0.00	8.63	0.00	0.000
29.36	2.26	121.37	1.82	220.63	51	3072	0.18	0.015	0.00	8.63	0.00	0.000
29.53	2.12	153.00	1.48	226.91	49	3152	0.18	0.014	0.00	8.63	0.00	0.000
29.69	1.96	193.51	1.25	242.23	50	3178	0.18	0.014	0.00	8.63	0.00	0.000
29.86	1.85	217.88	1.15	249.88	49	3056	0.18	0.015	0.01	8.63	0.00	0.000
30.02	1.81	217.72	1.11	242.59	47	2878	0.18	0.016	0.01	8.63	0.00	0.000
30.19	1.83	200.43	1.13	226.71	44	2748	0.18	0.017	0.01	8.63	0.01	0.000
30.35	1.90	177.04	1.19	211.17	42	2711	0.18	0.017	0.01	8.63	0.01	0.000
30.51	1.97	157.68	1.26	198.50	41	2661	0.18	0.018	0.01	8.63	0.01	0.000
30.68	2.00	144.96	1.29	187.58	39	2563	0.18	0.019	0.01	8.63	0.01	0.000
30.84	2.00	137.20	1.31	179.13	37	2467	0.18	0.020	0.01	8.63	0.01	0.000
31.01	2.03	131.07	1.34	176.10	37	2465	0.18	0.020	0.01	8.63	0.01	0.000
31.17	2.10	122.92	1.46	179.15	39	2578	0.18	0.019	0.01	8.63	0.01	0.000
31.33	2.19	113.25	1.64	185.94	42	2724	0.18	0.018	0.01	8.63	0.01	0.000
31.50	2.24	110.27	1.78	196.71	45	2895	0.18	0.017	0.01	8.63	0.00	0.000
31.66	2.25	113.02	1.81	204.08	47	3014	0.18	0.016	0.01	8.63	0.00	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
31.83	2.27	111.68	1.84	205.92	48	3052	0.18	0.016	0.01	8.63	0.00	0.000
31.99	2.29	105.15	1.90	200.27	47	2974	0.18	0.016	0.01	8.63	0.00	0.000
32.15	2.28	102.88	1.89	194.81	45	2906	0.18	0.017	0.01	8.63	0.00	0.000
32.32	2.17	121.26	1.59	192.53	43	2881	0.18	0.017	0.01	8.63	0.01	0.000
32.48	2.02	152.70	1.33	202.77	43	2916	0.18	0.017	0.01	8.63	0.01	0.000
32.65	1.90	181.91	1.19	215.88	43	2889	0.18	0.017	0.01	8.63	0.01	0.000
32.81	1.81	196.99	1.11	219.62	43	2749	0.18	0.018	0.01	8.63	0.01	0.000
32.97	1.75	198.03	1.07	211.89	40	2514	0.18	0.021	0.01	8.63	0.01	0.000
33.14	1.71	194.81	1.05	203.84	38	2351	0.18	0.022	0.01	8.63	0.01	0.000
33.30	1.74	190.87	1.06	202.66	38	2392	0.18	0.022	0.01	8.63	0.01	0.000
33.47	1.81	180.93	1.11	201.12	39	2537	0.18	0.021	0.01	8.63	0.01	0.000
33.63	1.87	161.57	1.17	188.41	37	2523	0.18	0.021	0.01	8.63	0.01	0.000
33.79	2.00	122.42	1.30	159.36	33	2330	0.18	0.023	0.01	8.63	0.01	0.000
33.96	2.16	79.10	1.56	123.78	27	1917	0.18	0.030	0.02	8.63	0.02	0.001
34.12	2.39	44.06	2.27	99.94	24	1536	0.18	0.041	0.03	8.63	0.02	0.001
34.29	2.64	25.94	3.58	92.88	0	0	0.18	0.000	0.00	0.00	0.00	0.000
34.45	2.90	20.43	5.71	116.70	0	0	0.18	0.000	0.00	0.00	0.00	0.000
34.61	2.89	27.78	5.59	155.25	0	0	0.18	0.000	0.00	0.00	0.00	0.000
34.78	2.55	63.16	3.01	189.95	50	2848	0.18	0.018	0.01	8.63	0.00	0.000
34.94	2.30	106.03	1.96	207.77	49	3297	0.18	0.016	0.01	8.63	0.00	0.000
35.11	2.15	139.98	1.56	218.78	48	3468	0.18	0.015	0.01	8.63	0.00	0.000
35.27	2.15	135.95	1.56	212.42	47	3378	0.18	0.015	0.01	8.63	0.00	0.000
35.43	2.16	132.83	1.57	208.04	46	3320	0.18	0.016	0.01	8.63	0.00	0.000
35.60	2.17	125.69	1.61	201.76	45	3241	0.18	0.016	0.01	8.63	0.00	0.000
35.76	2.17	121.46	1.59	193.01	43	3108	0.18	0.017	0.01	8.63	0.01	0.000
35.93	2.21	105.07	1.70	178.31	40	2896	0.18	0.019	0.01	8.63	0.01	0.000
36.09	2.26	88.65	1.82	161.40	37	2634	0.18	0.021	0.01	8.63	0.01	0.000
36.26	2.30	76.77	1.96	150.78	36	2464	0.18	0.023	0.01	8.63	0.01	0.000
36.42	2.34	72.94	2.09	152.36	37	2488	0.18	0.023	0.01	8.63	0.01	0.000
36.58	2.32	83.25	2.01	167.59	40	2754	0.18	0.020	0.01	8.63	0.01	0.000
36.75	2.24	111.39	1.77	197.56	45	3269	0.18	0.016	0.01	8.63	0.00	0.000
36.91	2.13	154.15	1.52	234.16	51	3831	0.18	0.014	0.00	8.63	0.00	0.000
37.08	2.05	194.03	1.37	266.22	57	4245	0.18	0.012	0.00	8.63	0.00	0.000
37.24	2.00	210.27	1.31	274.40	57	4285	0.18	0.012	0.00	8.63	0.00	0.000
37.40	2.02	192.61	1.33	255.74	54	4042	0.18	0.013	0.00	8.63	0.00	0.000
37.57	2.07	162.09	1.41	228.31	49	3710	0.18	0.015	0.00	8.63	0.00	0.000
37.73	2.14	134.95	1.53	206.12	45	3431	0.18	0.016	0.01	8.63	0.00	0.000
37.90	2.16	120.70	1.58	190.57	42	3200	0.18	0.017	0.01	8.63	0.01	0.000
38.06	2.18	109.35	1.62	176.78	40	2987	0.18	0.019	0.01	8.63	0.01	0.000
38.22	2.19	99.53	1.64	163.19	37	2770	0.18	0.021	0.01	8.63	0.01	0.000
38.39	2.20	90.54	1.67	150.89	34	2573	0.18	0.023	0.01	8.63	0.01	0.000
38.55	2.22	82.39	1.71	141.10	32	2418	0.18	0.025	0.01	8.63	0.01	0.000
38.72	2.25	76.46	1.79	136.67	31	2354	0.18	0.025	0.01	8.63	0.01	0.000
38.88	2.25	75.49	1.81	136.27	31	2355	0.18	0.026	0.01	8.63	0.01	0.000
39.04	2.24	77.83	1.76	137.19	31	2376	0.18	0.025	0.01	8.63	0.01	0.000
39.21	2.22	80.47	1.72	138.77	32	2409	0.18	0.025	0.01	8.63	0.01	0.000
39.37	2.23	80.15	1.75	140.11	32	2441	0.18	0.025	0.01	8.63	0.01	0.000
39.54	2.24	79.09	1.77	140.18	32	2452	0.18	0.025	0.01	8.63	0.01	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
39.70	2.23	78.37	1.76	137.68	32	2414	0.18	0.025	0.01	8.63	0.01	0.000
39.86	2.23	76.06	1.74	132.57	30	2331	0.18	0.026	0.02	8.63	0.01	0.000
40.03	2.24	71.73	1.76	126.26	29	2228	0.18	0.028	0.02	8.63	0.01	0.001
40.19	2.24	68.80	1.78	122.51	28	2169	0.18	0.029	0.02	8.63	0.02	0.001
40.36	2.21	74.07	1.69	125.45	28	2222	0.18	0.028	0.02	8.63	0.01	0.001
40.52	2.12	91.10	1.50	136.57	30	2381	0.18	0.026	0.02	8.63	0.01	0.000
40.68	2.05	109.24	1.38	150.34	32	2556	0.18	0.024	0.01	8.63	0.01	0.000
40.85	2.02	118.54	1.33	157.61	33	2643	0.18	0.023	0.01	8.63	0.01	0.000
41.01	2.04	116.94	1.35	157.81	33	2674	0.18	0.023	0.01	8.63	0.01	0.000
41.18	2.05	111.42	1.37	152.73	32	2614	0.18	0.023	0.01	8.63	0.01	0.000
41.34	2.06	105.02	1.39	145.97	31	2519	0.18	0.024	0.01	8.63	0.01	0.000
41.50	2.09	93.93	1.43	134.65	29	2357	0.18	0.027	0.02	8.63	0.01	0.001
41.67	2.15	78.55	1.56	122.57	27	2198	0.18	0.029	0.02	8.63	0.02	0.001
41.83	2.24	62.93	1.78	111.90	26	2041	0.18	0.032	0.02	8.63	0.02	0.001
42.00	2.32	52.17	2.02	105.22	25	1926	0.18	0.035	0.03	8.63	0.02	0.001
42.16	2.35	48.53	2.13	103.30	25	1892	0.18	0.036	0.03	8.63	0.02	0.001
42.32	2.34	51.18	2.10	107.50	26	1976	0.18	0.034	0.02	8.63	0.02	0.001
42.49	2.32	56.11	2.03	113.74	27	2100	0.18	0.031	0.02	8.63	0.02	0.001
42.65	2.33	59.25	2.05	121.28	29	2245	0.18	0.029	0.02	8.63	0.01	0.001
42.82	2.38	58.22	2.22	129.13	31	2389	0.18	0.027	0.02	8.63	0.01	0.000
42.98	2.46	53.68	2.57	137.79	35	2527	0.18	0.025	0.01	8.63	0.01	0.000
43.15	2.57	45.84	3.13	143.28	38	2582	0.18	0.024	0.01	8.63	0.01	0.000
43.31	2.68	36.54	3.88	141.82	0	0	0.18	0.000	0.00	0.00	0.00	0.000
43.47	2.81	27.98	4.84	135.32	0	0	0.17	0.000	0.00	0.00	0.00	0.000
43.64	2.83	24.88	5.03	125.22	0	0	0.17	0.000	0.00	0.00	0.00	0.000
43.80	2.85	21.44	5.25	112.56	0	0	0.17	0.000	0.00	0.00	0.00	0.000
43.97	2.88	17.66	5.50	97.15	0	0	0.17	0.000	0.00	0.00	0.00	0.000
44.13	3.00	12.44	6.69	83.22	0	0	0.17	0.000	0.00	0.00	0.00	0.000
44.29	3.02	11.35	6.94	78.79	0	0	0.17	0.000	0.00	0.00	0.00	0.000
44.46	3.03	12.34	7.06	87.06	0	0	0.17	0.000	0.00	0.00	0.00	0.000
44.62	2.99	15.22	6.63	100.93	0	0	0.17	0.000	0.00	0.00	0.00	0.000
44.79	2.95	18.73	6.17	115.46	0	0	0.17	0.000	0.00	0.00	0.00	0.000
44.95	2.88	22.79	5.48	124.92	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.11	2.85	24.80	5.20	128.94	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.28	2.81	26.01	4.85	126.17	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.44	2.54	41.93	2.98	124.74	33	2359	0.17	0.028	0.02	8.63	0.01	0.000
45.61	2.28	68.03	1.89	128.84	30	2509	0.17	0.026	0.02	8.63	0.01	0.001
45.77	2.10	100.98	1.46	147.42	32	2772	0.17	0.023	0.01	8.63	0.01	0.000
45.93	2.05	118.51	1.37	162.19	34	2979	0.17	0.021	0.01	8.63	0.01	0.000
46.10	2.04	126.25	1.36	171.90	36	3157	0.17	0.020	0.01	8.63	0.01	0.000
46.26	2.06	125.42	1.39	174.45	37	3244	0.17	0.019	0.01	8.63	0.01	0.000
46.43	2.10	119.50	1.45	173.49	38	3289	0.17	0.019	0.01	8.63	0.01	0.000
46.59	2.12	113.36	1.50	170.17	37	3267	0.17	0.019	0.01	8.63	0.01	0.000
46.75	2.12	111.46	1.48	165.44	36	3174	0.17	0.020	0.01	8.63	0.01	0.000
46.92	2.07	114.22	1.40	159.92	34	3012	0.17	0.021	0.01	8.63	0.01	0.000
47.08	2.02	121.39	1.32	160.45	34	2942	0.17	0.022	0.01	8.63	0.01	0.000
47.25	2.00	130.17	1.30	168.85	35	3066	0.17	0.021	0.01	8.63	0.01	0.000
47.41	2.00	142.43	1.30	184.68	38	3360	0.17	0.019	0.01	8.63	0.01	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
47.57	2.02	149.54	1.33	198.83	42	3683	0.17	0.017	0.01	8.63	0.01	0.000
47.74	2.07	150.07	1.40	209.86	45	3998	0.17	0.015	0.01	8.63	0.00	0.000
47.90	2.14	140.36	1.54	215.89	48	4256	0.17	0.014	0.01	8.63	0.00	0.000
48.07	2.21	129.37	1.70	220.44	50	4437	0.17	0.014	0.00	8.63	0.00	0.000
48.23	2.36	89.13	2.16	192.95	47	5010	0.17	0.012	0.00	8.63	0.00	0.000
48.39	2.39	85.09	2.28	193.84	47	4981	0.17	0.012	0.00	8.63	0.00	0.000
48.56	2.44	73.94	2.47	182.52	46	4600	0.17	0.013	0.00	8.63	0.00	0.000
48.72	2.52	55.86	2.89	161.26	42	3890	0.17	0.016	0.01	8.63	0.01	0.000
48.89	2.69	34.87	3.95	137.90	0	0	0.17	0.000	0.00	0.00	0.00	0.000
49.05	2.83	24.00	5.06	121.56	0	0	0.17	0.000	0.00	0.00	0.00	0.000
49.22	2.82	22.60	4.99	112.78	0	0	0.17	0.000	0.00	0.00	0.00	0.000
49.38	2.80	22.42	4.78	107.26	0	0	0.17	0.000	0.00	0.00	0.00	0.000
49.54	2.83	20.04	5.08	101.78	0	0	0.17	0.000	0.00	0.00	0.00	0.000
49.71	2.93	17.02	6.03	102.57	0	0	0.17	0.000	0.00	0.00	0.00	0.000
49.87	3.03	16.98	7.14	121.18	0	0	0.17	0.000	0.00	0.00	0.00	0.000

Total estimated settlement: 0.12

Abbreviations

Q_{tn}: Equivalent clean sand normalized cone resistance
K_c: Fines correction factor
$Q_{tn,cs}$: Post-liquefaction volumentric strain
G_{max}: Small strain shear modulus
CSR: Soil cyclic stress ratio
γ: Cyclic shear strain
$e_{vol(15)}$: Volumetric strain after 15 cycles
N_c: Equivalent number of cycles
e_v: Volumetric strain
Settle.: Calculated settlement

:: Post-earthquake settlement due to soil liquefaction ::

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
50.04	138.92	2.00	0.00	1.00	0.00						

Total estimated settlement: 0.00

Abbreviations

$Q_{tn,cs}$: Equivalent clean sand normalized cone resistance
FS: Factor of safety against liquefaction
e_v (%): Post-liquefaction volumentric strain
DF: e_v depth weighting factor
Settlement: Calculated settlement

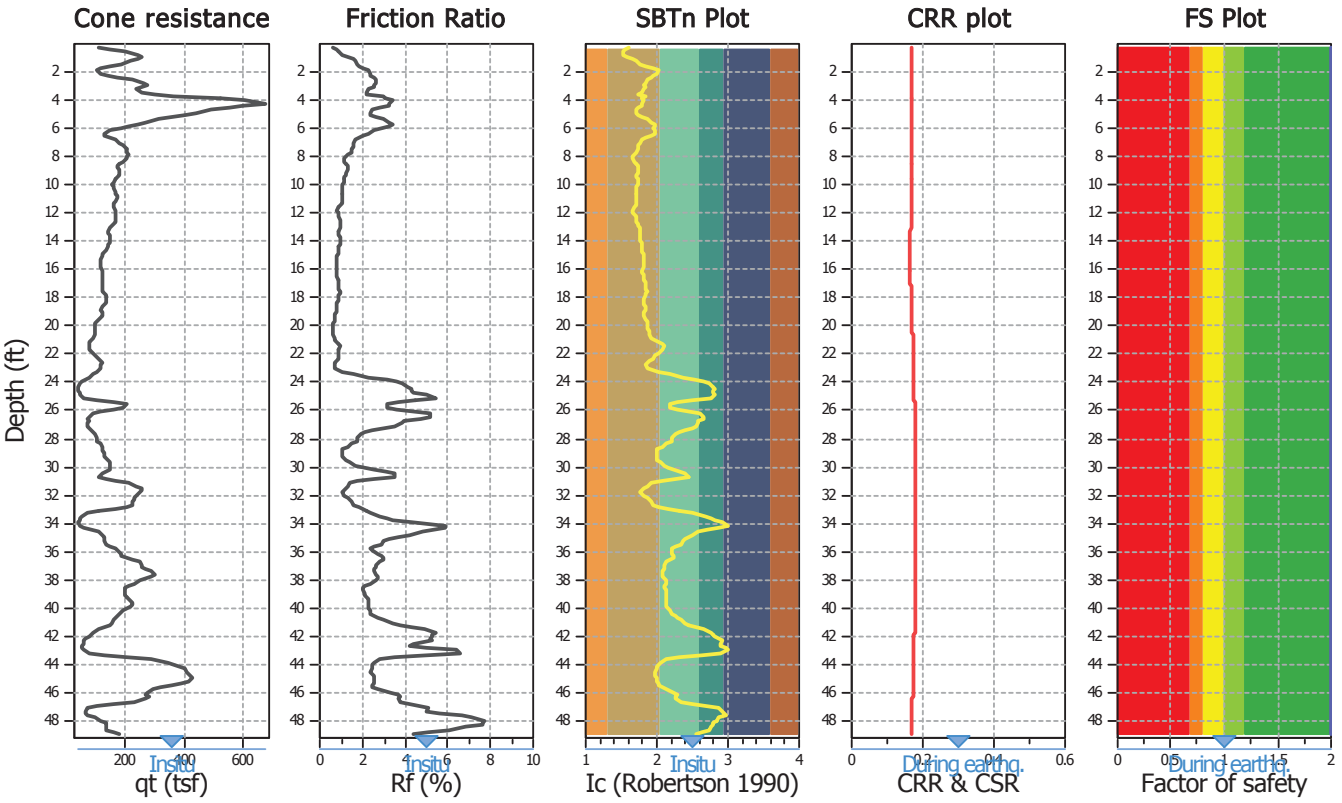
LIQUEFACTION ANALYSIS REPORT

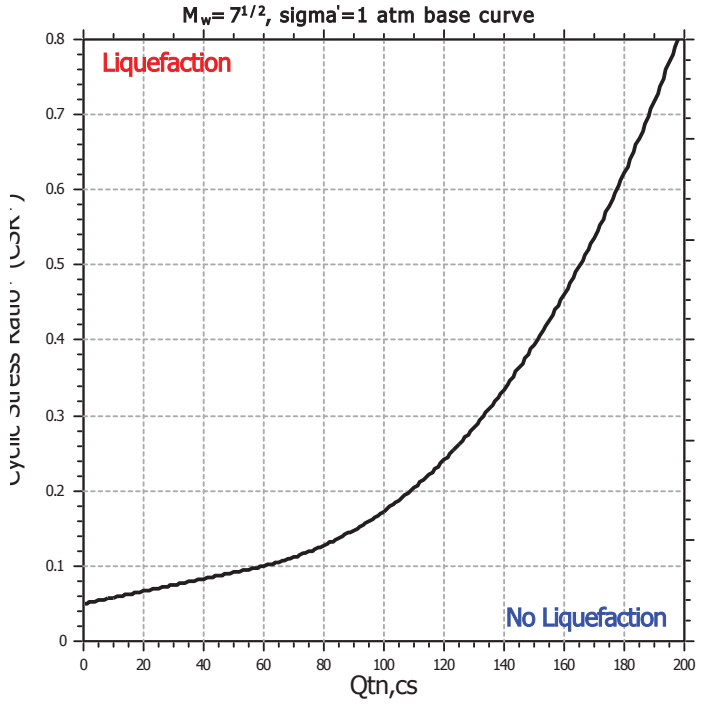
Project title : Kaiser Fresno MOB **Location : Fresno, CA**

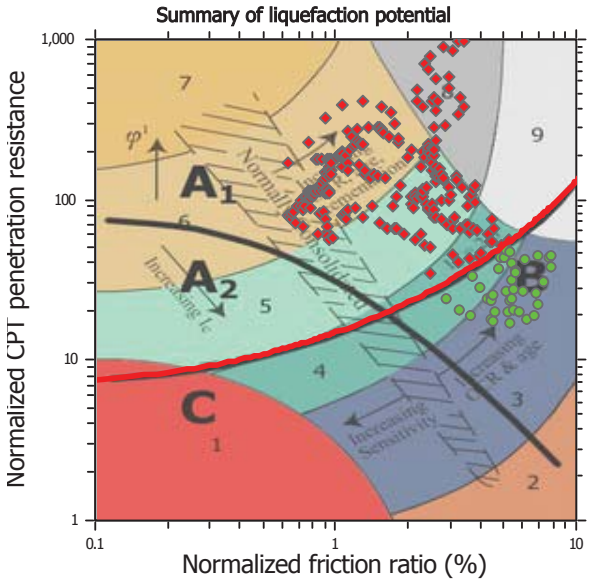
CPT file : CPT-05

Input parameters and analysis data

Analysis method:	NCEER (1998)	**G.W.T. (in-situ):**	50.00 ft	**Use fill:**	No	**Clay like behavior applied:**	Sands only
Fines correction method:	NCEER (1998)	**G.W.T. (earthq.):**	50.00 ft	**Fill height:**	N/A	**Limit depth applie**	No
Points to test:	Based on Ic value	**Average results interva**	3	**Fill weight:**	N/A	**Limit depth:**	N/A
Earthquake magnitude M_w:	6.70	**Ic cut-off value:**	2.60	**Trans. detect. applied:**	No	**MSF method:**	Method based
Peak ground acceleration:	0.35	**Unit weight calculation**	Based on SBT	**K_σ applied:**	Yes		

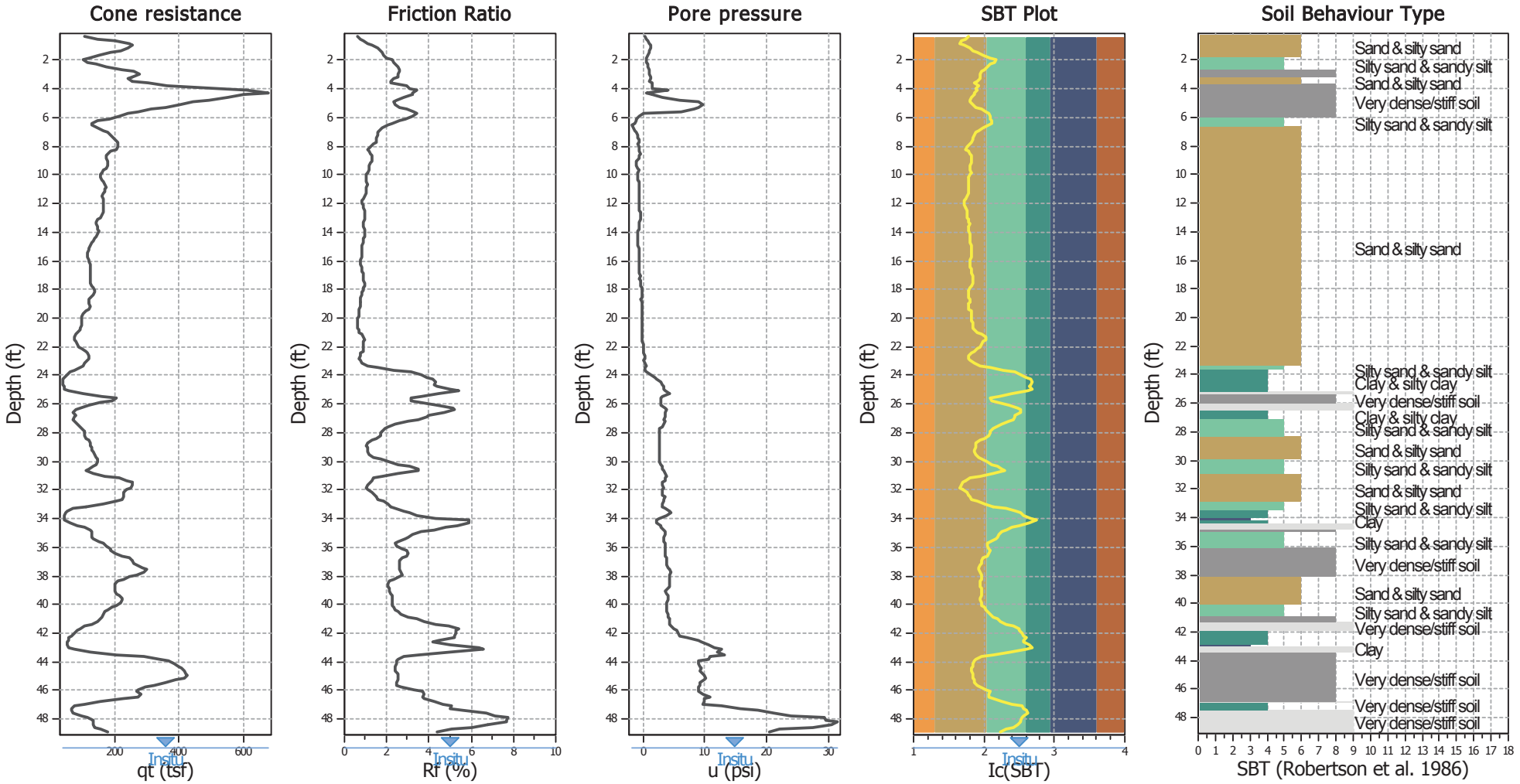






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



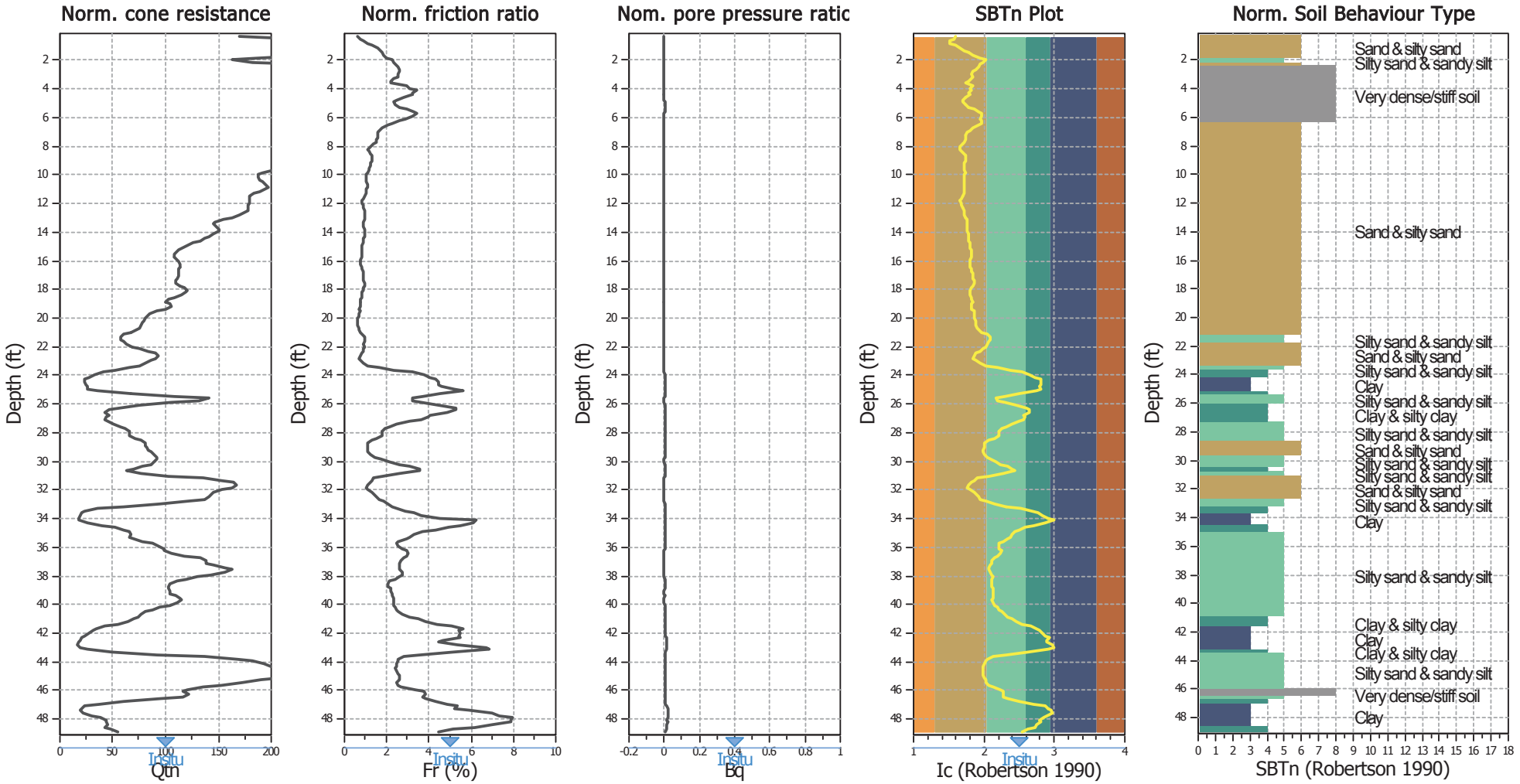
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



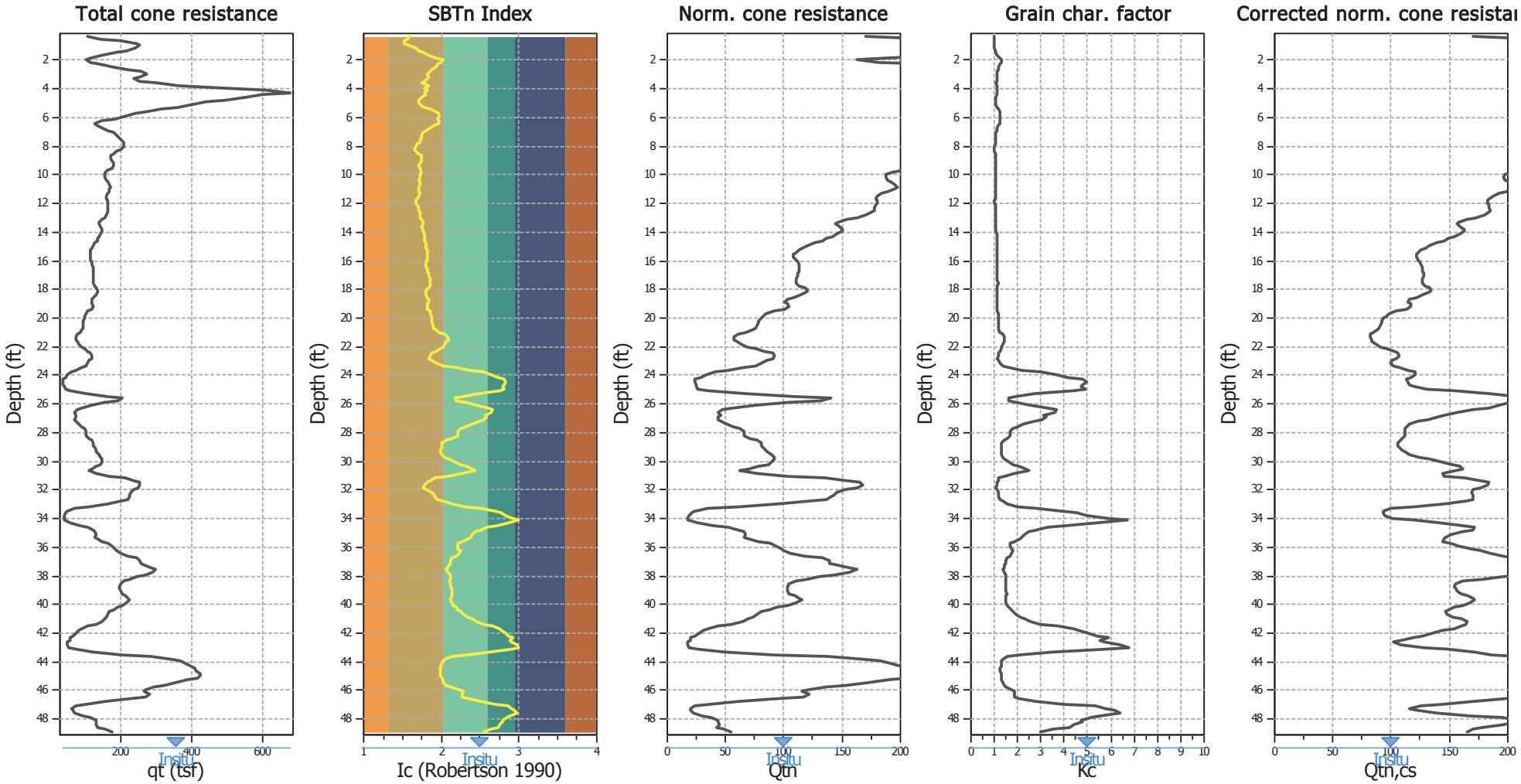
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

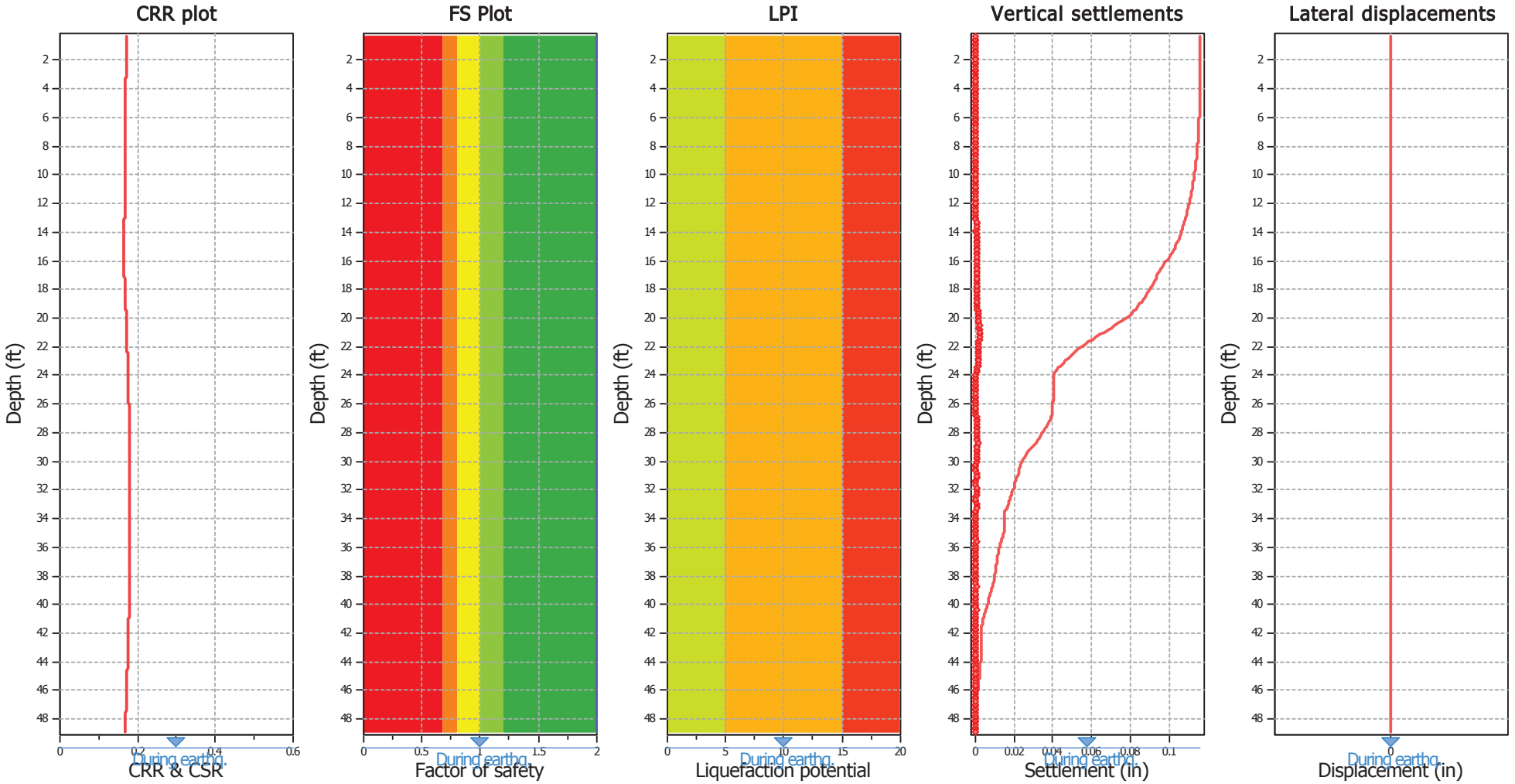
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

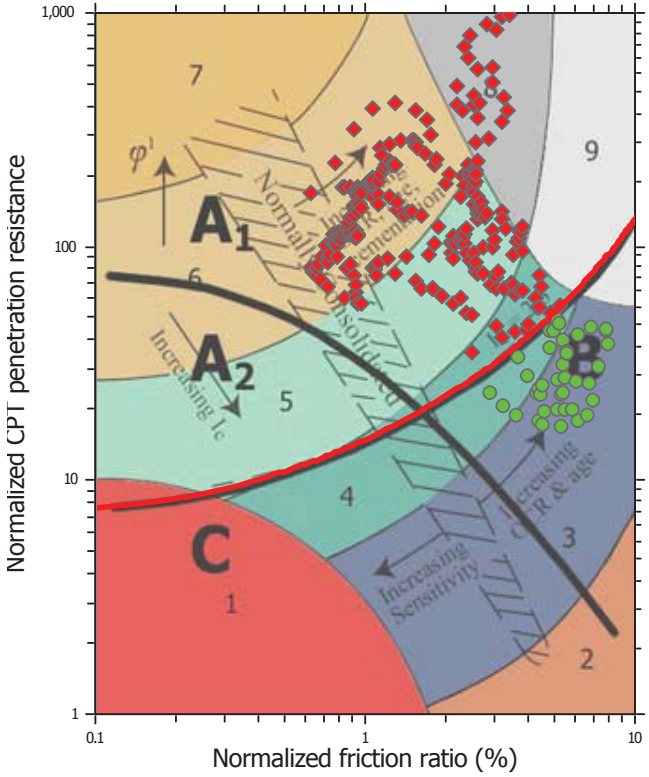
F.S. color scheme

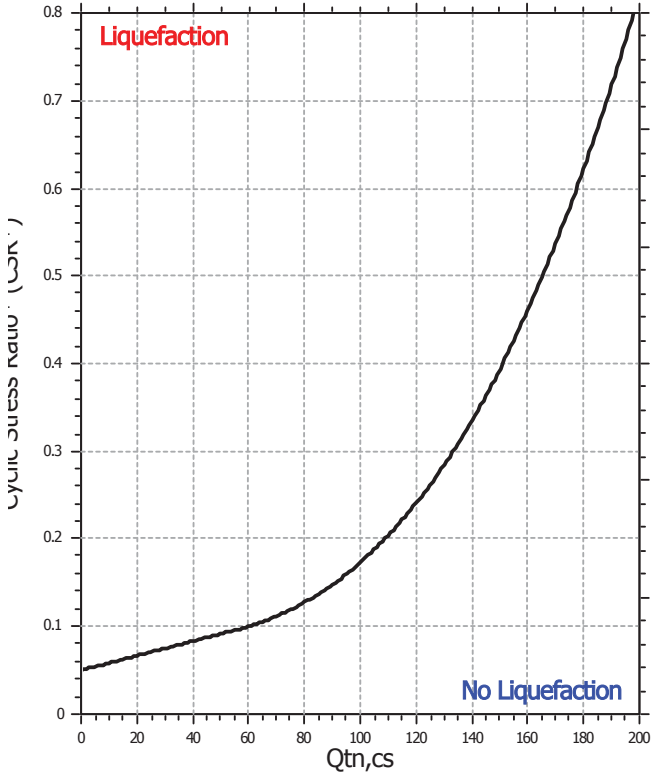
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

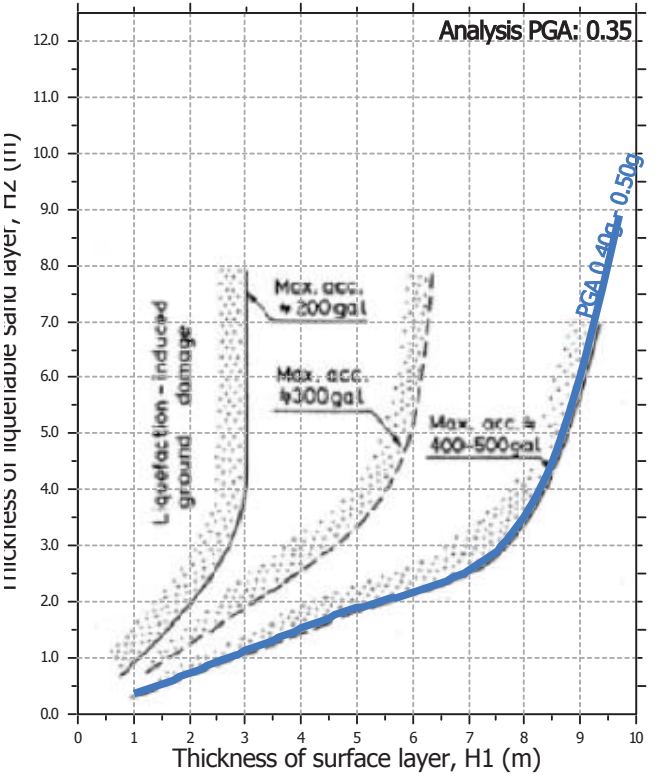
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



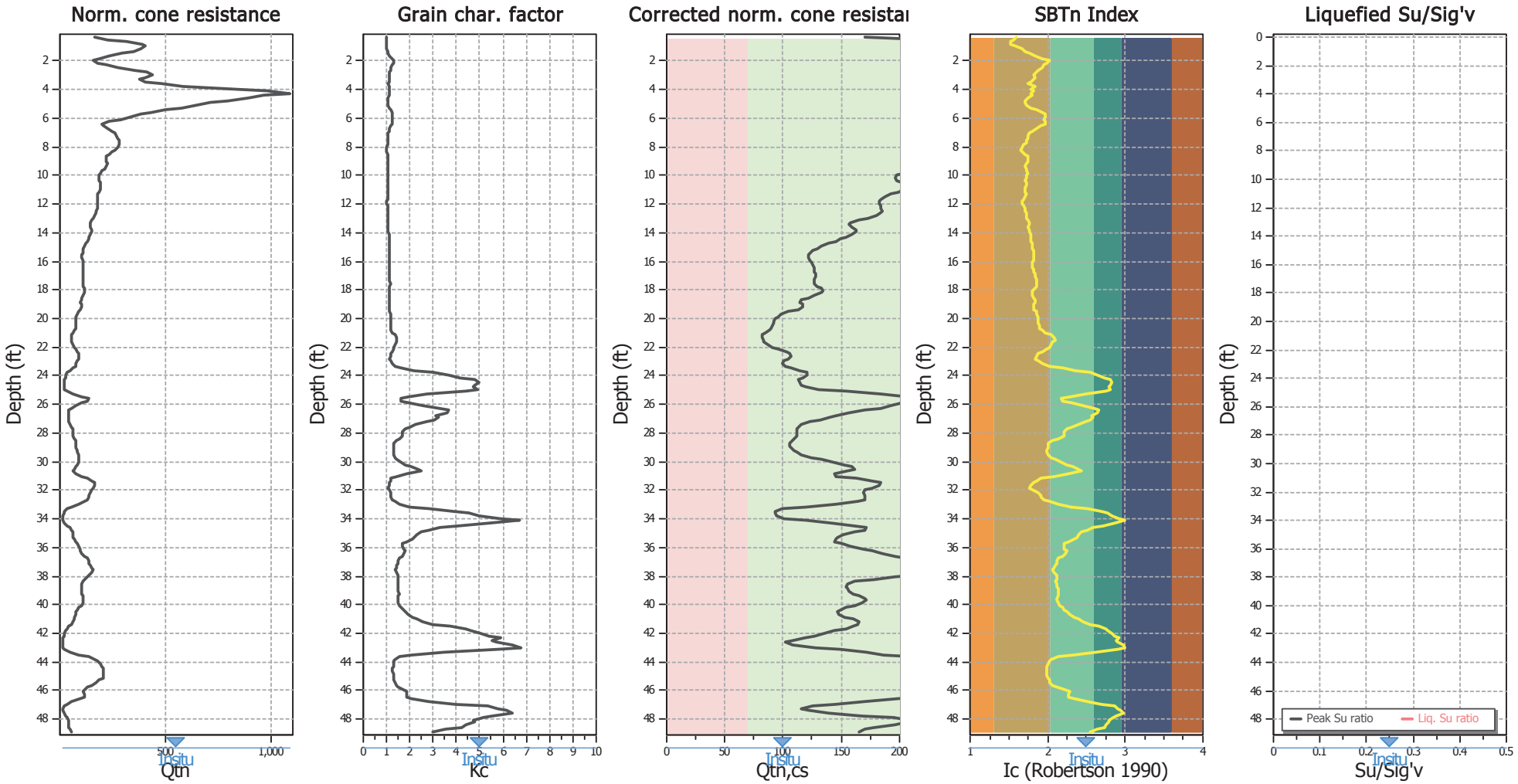




Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

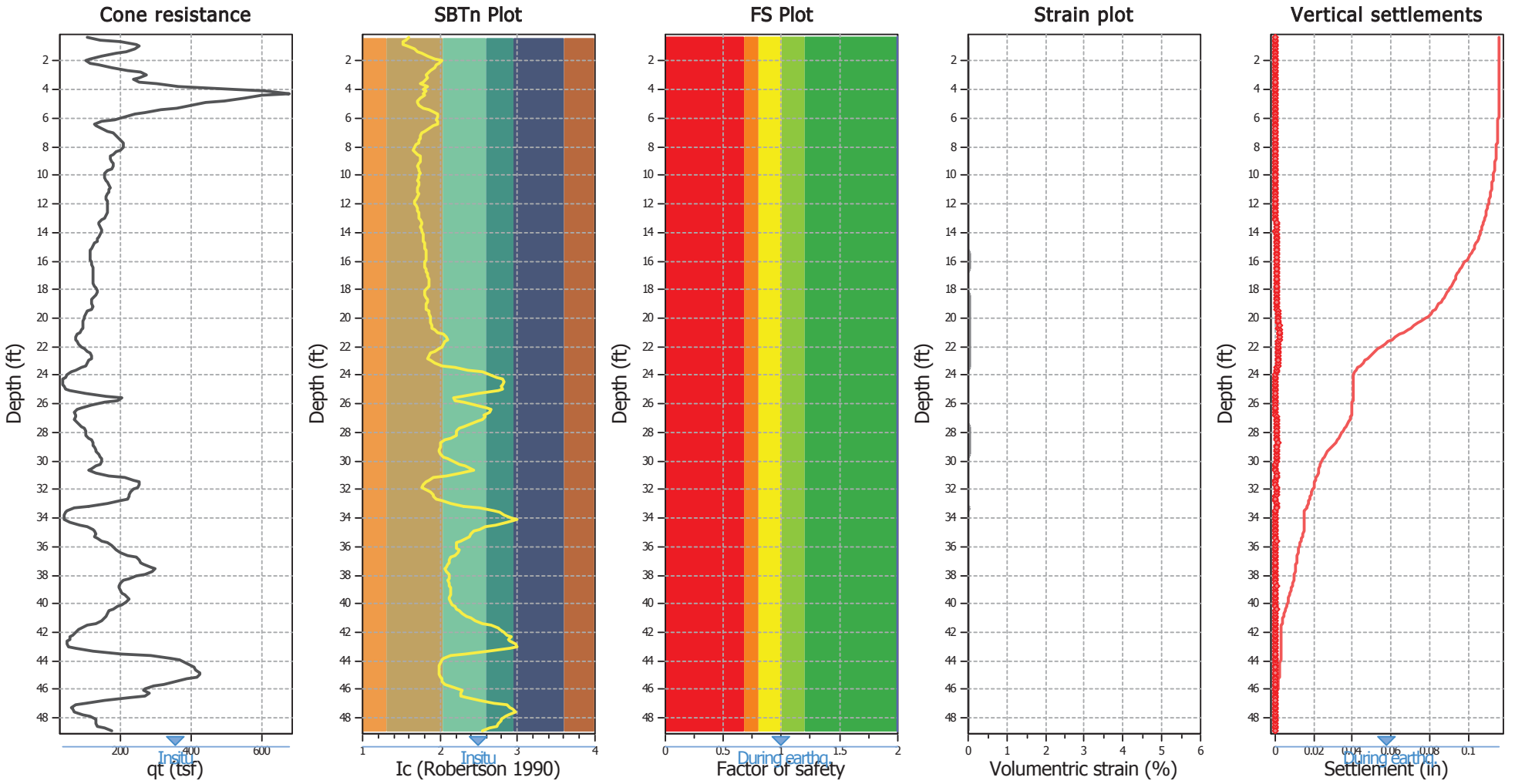
Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement of dry sands ::

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
0.33	1.61	169.85	1.00	169.85	31	727	0.17	0.001	0.00	8.63	0.00	0.000
0.49	1.57	229.87	1.00	229.87	41	935	0.17	0.001	0.00	8.63	0.00	0.000
0.66	1.52	320.05	1.00	320.05	56	1230	0.17	0.001	0.00	8.63	0.00	0.000
0.82	1.52	392.66	1.00	392.66	69	1515	0.17	0.001	0.00	8.63	0.00	0.000
0.98	1.59	408.44	1.00	408.44	73	1705	0.17	0.001	0.00	8.63	0.00	0.000
1.15	1.66	384.49	1.01	389.60	72	1772	0.17	0.001	0.00	8.63	0.00	0.000
1.31	1.72	350.14	1.05	367.38	69	1725	0.17	0.001	0.00	8.63	0.00	0.000
1.48	1.77	298.28	1.09	324.04	62	1575	0.17	0.001	0.00	8.63	0.00	0.000
1.64	1.84	237.95	1.14	270.71	53	1371	0.17	0.002	0.00	8.63	0.00	0.000
1.80	1.94	185.77	1.22	227.56	46	1208	0.17	0.002	0.00	8.63	0.00	0.000
1.97	2.02	162.46	1.32	215.13	45	1172	0.17	0.003	0.00	8.63	0.00	0.000
2.13	2.00	181.56	1.30	235.22	49	1275	0.17	0.003	0.00	8.63	0.00	0.000
2.30	1.95	224.50	1.24	279.32	57	1493	0.17	0.002	0.00	8.63	0.00	0.000
2.46	1.92	279.00	1.21	337.86	68	1784	0.17	0.002	0.00	8.63	0.00	0.000
2.62	1.87	356.64	1.17	415.79	83	2145	0.17	0.002	0.00	8.63	0.00	0.000
2.79	1.85	414.94	1.14	474.64	93	2415	0.17	0.002	0.00	8.63	0.00	0.000
2.95	1.82	439.99	1.12	494.66	96	2481	0.17	0.002	0.00	8.63	0.00	0.000
3.12	1.84	407.84	1.13	462.22	90	2334	0.17	0.002	0.00	8.63	0.00	0.000
3.28	1.82	381.74	1.12	427.12	83	2133	0.17	0.002	0.00	8.63	0.00	0.000
3.45	1.78	408.18	1.09	445.65	86	2176	0.17	0.002	0.00	8.63	0.00	0.000
3.61	1.75	484.75	1.07	518.17	98	2478	0.17	0.002	0.00	8.63	0.00	0.000
3.77	1.83	582.52	1.13	658.80	129	3321	0.17	0.002	0.00	8.63	0.00	0.000
3.94	1.79	840.82	1.10	925.19	178	4551	0.17	0.001	0.00	8.63	0.00	0.000
4.10	1.82	977.73	1.12	1097.20	214	5495	0.17	0.001	0.00	8.63	0.00	0.000
4.27	1.78	1089.54	1.09	1193.02	229	5842	0.17	0.001	0.00	8.63	0.00	0.000
4.43	1.79	967.79	1.10	1067.16	206	5260	0.17	0.001	0.00	8.63	0.00	0.000
4.59	1.75	889.03	1.07	951.32	181	4554	0.17	0.002	0.00	8.63	0.00	0.000
4.76	1.71	794.12	1.04	828.45	155	3868	0.17	0.002	0.00	8.63	0.00	0.000
4.92	1.71	711.46	1.04	741.55	139	3459	0.17	0.002	0.00	8.63	0.00	0.000
5.09	1.73	644.58	1.06	683.23	129	3240	0.17	0.002	0.00	8.63	0.00	0.000
5.25	1.79	575.36	1.10	631.06	121	3095	0.17	0.003	0.00	8.63	0.00	0.000
5.41	1.86	502.27	1.15	578.06	114	2955	0.17	0.003	0.00	8.63	0.00	0.000
5.58	1.93	433.52	1.21	526.49	107	2784	0.17	0.003	0.00	8.63	0.00	0.000
5.74	1.96	384.54	1.25	482.06	99	2585	0.17	0.004	0.00	8.63	0.00	0.000
5.91	1.97	340.82	1.26	429.48	88	2307	0.17	0.004	0.00	8.63	0.00	0.000
6.07	1.95	292.00	1.24	363.50	74	1944	0.17	0.005	0.00	8.63	0.00	0.000
6.23	1.97	233.45	1.26	294.92	61	1586	0.17	0.007	0.00	8.63	0.00	0.000
6.40	1.96	201.66	1.25	252.81	52	1355	0.17	0.008	0.00	8.63	0.00	0.000
6.56	1.92	205.93	1.21	248.81	50	1312	0.17	0.009	0.00	8.63	0.00	0.000
6.73	1.85	225.93	1.15	259.20	51	1364	0.17	0.008	0.00	8.63	0.00	0.000
6.89	1.80	248.54	1.10	274.48	53	1442	0.17	0.008	0.00	8.63	0.00	0.000
7.05	1.76	262.95	1.08	284.12	54	1496	0.17	0.008	0.00	8.63	0.00	0.000
7.22	1.75	271.45	1.07	290.86	55	1545	0.17	0.008	0.00	8.63	0.00	0.000
7.38	1.74	277.91	1.07	296.41	56	1589	0.17	0.008	0.00	8.63	0.00	0.000
7.55	1.73	283.16	1.06	300.34	57	1625	0.17	0.008	0.00	8.63	0.00	0.000
7.71	1.72	285.90	1.05	301.16	57	1642	0.17	0.008	0.00	8.63	0.00	0.000
7.87	1.69	283.61	1.03	293.16	55	1599	0.17	0.008	0.00	8.63	0.00	0.000
8.04	1.67	275.90	1.01	279.89	52	1528	0.17	0.009	0.00	8.63	0.00	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
8.20	1.65	265.29	1.00	265.65	49	1456	0.17	0.010	0.00	8.63	0.00	0.000
8.37	1.68	246.02	1.02	251.54	47	1407	0.17	0.010	0.00	8.63	0.00	0.000
8.53	1.71	233.10	1.04	243.47	46	1391	0.17	0.011	0.00	8.63	0.00	0.000
8.69	1.74	222.03	1.06	236.22	45	1378	0.17	0.011	0.00	8.63	0.00	0.000
8.86	1.74	223.70	1.07	238.34	45	1406	0.17	0.011	0.00	8.63	0.00	0.000
9.02	1.74	223.52	1.06	237.73	45	1414	0.17	0.011	0.00	8.63	0.00	0.000
9.19	1.73	225.59	1.06	238.47	45	1427	0.17	0.011	0.00	8.63	0.00	0.000
9.35	1.72	223.32	1.05	234.16	44	1406	0.17	0.012	0.00	8.63	0.00	0.000
9.51	1.72	215.48	1.05	226.45	43	1374	0.17	0.012	0.00	8.63	0.00	0.000
9.68	1.73	202.70	1.06	214.03	40	1314	0.17	0.013	0.01	8.63	0.00	0.000
9.84	1.74	191.44	1.06	203.34	38	1264	0.17	0.014	0.01	8.63	0.00	0.000
10.01	1.73	187.28	1.06	197.85	37	1236	0.17	0.015	0.01	8.63	0.01	0.000
10.17	1.72	187.15	1.05	196.58	37	1233	0.17	0.015	0.01	8.63	0.01	0.000
10.34	1.72	188.82	1.05	198.11	37	1252	0.17	0.015	0.01	8.63	0.01	0.000
10.50	1.72	191.13	1.05	200.89	38	1282	0.17	0.015	0.01	8.63	0.01	0.000
10.66	1.72	194.44	1.05	204.25	38	1313	0.17	0.014	0.01	8.63	0.01	0.000
10.83	1.71	197.03	1.05	206.30	39	1333	0.17	0.014	0.01	8.63	0.01	0.000
10.99	1.71	194.64	1.05	203.70	38	1326	0.17	0.015	0.01	8.63	0.01	0.000
11.16	1.72	189.11	1.05	198.34	37	1303	0.17	0.015	0.01	8.63	0.01	0.000
11.32	1.72	183.26	1.05	192.79	36	1279	0.17	0.016	0.01	8.63	0.01	0.000
11.48	1.70	179.80	1.04	187.06	35	1239	0.17	0.017	0.01	8.63	0.01	0.000
11.65	1.68	179.01	1.03	183.67	34	1213	0.17	0.018	0.01	8.63	0.01	0.000
11.81	1.66	179.91	1.01	182.07	34	1199	0.17	0.018	0.01	8.63	0.01	0.000
11.98	1.67	179.58	1.02	182.56	34	1215	0.17	0.018	0.01	8.63	0.01	0.000
12.14	1.69	178.54	1.03	183.51	34	1239	0.17	0.018	0.01	8.63	0.01	0.000
12.30	1.70	177.59	1.04	184.40	34	1263	0.17	0.018	0.01	8.63	0.01	0.000
12.47	1.71	177.43	1.05	185.67	35	1288	0.17	0.017	0.01	8.63	0.01	0.000
12.63	1.72	175.46	1.05	184.21	35	1290	0.17	0.018	0.01	8.63	0.01	0.000
12.80	1.73	170.37	1.06	179.98	34	1275	0.17	0.018	0.01	8.63	0.01	0.000
12.96	1.73	162.77	1.06	172.61	33	1235	0.17	0.019	0.01	8.63	0.01	0.000
13.12	1.75	154.29	1.07	165.42	31	1202	0.17	0.020	0.01	8.63	0.01	0.000
13.29	1.76	146.77	1.08	158.01	30	1160	0.17	0.022	0.01	8.63	0.01	0.000
13.45	1.76	144.63	1.08	156.44	30	1161	0.17	0.022	0.01	8.63	0.01	0.000
13.62	1.75	148.36	1.07	159.44	30	1184	0.17	0.022	0.01	8.63	0.01	0.000
13.78	1.76	150.63	1.08	162.25	31	1215	0.17	0.021	0.01	8.63	0.01	0.000
13.94	1.76	150.61	1.08	162.81	31	1230	0.17	0.021	0.01	8.63	0.01	0.000
14.11	1.78	145.32	1.09	158.42	30	1214	0.17	0.022	0.01	8.63	0.01	0.000
14.27	1.78	141.41	1.09	154.19	30	1189	0.17	0.023	0.01	8.63	0.01	0.000
14.44	1.78	136.83	1.09	149.51	29	1162	0.17	0.024	0.02	8.63	0.01	0.000
14.60	1.78	132.63	1.09	145.06	28	1135	0.17	0.025	0.02	8.63	0.01	0.000
14.76	1.79	126.36	1.10	139.24	27	1103	0.17	0.026	0.02	8.63	0.01	0.001
14.93	1.81	120.14	1.11	133.43	26	1071	0.17	0.028	0.02	8.63	0.02	0.001
15.09	1.81	115.45	1.11	128.61	25	1040	0.17	0.029	0.02	8.63	0.02	0.001
15.26	1.81	112.84	1.12	125.93	24	1026	0.17	0.030	0.02	8.63	0.02	0.001
15.42	1.82	110.07	1.12	123.16	24	1012	0.16	0.031	0.03	8.63	0.02	0.001
15.58	1.83	107.99	1.13	121.68	24	1011	0.16	0.032	0.03	8.63	0.02	0.001
15.75	1.82	108.35	1.12	121.78	24	1016	0.16	0.032	0.03	8.63	0.02	0.001
15.91	1.81	110.33	1.11	122.97	24	1023	0.16	0.032	0.03	8.63	0.02	0.001

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
16.08	1.80	112.21	1.11	124.09	24	1031	0.16	0.032	0.03	8.63	0.02	0.001
16.24	1.80	113.33	1.11	125.51	24	1050	0.16	0.031	0.02	8.63	0.02	0.001
16.40	1.81	113.24	1.11	126.12	24	1066	0.16	0.031	0.02	8.63	0.02	0.001
16.57	1.82	112.95	1.12	126.58	25	1082	0.16	0.031	0.02	8.63	0.02	0.001
16.73	1.83	112.50	1.13	126.94	25	1097	0.17	0.030	0.02	8.63	0.02	0.001
16.90	1.84	112.27	1.13	127.42	25	1113	0.17	0.030	0.02	8.63	0.02	0.001
17.06	1.85	111.76	1.14	127.72	25	1128	0.17	0.030	0.02	8.63	0.02	0.001
17.23	1.85	110.80	1.15	126.96	25	1129	0.17	0.030	0.02	8.63	0.02	0.001
17.39	1.85	109.94	1.15	126.27	25	1131	0.17	0.030	0.02	8.63	0.02	0.001
17.55	1.86	110.21	1.15	127.07	25	1148	0.17	0.030	0.02	8.63	0.02	0.001
17.72	1.85	113.20	1.14	129.61	26	1170	0.17	0.029	0.02	8.63	0.02	0.001
17.88	1.83	117.86	1.13	133.25	26	1196	0.17	0.029	0.02	8.63	0.02	0.001
18.05	1.81	120.69	1.11	134.29	26	1194	0.17	0.029	0.02	8.63	0.02	0.001
18.21	1.81	119.43	1.11	132.63	26	1183	0.17	0.030	0.02	8.63	0.02	0.001
18.37	1.80	114.63	1.11	127.18	25	1139	0.17	0.032	0.02	8.63	0.02	0.001
18.54	1.82	108.26	1.12	121.35	24	1103	0.17	0.034	0.03	8.63	0.02	0.001
18.70	1.83	102.82	1.13	116.14	23	1068	0.17	0.036	0.03	8.63	0.02	0.001
18.87	1.84	100.68	1.14	114.61	22	1066	0.17	0.037	0.03	8.63	0.02	0.001
19.03	1.82	103.50	1.12	116.39	23	1076	0.17	0.036	0.03	8.63	0.02	0.001
19.19	1.81	104.87	1.12	117.21	23	1082	0.17	0.036	0.03	8.63	0.02	0.001
19.36	1.82	100.36	1.12	112.59	22	1048	0.17	0.039	0.03	8.63	0.03	0.001
19.52	1.85	91.31	1.15	104.92	21	1002	0.17	0.042	0.04	8.63	0.03	0.001
19.69	1.87	84.52	1.16	97.87	19	946	0.17	0.047	0.05	8.63	0.04	0.002
19.85	1.87	81.64	1.16	95.05	19	926	0.17	0.049	0.05	8.63	0.04	0.002
20.01	1.87	80.37	1.16	93.26	18	910	0.17	0.052	0.06	8.63	0.04	0.002
20.18	1.88	78.84	1.17	92.19	18	910	0.17	0.052	0.06	8.63	0.05	0.002
20.34	1.88	77.93	1.17	91.53	18	910	0.17	0.053	0.06	8.63	0.05	0.002
20.51	1.89	76.97	1.18	90.84	18	911	0.17	0.053	0.06	8.63	0.05	0.002
20.67	1.90	75.75	1.19	89.99	18	910	0.17	0.054	0.06	8.63	0.05	0.002
20.83	1.92	72.69	1.21	88.01	18	905	0.17	0.055	0.06	8.63	0.05	0.002
21.00	1.97	67.15	1.26	84.64	17	894	0.17	0.057	0.07	8.63	0.05	0.002
21.16	2.04	60.73	1.35	82.26	17	894	0.17	0.057	0.07	8.63	0.05	0.002
21.33	2.09	57.01	1.43	81.67	18	901	0.17	0.057	0.07	8.63	0.05	0.002
21.49	2.10	57.30	1.45	82.87	18	919	0.17	0.055	0.06	8.63	0.05	0.002
21.65	2.07	59.92	1.40	83.84	18	930	0.17	0.055	0.06	8.63	0.05	0.002
21.82	2.04	63.41	1.36	86.40	18	958	0.17	0.052	0.06	8.63	0.05	0.002
21.98	2.02	68.28	1.33	90.72	19	1004	0.17	0.048	0.05	8.63	0.04	0.002
22.15	1.98	75.45	1.28	96.27	20	1055	0.17	0.045	0.05	8.63	0.04	0.001
22.31	1.94	83.60	1.23	102.56	21	1106	0.17	0.042	0.04	8.63	0.03	0.001
22.47	1.88	90.18	1.17	105.81	21	1111	0.17	0.042	0.04	8.63	0.03	0.001
22.64	1.86	92.54	1.15	106.52	21	1105	0.17	0.043	0.04	8.63	0.03	0.001
22.80	1.85	91.00	1.14	103.95	20	1075	0.17	0.045	0.04	8.63	0.03	0.001
22.97	1.88	86.04	1.17	100.61	20	1066	0.17	0.046	0.05	8.63	0.04	0.001
23.13	1.94	81.25	1.23	99.88	20	1102	0.17	0.044	0.04	8.63	0.03	0.001
23.30	2.03	75.66	1.34	101.76	21	1171	0.17	0.040	0.04	8.63	0.03	0.001
23.46	2.19	65.61	1.63	107.22	24	1265	0.17	0.036	0.03	8.63	0.02	0.001
23.62	2.37	52.26	2.18	114.04	28	1302	0.17	0.034	0.02	8.63	0.02	0.001
23.79	2.54	40.78	2.97	121.09	32	1299	0.17	0.035	0.02	8.63	0.02	0.001

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
23.95	2.65	33.18	3.63	120.57	0	0	0.18	0.000	0.00	0.00	0.00	0.000
24.12	2.73	27.95	4.19	117.06	0	0	0.18	0.000	0.00	0.00	0.00	0.000
24.28	2.80	23.59	4.79	113.05	0	0	0.18	0.000	0.00	0.00	0.00	0.000
24.44	2.82	23.08	4.94	114.02	0	0	0.18	0.000	0.00	0.00	0.00	0.000
24.61	2.80	24.24	4.78	115.77	0	0	0.18	0.000	0.00	0.00	0.00	0.000
24.77	2.79	25.41	4.71	119.75	0	0	0.18	0.000	0.00	0.00	0.00	0.000
24.94	2.82	26.62	4.92	130.96	0	0	0.18	0.000	0.00	0.00	0.00	0.000
25.10	2.75	35.31	4.38	154.65	0	0	0.18	0.000	0.00	0.00	0.00	0.000
25.26	2.49	67.08	2.73	183.44	47	2107	0.18	0.019	0.01	8.63	0.01	0.000
25.43	2.29	108.04	1.93	208.06	49	2565	0.18	0.015	0.01	8.63	0.00	0.000
25.59	2.17	140.80	1.60	225.34	50	2827	0.18	0.014	0.00	8.63	0.00	0.000
25.76	2.19	131.91	1.64	216.81	49	2733	0.18	0.014	0.00	8.63	0.00	0.000
25.92	2.30	104.91	1.93	202.93	48	2539	0.18	0.016	0.01	8.63	0.00	0.000
26.08	2.45	75.57	2.55	192.53	49	2309	0.18	0.018	0.01	8.63	0.00	0.000
26.25	2.59	56.03	3.29	184.38	50	2105	0.18	0.020	0.01	8.63	0.01	0.000
26.41	2.65	46.76	3.65	170.47	0	0	0.18	0.000	0.00	0.00	0.00	0.000
26.58	2.65	43.06	3.62	156.03	0	0	0.18	0.000	0.00	0.00	0.00	0.000
26.74	2.57	46.50	3.12	145.26	39	1705	0.18	0.027	0.01	8.63	0.01	0.000
26.90	2.58	43.80	3.20	140.13	38	1644	0.18	0.029	0.01	8.63	0.01	0.000
27.07	2.56	42.97	3.06	131.66	35	1568	0.18	0.031	0.02	8.63	0.01	0.001
27.23	2.49	45.35	2.72	123.29	32	1513	0.18	0.033	0.02	8.63	0.01	0.001
27.40	2.39	51.06	2.27	115.67	28	1476	0.18	0.034	0.02	8.63	0.02	0.001
27.56	2.31	56.90	1.98	112.68	27	1473	0.18	0.034	0.02	8.63	0.02	0.001
27.72	2.26	61.58	1.82	112.08	26	1484	0.18	0.034	0.02	8.63	0.02	0.001
27.89	2.21	66.05	1.69	111.85	25	1493	0.18	0.034	0.03	8.63	0.02	0.001
28.05	2.21	66.15	1.69	111.69	25	1497	0.18	0.034	0.03	8.63	0.02	0.001
28.22	2.21	66.13	1.69	111.49	25	1501	0.18	0.034	0.03	8.63	0.02	0.001
28.38	2.14	71.18	1.54	109.51	24	1475	0.18	0.035	0.03	8.63	0.02	0.001
28.54	2.07	76.85	1.40	107.77	23	1435	0.18	0.037	0.03	8.63	0.02	0.001
28.71	2.01	80.22	1.31	104.98	22	1370	0.18	0.040	0.04	8.63	0.03	0.001
28.87	2.00	80.70	1.30	105.14	22	1375	0.18	0.040	0.04	8.63	0.03	0.001
29.04	2.00	81.73	1.30	106.29	22	1394	0.18	0.039	0.03	8.63	0.03	0.001
29.20	2.00	84.01	1.30	108.80	23	1429	0.18	0.038	0.03	8.63	0.03	0.001
29.36	1.99	86.11	1.29	111.19	23	1463	0.18	0.037	0.03	8.63	0.02	0.001
29.53	2.00	88.86	1.30	115.81	24	1536	0.18	0.035	0.03	8.63	0.02	0.001
29.69	2.04	91.39	1.36	123.93	26	1676	0.18	0.031	0.02	8.63	0.02	0.001
29.86	2.10	91.60	1.45	132.63	29	1833	0.18	0.027	0.02	8.63	0.01	0.001
30.02	2.17	89.62	1.59	142.45	32	2000	0.18	0.025	0.01	8.63	0.01	0.000
30.19	2.24	86.34	1.77	152.85	35	2158	0.18	0.022	0.01	8.63	0.01	0.000
30.35	2.33	78.15	2.04	159.23	38	2233	0.18	0.022	0.01	8.63	0.01	0.000
30.51	2.40	69.24	2.33	161.36	40	2231	0.18	0.022	0.01	8.63	0.01	0.000
30.68	2.44	62.54	2.48	155.05	39	2132	0.18	0.023	0.01	8.63	0.01	0.000
30.84	2.27	77.11	1.87	144.19	34	2063	0.18	0.024	0.01	8.63	0.01	0.000
31.01	2.07	103.19	1.41	145.28	31	2048	0.18	0.025	0.01	8.63	0.01	0.000
31.17	1.91	135.51	1.20	162.34	33	2111	0.18	0.024	0.01	8.63	0.01	0.000
31.33	1.86	153.76	1.15	176.80	35	2216	0.18	0.023	0.01	8.63	0.01	0.000
31.50	1.82	164.65	1.12	184.13	36	2241	0.18	0.022	0.01	8.63	0.01	0.000
31.66	1.78	167.59	1.09	182.91	35	2163	0.18	0.023	0.01	8.63	0.01	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
31.83	1.77	162.75	1.09	176.64	34	2080	0.18	0.025	0.01	8.63	0.01	0.000
31.99	1.81	152.86	1.11	170.13	33	2077	0.18	0.025	0.01	8.63	0.01	0.000
32.15	1.87	144.80	1.16	168.58	33	2175	0.18	0.024	0.01	8.63	0.01	0.000
32.32	1.91	142.47	1.19	170.18	34	2258	0.18	0.023	0.01	8.63	0.01	0.000
32.48	1.92	140.63	1.21	170.11	34	2288	0.18	0.022	0.01	8.63	0.01	0.000
32.65	1.95	136.36	1.25	169.81	35	2343	0.18	0.022	0.01	8.63	0.01	0.000
32.81	2.03	121.32	1.35	163.39	34	2358	0.18	0.022	0.01	8.63	0.01	0.000
32.97	2.15	94.24	1.54	145.52	32	2181	0.18	0.024	0.01	8.63	0.01	0.000
33.14	2.31	60.61	1.97	119.56	28	1802	0.18	0.031	0.02	8.63	0.02	0.001
33.30	2.51	35.15	2.82	99.17	26	1431	0.18	0.044	0.03	8.63	0.03	0.001
33.47	2.69	23.71	3.91	92.64	0	0	0.18	0.000	0.00	0.00	0.00	0.000
33.63	2.77	20.51	4.53	92.88	0	0	0.18	0.000	0.00	0.00	0.00	0.000
33.79	2.82	18.98	5.00	94.81	0	0	0.18	0.000	0.00	0.00	0.00	0.000
33.96	2.92	17.13	5.90	101.08	0	0	0.18	0.000	0.00	0.00	0.00	0.000
34.12	3.00	17.79	6.72	119.50	0	0	0.18	0.000	0.00	0.00	0.00	0.000
34.29	2.87	26.23	5.40	141.49	0	0	0.18	0.000	0.00	0.00	0.00	0.000
34.45	2.71	39.82	4.06	161.53	0	0	0.18	0.000	0.00	0.00	0.00	0.000
34.61	2.59	52.38	3.27	171.42	46	2493	0.18	0.021	0.01	8.63	0.01	0.000
34.78	2.51	60.85	2.80	170.13	44	2548	0.18	0.021	0.01	8.63	0.01	0.000
34.94	2.44	65.40	2.47	161.69	40	2476	0.18	0.022	0.01	8.63	0.01	0.000
35.11	2.39	66.49	2.28	151.54	37	2354	0.18	0.023	0.01	8.63	0.01	0.000
35.27	2.37	66.42	2.20	146.27	36	2289	0.18	0.024	0.01	8.63	0.01	0.000
35.43	2.35	69.22	2.10	145.55	35	2297	0.18	0.024	0.01	8.63	0.01	0.000
35.60	2.27	78.14	1.84	144.07	33	2300	0.18	0.024	0.01	8.63	0.01	0.000
35.76	2.22	88.05	1.70	150.11	34	2403	0.18	0.023	0.01	8.63	0.01	0.000
35.93	2.21	93.61	1.69	157.85	36	2535	0.18	0.021	0.01	8.63	0.01	0.000
36.09	2.22	98.56	1.72	169.26	38	2730	0.18	0.020	0.01	8.63	0.01	0.000
36.26	2.24	98.93	1.78	176.08	40	2852	0.18	0.019	0.01	8.63	0.01	0.000
36.42	2.23	106.11	1.75	185.34	42	3011	0.18	0.018	0.01	8.63	0.01	0.000
36.58	2.19	118.44	1.65	195.92	44	3186	0.18	0.017	0.01	8.63	0.01	0.000
36.75	2.14	132.58	1.54	204.03	45	3302	0.18	0.016	0.01	8.63	0.00	0.000
36.91	2.11	138.74	1.48	205.09	45	3303	0.18	0.016	0.01	8.63	0.00	0.000
37.08	2.11	138.72	1.47	204.41	44	3301	0.18	0.016	0.01	8.63	0.00	0.000
37.24	2.10	145.04	1.45	209.74	45	3381	0.18	0.016	0.01	8.63	0.00	0.000
37.40	2.07	156.43	1.41	220.51	47	3538	0.18	0.015	0.01	8.63	0.00	0.000
37.57	2.07	162.34	1.40	226.77	48	3639	0.18	0.015	0.01	8.63	0.00	0.000
37.73	2.09	156.15	1.43	223.85	48	3634	0.18	0.015	0.01	8.63	0.00	0.000
37.90	2.12	143.11	1.48	212.43	46	3492	0.18	0.015	0.01	8.63	0.00	0.000
38.06	2.13	130.33	1.50	196.12	43	3243	0.18	0.017	0.01	8.63	0.01	0.000
38.22	2.12	119.35	1.49	178.02	39	2947	0.18	0.019	0.01	8.63	0.01	0.000
38.39	2.10	110.56	1.46	161.83	35	2676	0.18	0.021	0.01	8.63	0.01	0.000
38.55	2.11	104.74	1.48	155.05	34	2578	0.18	0.022	0.01	8.63	0.01	0.000
38.72	2.12	103.24	1.49	153.77	34	2569	0.18	0.022	0.01	8.63	0.01	0.000
38.88	2.13	102.51	1.52	155.63	34	2619	0.18	0.022	0.01	8.63	0.01	0.000
39.04	2.13	103.51	1.51	156.32	34	2635	0.18	0.022	0.01	8.63	0.01	0.000
39.21	2.14	104.39	1.53	159.70	35	2708	0.18	0.021	0.01	8.63	0.01	0.000
39.37	2.13	109.26	1.51	165.50	36	2809	0.18	0.020	0.01	8.63	0.01	0.000
39.54	2.12	113.55	1.50	170.54	37	2898	0.18	0.020	0.01	8.63	0.01	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
39.70	2.12	115.11	1.49	171.44	37	2916	0.18	0.020	0.01	8.63	0.01	0.000
39.86	2.13	111.15	1.51	167.88	37	2873	0.18	0.020	0.01	8.63	0.01	0.000
40.03	2.15	103.45	1.56	161.11	36	2782	0.18	0.021	0.01	8.63	0.01	0.000
40.19	2.19	94.66	1.63	154.57	35	2695	0.18	0.022	0.01	8.63	0.01	0.000
40.36	2.22	87.05	1.71	149.12	34	2620	0.18	0.023	0.01	8.63	0.01	0.000
40.52	2.26	81.01	1.81	146.87	34	2594	0.18	0.023	0.01	8.63	0.01	0.000
40.68	2.29	76.63	1.93	147.85	35	2620	0.18	0.023	0.01	8.63	0.01	0.000
40.85	2.34	73.30	2.09	153.40	37	2719	0.18	0.022	0.01	8.63	0.01	0.000
41.01	2.39	70.11	2.29	160.64	39	2838	0.18	0.021	0.01	8.63	0.01	0.000
41.18	2.45	65.02	2.53	164.78	42	2894	0.18	0.020	0.01	8.63	0.01	0.000
41.34	2.54	54.98	2.99	164.17	43	2839	0.18	0.021	0.01	8.63	0.01	0.000
41.50	2.66	43.15	3.70	159.79	0	0	0.18	0.000	0.00	0.00	0.00	0.000
41.67	2.76	34.77	4.42	153.79	0	0	0.18	0.000	0.00	0.00	0.00	0.000
41.83	2.78	31.28	4.61	144.23	0	0	0.18	0.000	0.00	0.00	0.00	0.000
42.00	2.83	27.04	5.02	135.84	0	0	0.18	0.000	0.00	0.00	0.00	0.000
42.16	2.87	23.58	5.39	127.04	0	0	0.18	0.000	0.00	0.00	0.00	0.000
42.32	2.92	20.08	5.92	118.86	0	0	0.18	0.000	0.00	0.00	0.00	0.000
42.49	2.88	19.64	5.52	108.45	0	0	0.18	0.000	0.00	0.00	0.00	0.000
42.65	2.90	17.84	5.70	101.76	0	0	0.18	0.000	0.00	0.00	0.00	0.000
42.82	2.97	16.88	6.41	108.14	0	0	0.18	0.000	0.00	0.00	0.00	0.000
42.98	3.00	18.85	6.77	127.54	0	0	0.18	0.000	0.00	0.00	0.00	0.000
43.15	2.91	25.90	5.78	149.59	0	0	0.17	0.000	0.00	0.00	0.00	0.000
43.31	2.62	49.09	3.48	170.88	0	0	0.17	0.000	0.00	0.00	0.00	0.000
43.47	2.33	91.67	2.03	186.26	44	3470	0.17	0.017	0.01	8.63	0.01	0.000
43.64	2.14	137.57	1.52	209.64	46	3834	0.17	0.015	0.01	8.63	0.00	0.000
43.80	2.04	168.86	1.36	229.95	49	4057	0.17	0.014	0.00	8.63	0.00	0.000
43.97	2.02	182.44	1.33	242.37	51	4234	0.17	0.014	0.00	8.63	0.00	0.000
44.13	2.00	192.82	1.30	251.35	52	4353	0.17	0.013	0.00	8.63	0.00	0.000
44.29	1.99	200.63	1.28	257.52	53	4425	0.17	0.013	0.00	8.63	0.00	0.000
44.46	1.98	204.79	1.27	260.68	54	4465	0.17	0.013	0.00	8.63	0.00	0.000
44.62	1.98	207.63	1.27	264.36	55	4540	0.17	0.013	0.00	8.63	0.00	0.000
44.79	1.99	210.71	1.28	270.21	56	4676	0.17	0.012	0.00	8.63	0.00	0.000
44.95	1.99	211.40	1.29	272.76	57	4751	0.17	0.012	0.00	8.63	0.00	0.000
45.11	2.00	204.98	1.30	266.84	56	4686	0.17	0.012	0.00	8.63	0.00	0.000
45.28	2.02	189.98	1.33	251.84	53	4483	0.17	0.013	0.00	8.63	0.00	0.000
45.44	2.03	172.30	1.34	231.37	49	4159	0.17	0.014	0.00	8.63	0.00	0.000
45.61	2.07	152.61	1.40	213.87	46	3933	0.17	0.015	0.01	8.63	0.00	0.000
45.77	2.12	136.25	1.50	204.48	45	3858	0.17	0.015	0.01	8.63	0.00	0.000
45.93	2.23	120.31	1.74	209.37	48	4060	0.17	0.015	0.01	8.63	0.00	0.000
46.10	2.28	115.90	1.88	218.22	51	4262	0.17	0.014	0.00	8.63	0.00	0.000
46.26	2.27	121.74	1.86	226.46	53	4434	0.17	0.013	0.00	8.63	0.00	0.000
46.43	2.27	116.96	1.87	218.60	51	4293	0.17	0.014	0.00	8.63	0.00	0.000
46.59	2.34	95.74	2.07	198.19	47	3905	0.17	0.015	0.01	8.63	0.00	0.000
46.75	2.51	60.42	2.81	169.63	44	3289	0.17	0.019	0.01	8.63	0.01	0.000
46.92	2.70	36.33	3.97	144.37	0	0	0.17	0.000	0.00	0.00	0.00	0.000
47.08	2.87	23.28	5.36	124.89	0	0	0.17	0.000	0.00	0.00	0.00	0.000
47.25	2.91	20.02	5.78	115.73	0	0	0.17	0.000	0.00	0.00	0.00	0.000
47.41	2.95	19.75	6.17	121.76	0	0	0.17	0.000	0.00	0.00	0.00	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
47.57	2.97	21.82	6.40	139.61	0	0	0.17	0.000	0.00	0.00	0.00	0.000
47.74	2.88	30.38	5.51	167.41	0	0	0.17	0.000	0.00	0.00	0.00	0.000
47.90	2.84	37.79	5.15	194.57	0	0	0.17	0.000	0.00	0.00	0.00	0.000
48.07	2.79	44.02	4.74	208.56	0	0	0.17	0.000	0.00	0.00	0.00	0.000
48.23	2.80	43.42	4.77	207.03	0	0	0.17	0.000	0.00	0.00	0.00	0.000
48.39	2.75	44.81	4.38	196.26	0	0	0.17	0.000	0.00	0.00	0.00	0.000
48.56	2.73	41.92	4.23	177.24	0	0	0.17	0.000	0.00	0.00	0.00	0.000
48.72	2.63	48.42	3.52	170.49	0	0	0.17	0.000	0.00	0.00	0.00	0.000
48.89	2.55	55.03	3.01	165.66	44	3932	0.17	0.016	0.01	8.63	0.00	0.000

Total estimated settlement: 0.12

Abbreviations

Q_{tn}: Equivalent clean sand normalized cone resistance
K_c: Fines correction factor
$Q_{tn,cs}$: Post-liquefaction volumentric strain
G_{max}: Small strain shear modulus
CSR: Soil cyclic stress ratio
γ: Cyclic shear strain
$e_{vol(15)}$: Volumetric strain after 15 cycles
N_c: Equivalent number of cycles
e_v: Volumetric strain
Settle.: Calculated settlement

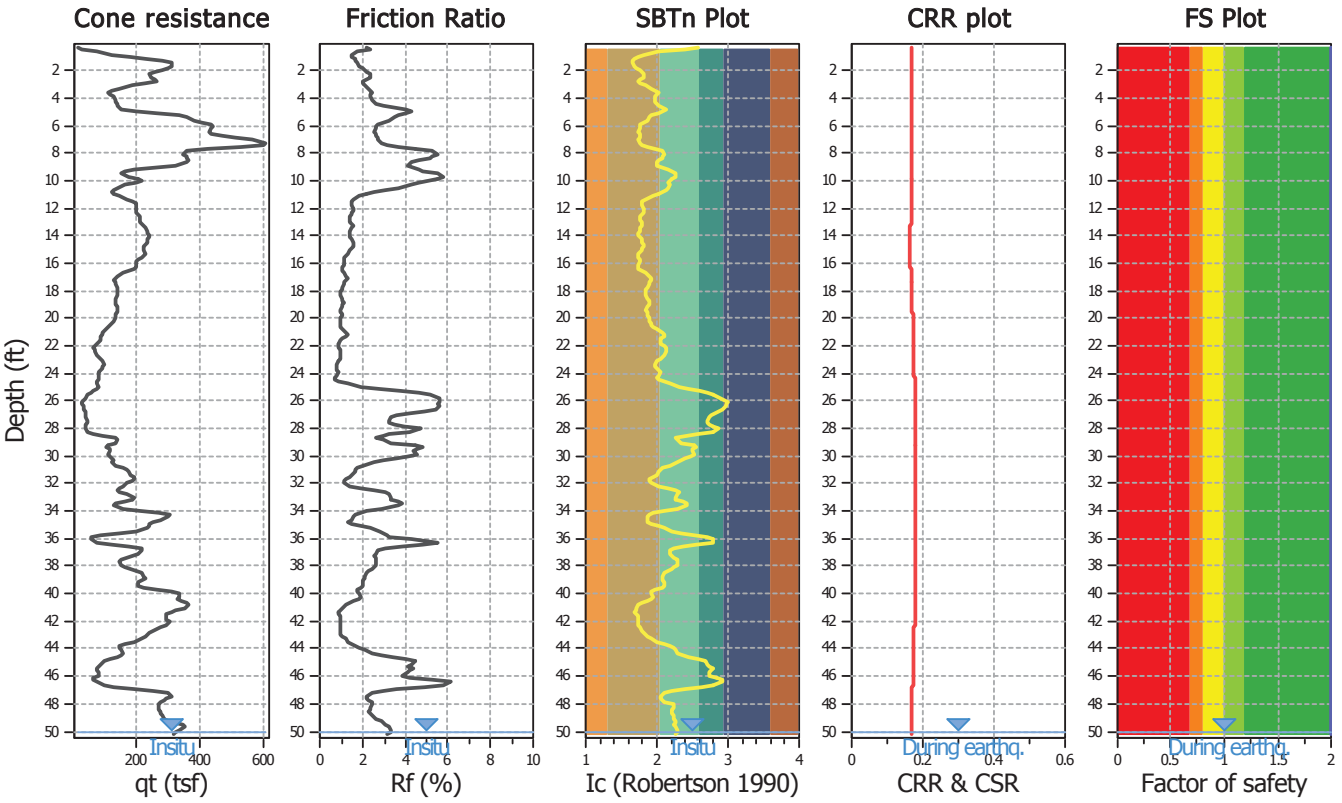
LIQUEFACTION ANALYSIS REPORT

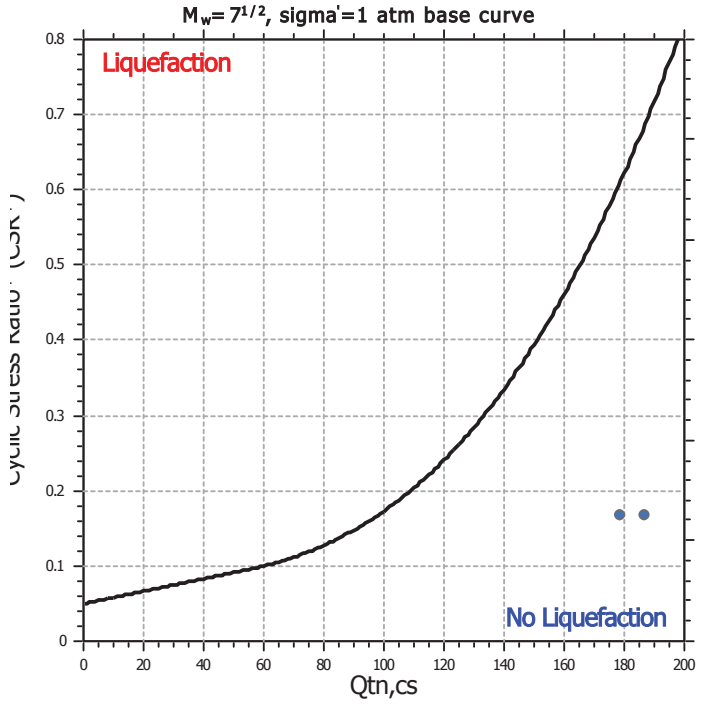
Project title : Kaiser Fresno MOB **Location : Fresno, CA**

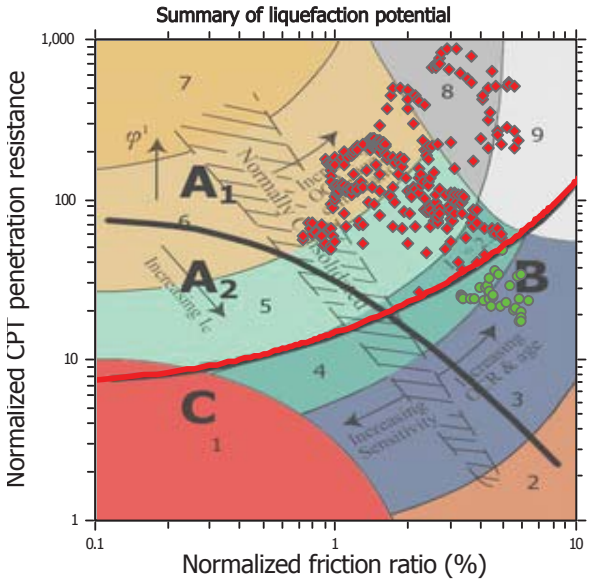
CPT file : CPT-06

Input parameters and analysis data

Analysis method:	**NCEER (1998)**	**G.W.T. (in-situ):**	**50.00 ft**	**Use fill:**	**No**	**Clay like behavior applied:**	**Sands only**
Fines correction method:	**NCEER (1998)**	**G.W.T. (earthq.):**	**50.00 ft**	**Fill height:**	**N/A**	**Limit depth applie**	**No**
Points to test:	**Based on Ic value**	**Average results interva**	**3**	**Fill weight:**	**N/A**	**Limit depth:**	**N/A**
Earthquake magnitude M_w:	**6.70**	**Ic cut-off value:**	**2.60**	**Trans. detect. applied:**	**No**	**MSF method:**	**Method based**
Peak ground acceleration:	**0.35**	**Unit weight calculation**	**Based on SBT**	**K_σ applied:**	**Yes**		

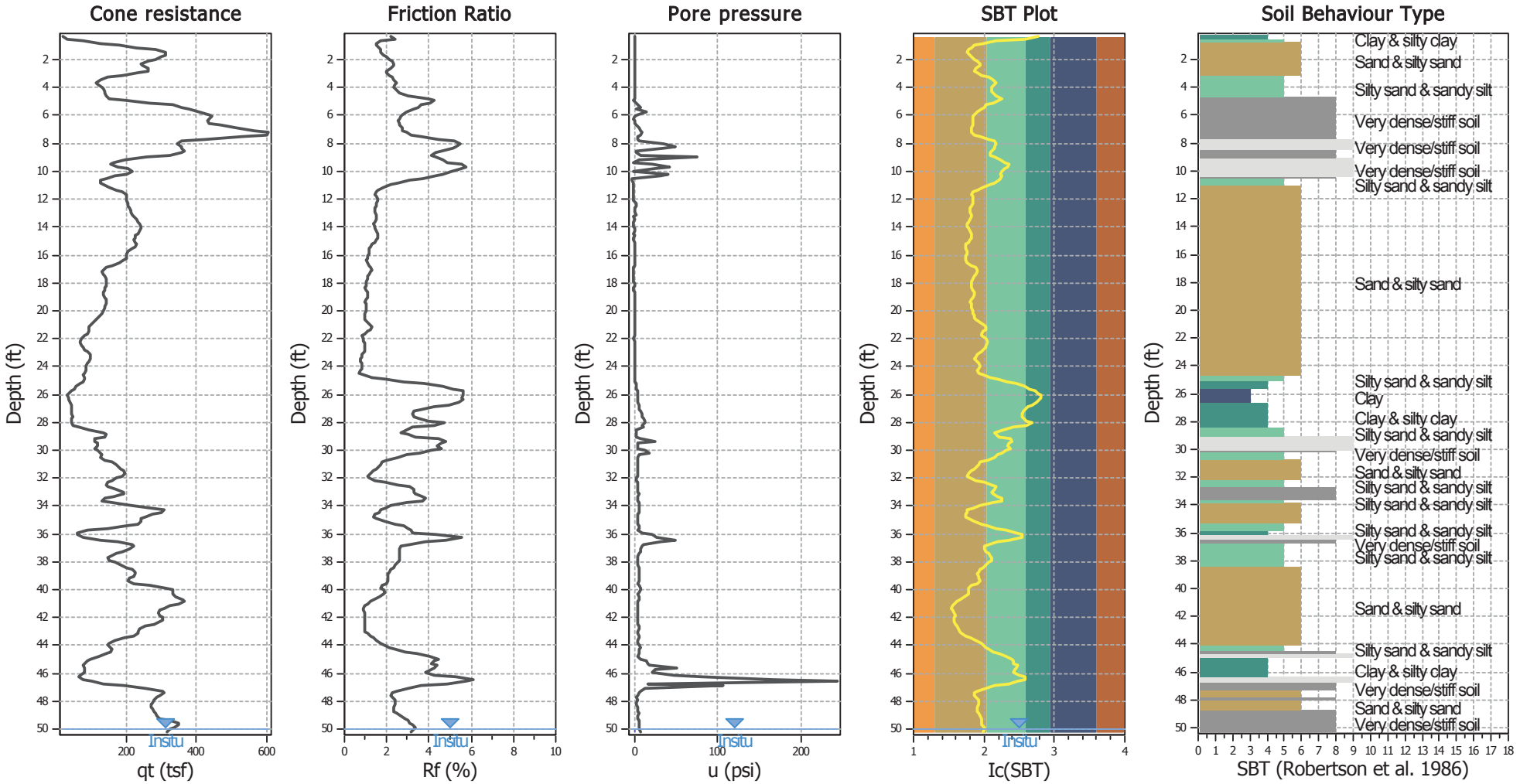






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



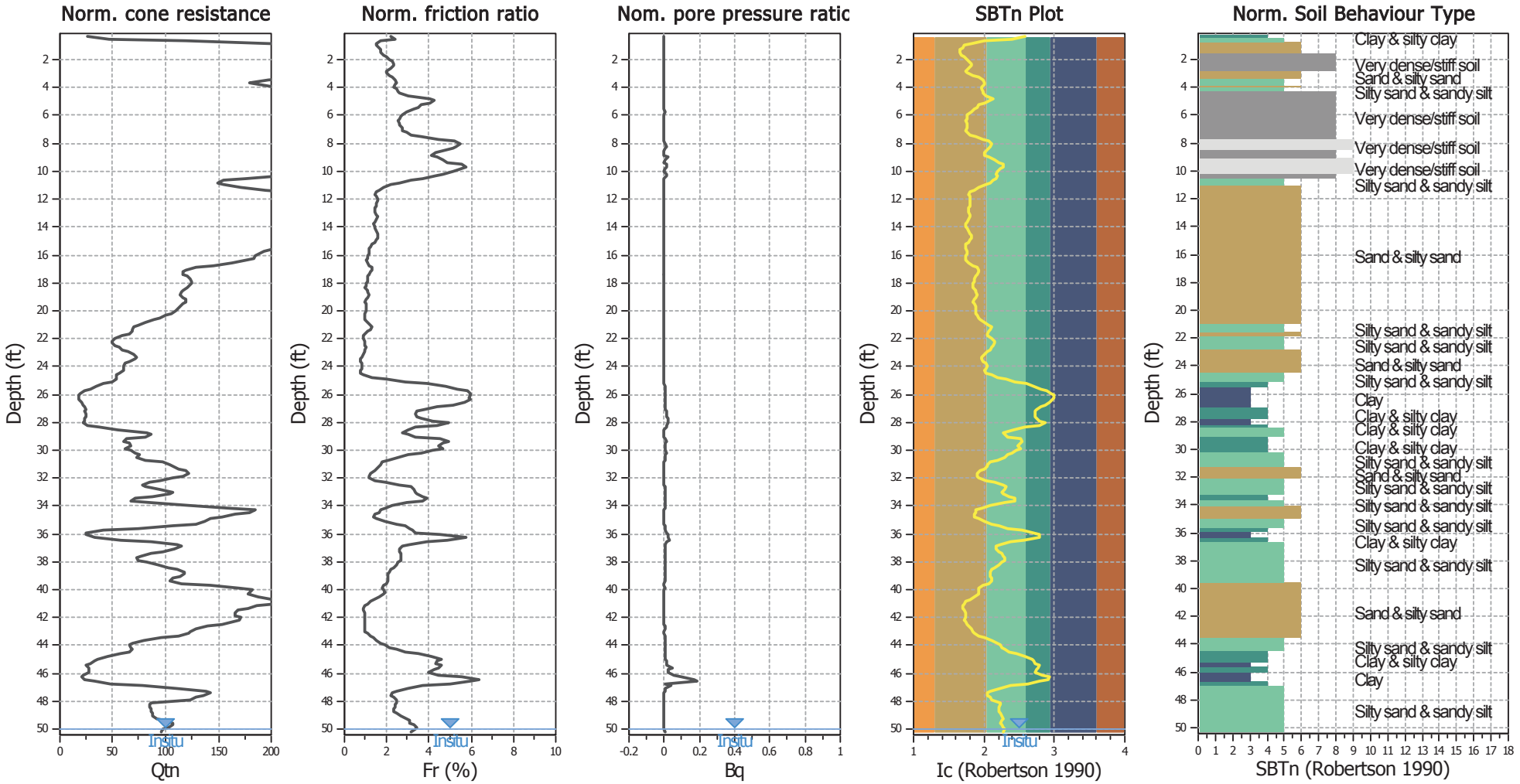
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



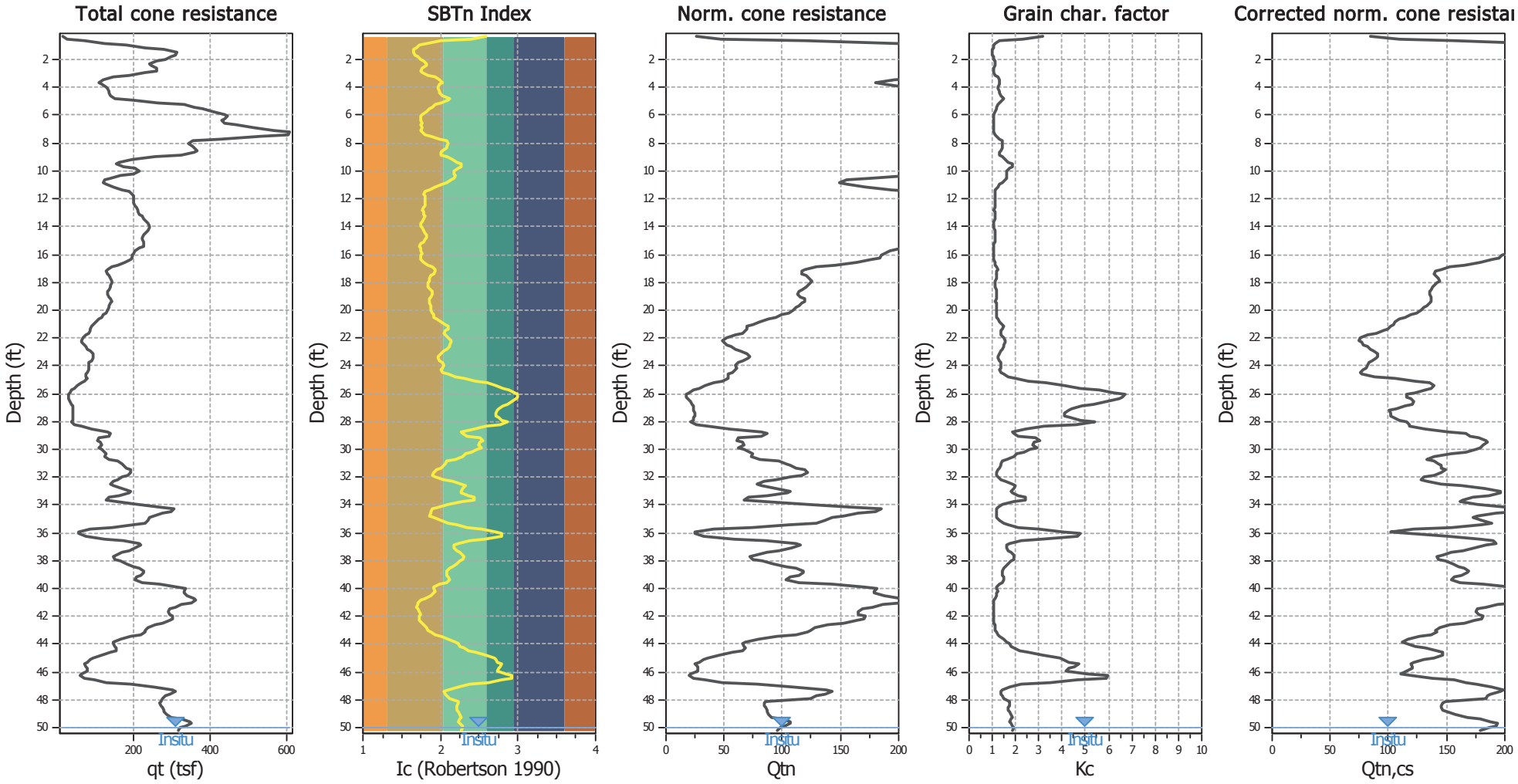
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

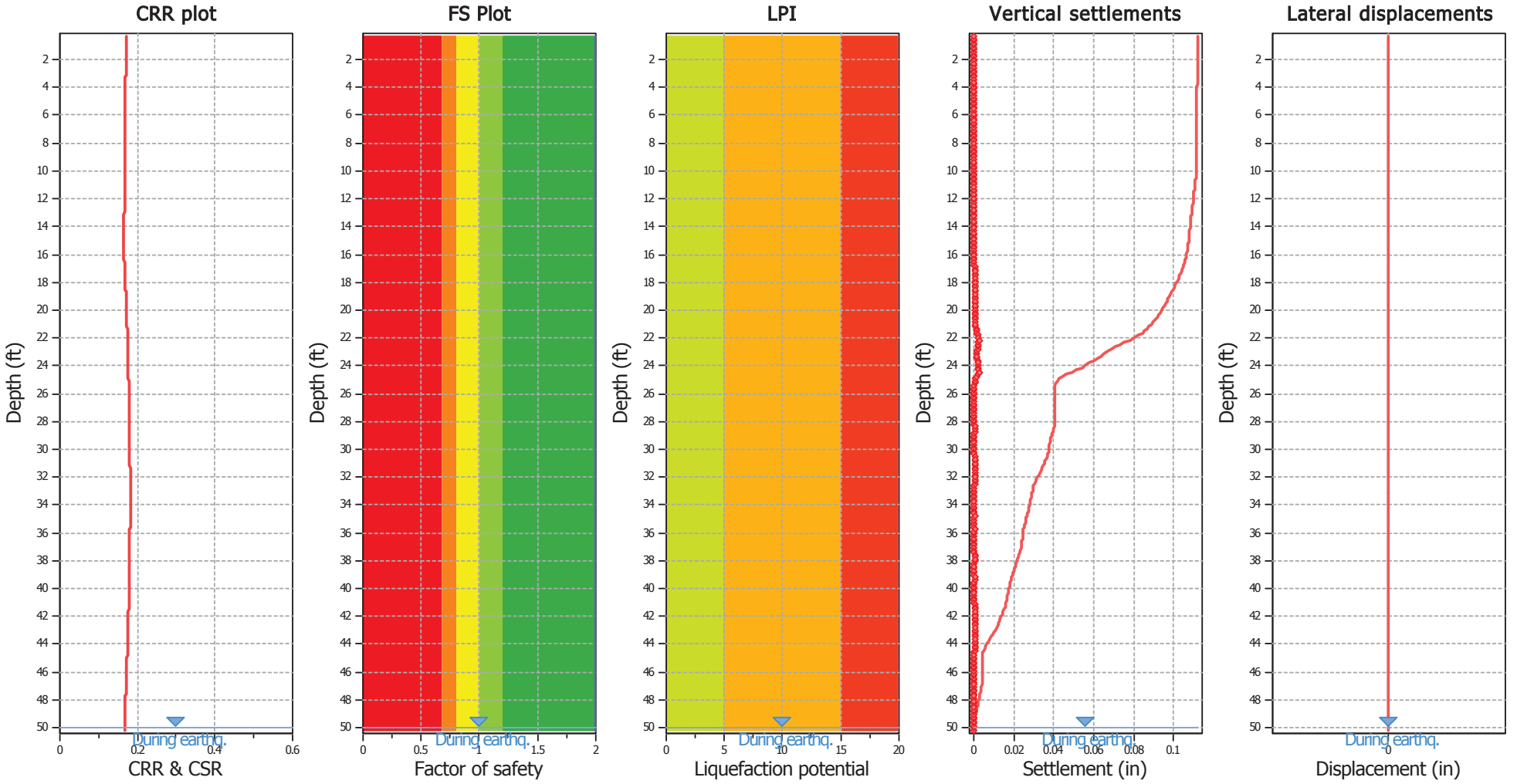
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

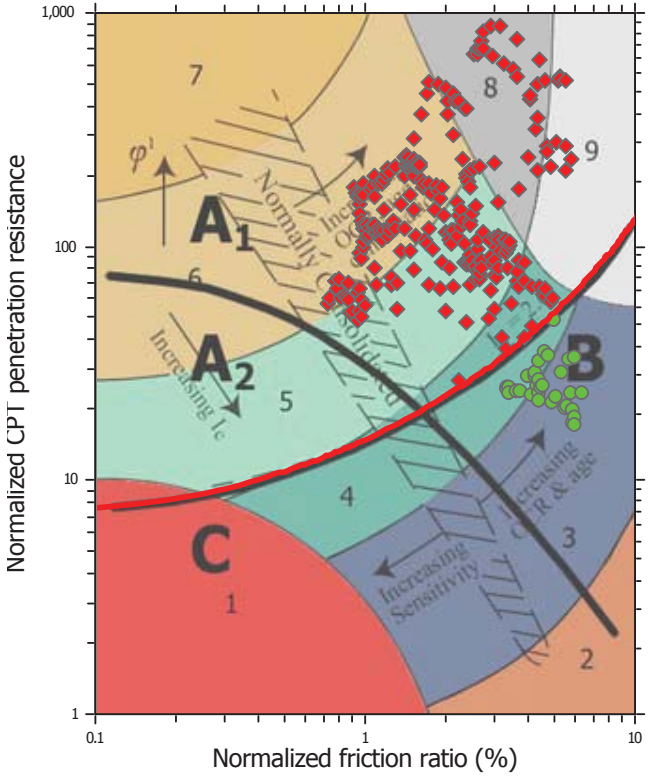
F.S. color scheme

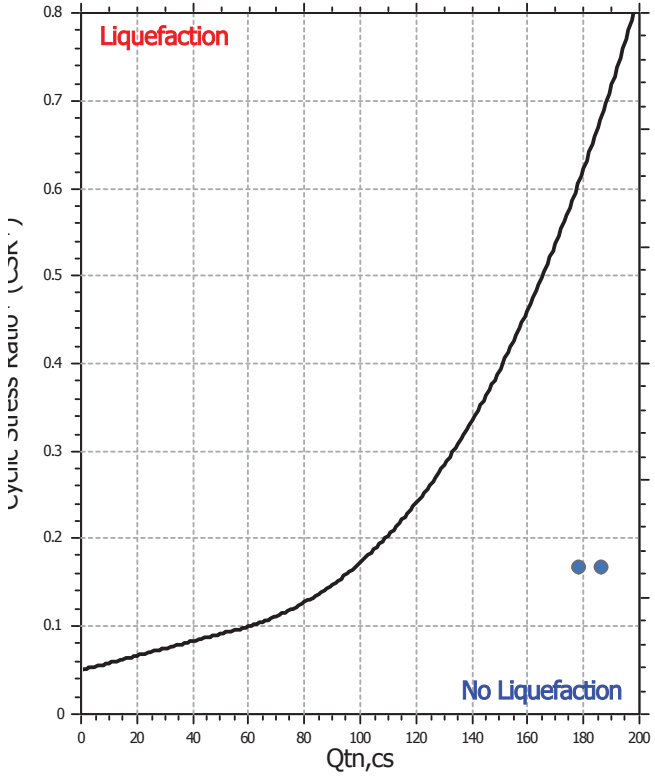
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

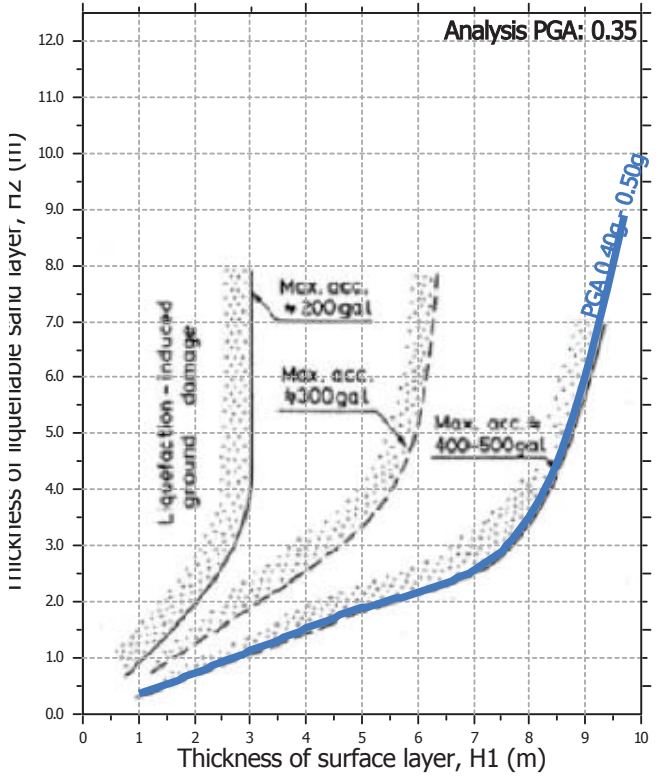
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



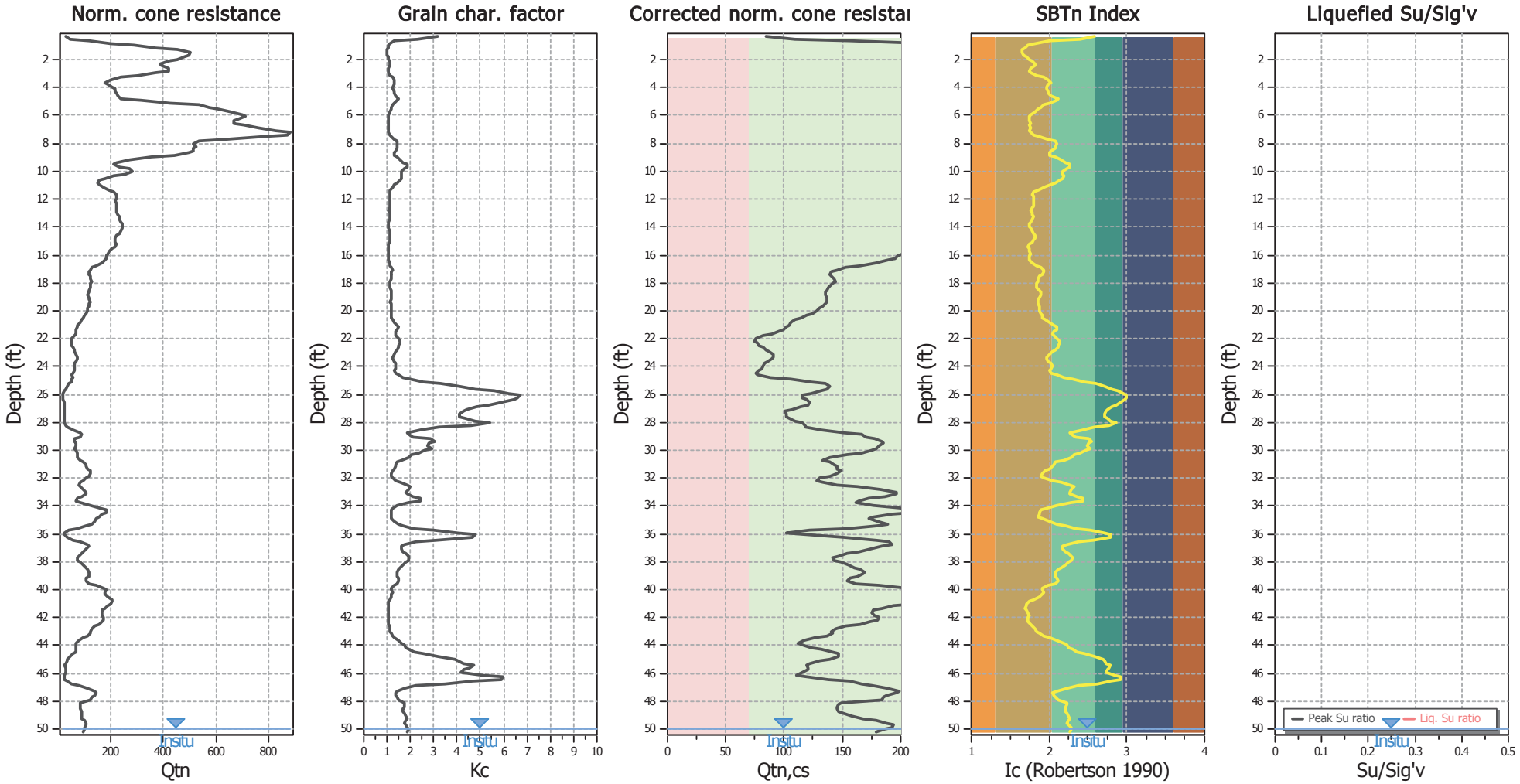




Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

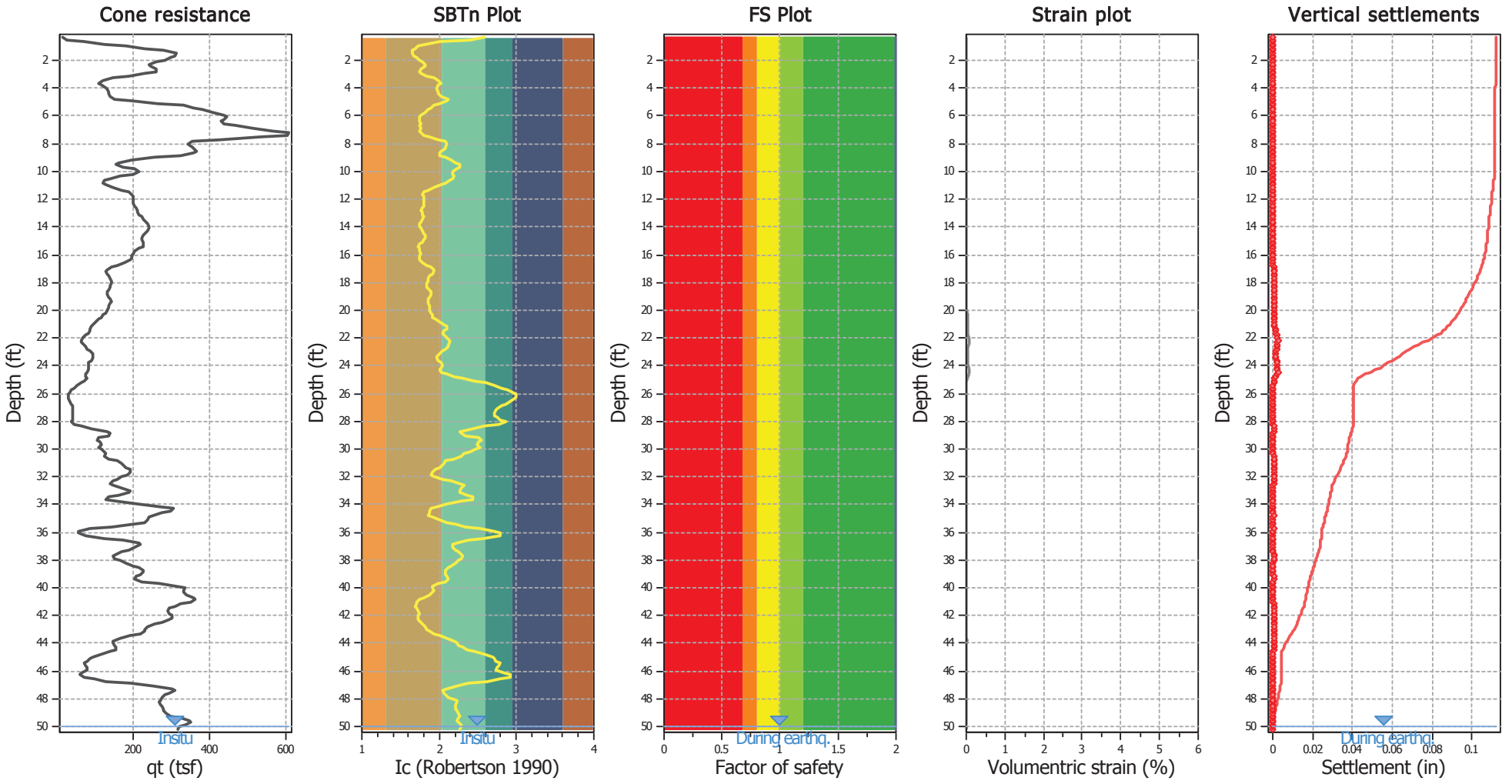
Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement of dry sands ::

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
0.33	2.58	26.59	3.18	84.58	23	389	0.17	0.001	0.00	8.63	0.00	0.000
0.49	2.40	47.25	2.32	109.80	27	555	0.17	0.001	0.00	8.63	0.00	0.000
0.66	2.02	118.78	1.32	156.81	33	854	0.17	0.001	0.00	8.63	0.00	0.000
0.82	1.83	200.54	1.13	225.68	44	1133	0.17	0.001	0.00	8.63	0.00	0.000
0.98	1.73	289.11	1.06	305.29	58	1442	0.17	0.001	0.00	8.63	0.00	0.000
1.15	1.69	369.15	1.03	381.08	71	1762	0.17	0.001	0.00	8.63	0.00	0.000
1.31	1.66	451.23	1.01	456.17	84	2070	0.17	0.001	0.00	8.63	0.00	0.000
1.48	1.65	501.61	1.00	502.79	92	2266	0.17	0.001	0.00	8.63	0.00	0.000
1.64	1.68	499.29	1.02	511.01	95	2344	0.17	0.001	0.00	8.63	0.00	0.000
1.80	1.71	480.69	1.05	502.77	94	2353	0.17	0.001	0.00	8.63	0.00	0.000
1.97	1.75	451.85	1.07	484.32	92	2322	0.17	0.001	0.00	8.63	0.00	0.000
2.13	1.78	417.35	1.10	457.09	88	2239	0.17	0.001	0.00	8.63	0.00	0.000
2.30	1.82	386.43	1.12	433.56	84	2171	0.17	0.002	0.00	8.63	0.00	0.000
2.46	1.81	391.66	1.12	437.74	85	2184	0.17	0.002	0.00	8.63	0.00	0.000
2.62	1.77	418.74	1.09	454.77	87	2209	0.17	0.002	0.00	8.63	0.00	0.000
2.79	1.74	420.97	1.07	448.89	85	2142	0.17	0.002	0.00	8.63	0.00	0.000
2.95	1.77	370.55	1.09	402.07	77	1951	0.17	0.002	0.00	8.63	0.00	0.000
3.12	1.84	301.28	1.13	341.57	67	1726	0.17	0.003	0.00	8.63	0.00	0.000
3.28	1.92	235.98	1.21	286.02	58	1511	0.17	0.003	0.00	8.63	0.00	0.000
3.45	1.98	196.87	1.28	251.17	52	1355	0.17	0.004	0.00	8.63	0.00	0.000
3.61	2.02	179.56	1.32	237.34	50	1292	0.17	0.005	0.00	8.63	0.00	0.000
3.77	2.00	188.01	1.30	243.58	51	1320	0.17	0.005	0.00	8.63	0.00	0.000
3.94	1.97	204.38	1.26	258.08	53	1387	0.17	0.005	0.00	8.63	0.00	0.000
4.10	1.97	213.26	1.26	269.45	55	1449	0.17	0.005	0.00	8.63	0.00	0.000
4.27	1.98	216.24	1.27	275.67	57	1487	0.17	0.005	0.00	8.63	0.00	0.000
4.43	1.99	221.52	1.29	284.91	59	1541	0.17	0.005	0.00	8.63	0.00	0.000
4.59	2.03	228.19	1.34	305.82	64	1670	0.17	0.004	0.00	8.63	0.00	0.000
4.76	2.12	240.42	1.50	360.42	79	1982	0.17	0.004	0.00	8.63	0.00	0.000
4.92	2.09	315.55	1.44	453.59	98	2494	0.17	0.003	0.00	8.63	0.00	0.000
5.09	2.01	424.11	1.32	559.21	117	3043	0.17	0.003	0.00	8.63	0.00	0.000
5.25	1.93	533.20	1.22	649.99	132	3443	0.17	0.002	0.00	8.63	0.00	0.000
5.41	1.90	575.34	1.19	685.45	138	3586	0.17	0.002	0.00	8.63	0.00	0.000
5.58	1.87	608.98	1.16	705.61	140	3625	0.17	0.002	0.00	8.63	0.00	0.000
5.74	1.82	653.92	1.12	731.04	142	3649	0.17	0.002	0.00	8.63	0.00	0.000
5.91	1.77	699.78	1.08	759.19	145	3684	0.17	0.002	0.00	8.63	0.00	0.000
6.07	1.75	709.38	1.07	762.38	145	3678	0.17	0.003	0.00	8.63	0.00	0.000
6.23	1.75	686.49	1.07	737.53	140	3610	0.17	0.003	0.00	8.63	0.00	0.000
6.40	1.75	667.07	1.07	713.64	135	3540	0.17	0.003	0.00	8.63	0.00	0.000
6.56	1.76	668.94	1.08	721.44	137	3642	0.17	0.003	0.00	8.63	0.00	0.000
6.73	1.75	706.23	1.07	758.58	144	3877	0.17	0.003	0.00	8.63	0.00	0.000
6.89	1.75	763.69	1.07	820.83	156	4253	0.17	0.002	0.00	8.63	0.00	0.000
7.05	1.75	827.09	1.07	884.87	168	4633	0.17	0.002	0.00	8.63	0.00	0.000
7.22	1.77	882.48	1.08	955.53	182	5102	0.17	0.002	0.00	8.63	0.00	0.000
7.38	1.80	873.48	1.11	967.28	187	5289	0.17	0.002	0.00	8.63	0.00	0.000
7.55	1.87	778.22	1.17	907.03	180	5131	0.17	0.002	0.00	8.63	0.00	0.000
7.71	1.98	631.51	1.28	807.86	167	4700	0.17	0.003	0.00	8.63	0.00	0.000
7.87	2.08	535.51	1.41	756.57	162	4429	0.17	0.003	0.00	8.63	0.00	0.000
8.04	2.10	513.81	1.46	749.06	162	4426	0.17	0.003	0.00	8.63	0.00	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
8.20	2.08	521.66	1.42	742.40	160	4465	0.17	0.003	0.00	8.63	0.00	0.000
8.37	2.08	515.19	1.41	727.43	156	4442	0.17	0.003	0.00	8.63	0.00	0.000
8.53	2.03	515.41	1.34	692.33	146	4302	0.17	0.003	0.00	8.63	0.00	0.000
8.69	2.01	495.75	1.31	651.67	136	4101	0.17	0.003	0.00	8.63	0.00	0.000
8.86	2.01	442.05	1.31	581.11	121	3705	0.17	0.004	0.00	8.63	0.00	0.000
9.02	2.08	353.16	1.41	498.41	107	3204	0.17	0.004	0.00	8.63	0.00	0.000
9.19	2.16	269.03	1.57	422.17	94	2698	0.17	0.005	0.00	8.63	0.00	0.000
9.35	2.22	221.18	1.71	377.22	86	2389	0.17	0.006	0.00	8.63	0.00	0.000
9.51	2.27	211.21	1.87	394.88	92	2461	0.17	0.006	0.00	8.63	0.00	0.000
9.68	2.27	234.95	1.84	433.05	100	2748	0.17	0.006	0.00	8.63	0.00	0.000
9.84	2.22	271.04	1.72	467.37	106	3064	0.17	0.005	0.00	8.63	0.00	0.000
10.01	2.18	279.63	1.63	454.85	102	3066	0.17	0.005	0.00	8.63	0.00	0.000
10.17	2.17	254.82	1.60	406.75	91	2785	0.17	0.006	0.00	8.63	0.00	0.000
10.34	2.18	210.04	1.63	341.93	77	2359	0.17	0.007	0.00	8.63	0.00	0.000
10.50	2.17	174.85	1.60	279.19	62	1955	0.17	0.009	0.00	8.63	0.00	0.000
10.66	2.14	154.71	1.53	236.91	52	1690	0.17	0.011	0.00	8.63	0.00	0.000
10.83	2.08	149.03	1.43	212.70	46	1546	0.17	0.012	0.00	8.63	0.00	0.000
10.99	2.02	155.14	1.33	205.88	43	1511	0.17	0.013	0.01	8.63	0.00	0.000
11.16	1.93	171.80	1.22	210.18	43	1533	0.17	0.013	0.01	8.63	0.00	0.000
11.32	1.85	194.28	1.15	222.98	44	1594	0.17	0.012	0.00	8.63	0.00	0.000
11.48	1.80	212.41	1.11	235.38	46	1656	0.17	0.012	0.00	8.63	0.00	0.000
11.65	1.79	220.67	1.10	242.18	47	1705	0.17	0.012	0.00	8.63	0.00	0.000
11.81	1.80	221.07	1.10	243.91	47	1737	0.17	0.012	0.00	8.63	0.00	0.000
11.98	1.81	218.93	1.11	243.33	47	1757	0.17	0.012	0.00	8.63	0.00	0.000
12.14	1.81	218.14	1.11	243.01	47	1771	0.17	0.012	0.00	8.63	0.00	0.000
12.30	1.80	218.45	1.11	242.19	47	1771	0.17	0.012	0.00	8.63	0.00	0.000
12.47	1.79	220.38	1.10	243.02	47	1783	0.17	0.012	0.00	8.63	0.00	0.000
12.63	1.78	222.25	1.09	242.04	46	1770	0.17	0.012	0.00	8.63	0.00	0.000
12.80	1.77	222.72	1.09	241.96	46	1778	0.17	0.012	0.00	8.63	0.00	0.000
12.96	1.78	221.89	1.09	242.26	46	1800	0.17	0.012	0.00	8.63	0.00	0.000
13.12	1.79	224.56	1.10	247.14	48	1861	0.17	0.012	0.00	8.63	0.00	0.000
13.29	1.79	229.68	1.10	252.92	49	1919	0.17	0.012	0.00	8.63	0.00	0.000
13.45	1.77	234.36	1.09	255.04	49	1929	0.17	0.012	0.00	8.63	0.00	0.000
13.62	1.76	237.78	1.08	256.32	49	1935	0.17	0.012	0.00	8.63	0.00	0.000
13.78	1.75	240.66	1.07	257.26	49	1940	0.17	0.012	0.00	8.63	0.00	0.000
13.94	1.75	243.72	1.07	260.59	49	1978	0.17	0.012	0.00	8.63	0.00	0.000
14.11	1.76	242.71	1.08	261.23	50	2007	0.17	0.012	0.00	8.63	0.00	0.000
14.27	1.78	236.83	1.09	258.65	50	2027	0.17	0.012	0.00	8.63	0.00	0.000
14.44	1.80	229.83	1.11	254.72	49	2036	0.17	0.012	0.00	8.63	0.00	0.000
14.60	1.81	222.84	1.12	248.72	48	2012	0.17	0.012	0.00	8.63	0.00	0.000
14.76	1.82	217.95	1.12	244.10	47	1993	0.17	0.013	0.00	8.63	0.00	0.000
14.93	1.80	215.62	1.11	239.01	46	1946	0.17	0.013	0.00	8.63	0.00	0.000
15.09	1.78	218.19	1.09	238.25	46	1925	0.17	0.013	0.00	8.63	0.00	0.000
15.26	1.74	219.55	1.07	234.44	44	1865	0.17	0.014	0.01	8.63	0.00	0.000
15.42	1.73	214.98	1.06	227.78	43	1808	0.16	0.015	0.01	8.63	0.00	0.000
15.58	1.74	203.65	1.06	216.70	41	1737	0.16	0.016	0.01	8.63	0.01	0.000
15.75	1.75	192.75	1.07	207.00	39	1684	0.16	0.016	0.01	8.63	0.01	0.000
15.91	1.76	187.00	1.08	201.25	38	1649	0.16	0.017	0.01	8.63	0.01	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
16.08	1.75	184.67	1.07	197.72	38	1621	0.17	0.018	0.01	8.63	0.01	0.000
16.24	1.74	183.25	1.06	194.78	37	1594	0.17	0.018	0.01	8.63	0.01	0.000
16.40	1.74	176.82	1.07	188.57	36	1556	0.17	0.019	0.01	8.63	0.01	0.000
16.57	1.78	163.64	1.09	178.49	34	1515	0.17	0.020	0.01	8.63	0.01	0.000
16.73	1.84	144.93	1.14	164.74	32	1460	0.17	0.021	0.01	8.63	0.01	0.000
16.90	1.90	128.94	1.19	153.07	31	1409	0.17	0.022	0.01	8.63	0.01	0.000
17.06	1.93	119.24	1.22	144.94	29	1360	0.17	0.024	0.01	8.63	0.01	0.000
17.23	1.92	116.34	1.21	140.87	28	1326	0.17	0.025	0.02	8.63	0.01	0.001
17.39	1.90	117.07	1.19	139.71	28	1311	0.17	0.025	0.02	8.63	0.01	0.001
17.55	1.88	120.01	1.17	140.67	28	1311	0.17	0.026	0.02	8.63	0.01	0.001
17.72	1.86	123.47	1.16	142.72	28	1323	0.17	0.026	0.02	8.63	0.01	0.001
17.88	1.85	124.96	1.15	143.53	28	1331	0.17	0.026	0.02	8.63	0.01	0.001
18.05	1.84	124.40	1.14	141.70	28	1311	0.17	0.026	0.02	8.63	0.01	0.001
18.21	1.85	121.96	1.14	139.30	27	1298	0.17	0.027	0.02	8.63	0.01	0.001
18.37	1.85	120.12	1.14	137.30	27	1286	0.17	0.028	0.02	8.63	0.02	0.001
18.54	1.88	116.74	1.17	136.31	27	1306	0.17	0.027	0.02	8.63	0.01	0.001
18.70	1.89	114.72	1.18	135.57	27	1317	0.17	0.027	0.02	8.63	0.01	0.001
18.87	1.90	113.62	1.19	135.41	27	1330	0.17	0.027	0.02	8.63	0.01	0.001
19.03	1.88	115.97	1.17	136.07	27	1328	0.17	0.028	0.02	8.63	0.01	0.001
19.19	1.86	118.71	1.15	137.04	27	1326	0.17	0.028	0.02	8.63	0.02	0.001
19.36	1.85	119.53	1.14	136.78	27	1320	0.17	0.028	0.02	8.63	0.02	0.001
19.52	1.86	117.03	1.15	135.02	27	1319	0.17	0.029	0.02	8.63	0.02	0.001
19.69	1.88	113.72	1.17	132.76	26	1315	0.17	0.029	0.02	8.63	0.02	0.001
19.85	1.88	111.82	1.17	130.75	26	1303	0.17	0.030	0.02	8.63	0.02	0.001
20.01	1.88	109.62	1.17	128.55	26	1290	0.17	0.030	0.02	8.63	0.02	0.001
20.18	1.89	105.39	1.18	124.36	25	1260	0.17	0.032	0.02	8.63	0.02	0.001
20.34	1.91	99.44	1.20	119.10	24	1225	0.17	0.033	0.03	8.63	0.02	0.001
20.51	1.92	94.45	1.20	113.70	23	1178	0.17	0.036	0.03	8.63	0.02	0.001
20.67	1.94	88.59	1.23	109.29	22	1155	0.17	0.037	0.03	8.63	0.03	0.001
20.83	2.00	81.16	1.30	105.87	22	1152	0.17	0.038	0.03	8.63	0.03	0.001
21.00	2.07	74.18	1.40	104.22	22	1160	0.17	0.038	0.03	8.63	0.03	0.001
21.16	2.10	70.15	1.46	102.46	22	1152	0.17	0.038	0.03	8.63	0.03	0.001
21.33	2.10	69.10	1.45	99.91	22	1128	0.17	0.040	0.04	8.63	0.03	0.001
21.49	2.06	68.75	1.39	95.68	20	1079	0.17	0.044	0.04	8.63	0.03	0.001
21.65	2.04	65.61	1.36	89.13	19	1004	0.17	0.050	0.05	8.63	0.04	0.002
21.82	2.06	59.30	1.38	81.84	17	930	0.17	0.058	0.07	8.63	0.05	0.002
21.98	2.11	52.17	1.46	76.37	17	879	0.17	0.065	0.08	8.63	0.06	0.002
22.15	2.14	48.79	1.54	75.06	17	871	0.17	0.067	0.08	8.63	0.07	0.003
22.31	2.14	49.81	1.54	76.58	17	893	0.17	0.064	0.08	8.63	0.06	0.002
22.47	2.12	52.64	1.50	78.70	17	920	0.17	0.061	0.07	8.63	0.06	0.002
22.64	2.11	55.59	1.48	82.03	18	962	0.17	0.057	0.06	8.63	0.05	0.002
22.80	2.08	59.47	1.42	84.58	18	992	0.17	0.054	0.06	8.63	0.05	0.002
22.97	2.05	63.89	1.37	87.48	19	1022	0.18	0.052	0.06	8.63	0.04	0.002
23.13	2.00	69.49	1.30	90.20	19	1041	0.18	0.050	0.05	8.63	0.04	0.002
23.30	1.97	71.95	1.26	90.58	19	1035	0.18	0.051	0.06	8.63	0.04	0.002
23.46	1.96	71.08	1.25	89.12	18	1020	0.18	0.053	0.06	8.63	0.05	0.002
23.62	1.99	66.41	1.29	85.49	18	995	0.18	0.056	0.06	8.63	0.05	0.002
23.79	2.03	61.99	1.34	83.07	17	986	0.18	0.057	0.07	8.63	0.05	0.002

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
23.95	2.05	60.22	1.36	82.12	17	983	0.18	0.058	0.07	8.63	0.05	0.002
24.12	2.03	60.62	1.34	81.21	17	971	0.18	0.060	0.07	8.63	0.06	0.002
24.28	2.01	59.88	1.31	78.72	16	939	0.18	0.065	0.08	8.63	0.06	0.002
24.44	2.03	56.61	1.34	75.91	16	915	0.18	0.068	0.09	8.63	0.07	0.003
24.61	2.10	53.03	1.46	77.52	17	956	0.18	0.063	0.08	8.63	0.06	0.002
24.77	2.19	53.82	1.65	88.81	20	1107	0.18	0.049	0.05	8.63	0.04	0.001
24.94	2.31	53.05	1.99	105.62	25	1301	0.18	0.038	0.03	8.63	0.02	0.001
25.10	2.45	48.86	2.52	122.93	31	1459	0.18	0.032	0.02	8.63	0.01	0.001
25.26	2.59	41.09	3.29	135.01	36	1519	0.18	0.031	0.01	8.63	0.01	0.000
25.43	2.72	33.89	4.11	139.34	0	0	0.18	0.000	0.00	0.00	0.00	0.000
25.59	2.80	28.70	4.78	137.24	0	0	0.18	0.000	0.00	0.00	0.00	0.000
25.76	2.89	23.58	5.59	131.74	0	0	0.18	0.000	0.00	0.00	0.00	0.000
25.92	2.95	19.79	6.20	122.62	0	0	0.18	0.000	0.00	0.00	0.00	0.000
26.08	2.99	17.27	6.68	115.34	0	0	0.18	0.000	0.00	0.00	0.00	0.000
26.25	2.99	17.45	6.59	114.98	0	0	0.18	0.000	0.00	0.00	0.00	0.000
26.41	2.97	18.39	6.45	118.70	0	0	0.18	0.000	0.00	0.00	0.00	0.000
26.58	2.92	20.69	5.91	122.28	0	0	0.18	0.000	0.00	0.00	0.00	0.000
26.74	2.86	22.60	5.35	120.94	0	0	0.18	0.000	0.00	0.00	0.00	0.000
26.90	2.80	23.71	4.82	114.39	0	0	0.18	0.000	0.00	0.00	0.00	0.000
27.07	2.76	24.07	4.42	106.45	0	0	0.18	0.000	0.00	0.00	0.00	0.000
27.23	2.74	23.61	4.26	100.56	0	0	0.18	0.000	0.00	0.00	0.00	0.000
27.40	2.72	24.56	4.12	101.26	0	0	0.18	0.000	0.00	0.00	0.00	0.000
27.56	2.72	24.73	4.13	102.13	0	0	0.18	0.000	0.00	0.00	0.00	0.000
27.72	2.75	23.90	4.36	104.31	0	0	0.18	0.000	0.00	0.00	0.00	0.000
27.89	2.80	23.01	4.76	109.60	0	0	0.18	0.000	0.00	0.00	0.00	0.000
28.05	2.87	21.36	5.41	115.56	0	0	0.18	0.000	0.00	0.00	0.00	0.000
28.22	2.78	25.57	4.61	117.75	0	0	0.18	0.000	0.00	0.00	0.00	0.000
28.38	2.58	36.50	3.24	118.10	32	1468	0.18	0.036	0.02	8.63	0.02	0.001
28.54	2.43	54.49	2.43	132.25	33	1745	0.18	0.029	0.02	8.63	0.01	0.000
28.71	2.27	81.51	1.86	151.78	35	2085	0.18	0.023	0.01	8.63	0.01	0.000
28.87	2.29	86.90	1.91	166.05	39	2285	0.18	0.020	0.01	8.63	0.01	0.000
29.04	2.34	81.43	2.09	170.36	41	2332	0.18	0.020	0.01	8.63	0.01	0.000
29.20	2.51	62.64	2.84	178.17	46	2329	0.18	0.020	0.01	8.63	0.01	0.000
29.36	2.55	60.81	3.03	183.99	49	2388	0.18	0.020	0.01	8.63	0.01	0.000
29.53	2.51	65.70	2.82	185.44	48	2450	0.18	0.019	0.01	8.63	0.01	0.000
29.69	2.49	66.86	2.72	181.57	47	2427	0.18	0.020	0.01	8.63	0.01	0.000
29.86	2.53	61.64	2.91	179.10	47	2376	0.18	0.020	0.01	8.63	0.01	0.000
30.02	2.47	67.05	2.61	174.74	44	2375	0.18	0.020	0.01	8.63	0.01	0.000
30.19	2.40	71.55	2.33	166.81	41	2320	0.18	0.021	0.01	8.63	0.01	0.000
30.35	2.33	74.94	2.05	153.92	37	2187	0.18	0.023	0.01	8.63	0.01	0.000
30.51	2.29	72.97	1.91	139.16	33	1999	0.18	0.026	0.01	8.63	0.01	0.000
30.68	2.18	81.34	1.63	132.54	30	1918	0.18	0.027	0.02	8.63	0.01	0.001
30.84	2.09	96.79	1.43	138.63	30	1979	0.18	0.026	0.02	8.63	0.01	0.000
31.01	2.05	103.61	1.38	142.71	30	2022	0.18	0.026	0.02	8.63	0.01	0.000
31.17	2.04	107.06	1.35	144.80	31	2046	0.18	0.025	0.02	8.63	0.01	0.000
31.33	2.00	111.97	1.30	145.22	30	2020	0.18	0.026	0.02	8.63	0.01	0.000
31.50	1.95	119.57	1.24	148.54	30	2021	0.18	0.026	0.02	8.63	0.01	0.001
31.66	1.91	122.16	1.19	145.87	29	1930	0.18	0.028	0.02	8.63	0.01	0.001

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
31.83	1.90	116.84	1.19	138.60	28	1828	0.18	0.030	0.02	8.63	0.02	0.001
31.99	1.93	106.86	1.22	130.16	26	1762	0.18	0.032	0.02	8.63	0.02	0.001
32.15	2.04	94.90	1.35	127.99	27	1843	0.18	0.030	0.02	8.63	0.02	0.001
32.32	2.16	85.02	1.56	133.03	29	1991	0.18	0.027	0.02	8.63	0.01	0.001
32.48	2.27	78.42	1.85	145.46	34	2193	0.18	0.024	0.01	8.63	0.01	0.000
32.65	2.32	81.39	2.01	163.30	39	2459	0.18	0.021	0.01	8.63	0.01	0.000
32.81	2.29	94.44	1.93	182.23	43	2763	0.18	0.018	0.01	8.63	0.01	0.000
32.97	2.26	107.26	1.83	196.13	45	2993	0.18	0.017	0.01	8.63	0.00	0.000
33.14	2.28	104.60	1.87	195.73	46	2997	0.18	0.017	0.01	8.63	0.00	0.000
33.30	2.36	87.01	2.14	186.28	45	2832	0.18	0.018	0.01	8.63	0.01	0.000
33.47	2.43	71.06	2.43	172.98	43	2599	0.18	0.020	0.01	8.63	0.01	0.000
33.63	2.43	67.40	2.44	164.31	41	2478	0.18	0.021	0.01	8.63	0.01	0.000
33.79	2.29	84.42	1.91	161.56	38	2508	0.18	0.021	0.01	8.63	0.01	0.000
33.96	2.09	121.79	1.44	175.94	38	2689	0.18	0.019	0.01	8.63	0.01	0.000
34.12	1.96	161.47	1.25	201.94	41	2905	0.18	0.018	0.01	8.63	0.01	0.000
34.29	1.89	184.93	1.18	217.91	43	2990	0.18	0.017	0.01	8.63	0.01	0.000
34.45	1.88	179.97	1.17	210.48	42	2874	0.18	0.018	0.01	8.63	0.01	0.000
34.61	1.87	165.67	1.16	192.16	38	2608	0.18	0.021	0.01	8.63	0.01	0.000
34.78	1.86	152.97	1.16	176.98	35	2403	0.18	0.023	0.01	8.63	0.01	0.000
34.94	1.92	143.02	1.21	172.88	35	2459	0.18	0.022	0.01	8.63	0.01	0.000
35.11	2.01	136.95	1.32	180.45	38	2728	0.18	0.020	0.01	8.63	0.01	0.000
35.27	2.10	129.12	1.46	188.82	41	2973	0.18	0.018	0.01	8.63	0.01	0.000
35.43	2.21	106.47	1.69	180.32	41	2905	0.18	0.018	0.01	8.63	0.01	0.000
35.60	2.34	73.79	2.09	154.19	37	2479	0.18	0.022	0.01	8.63	0.01	0.000
35.76	2.54	41.28	2.96	122.07	32	1886	0.18	0.032	0.02	8.63	0.01	0.001
35.93	2.71	25.09	4.07	102.07	0	0	0.18	0.000	0.00	0.00	0.00	0.000
36.09	2.80	24.81	4.76	118.02	0	0	0.18	0.000	0.00	0.00	0.00	0.000
36.26	2.78	32.55	4.64	151.14	0	0	0.18	0.000	0.00	0.00	0.00	0.000
36.42	2.56	57.91	3.10	179.46	48	2797	0.18	0.020	0.01	8.63	0.01	0.000
36.58	2.37	86.11	2.21	190.28	46	3109	0.18	0.017	0.01	8.63	0.00	0.000
36.75	2.23	111.28	1.73	192.87	44	3195	0.18	0.017	0.01	8.63	0.01	0.000
36.91	2.17	114.96	1.60	184.33	41	3046	0.18	0.018	0.01	8.63	0.01	0.000
37.08	2.18	107.83	1.62	174.42	39	2895	0.18	0.019	0.01	8.63	0.01	0.000
37.24	2.21	97.15	1.69	163.72	37	2735	0.18	0.021	0.01	8.63	0.01	0.000
37.40	2.25	86.56	1.79	154.64	36	2598	0.18	0.022	0.01	8.63	0.01	0.000
37.57	2.28	77.32	1.90	146.56	34	2470	0.18	0.023	0.01	8.63	0.01	0.000
37.73	2.30	72.39	1.96	141.58	33	2391	0.18	0.025	0.01	8.63	0.01	0.000
37.90	2.29	74.56	1.92	143.40	34	2432	0.18	0.024	0.01	8.63	0.01	0.000
38.06	2.25	82.71	1.80	148.64	34	2530	0.18	0.023	0.01	8.63	0.01	0.000
38.22	2.20	92.53	1.68	155.13	35	2641	0.18	0.022	0.01	8.63	0.01	0.000
38.39	2.15	102.89	1.56	160.80	36	2724	0.18	0.021	0.01	8.63	0.01	0.000
38.55	2.11	111.59	1.48	165.00	36	2772	0.18	0.021	0.01	8.63	0.01	0.000
38.72	2.09	117.69	1.43	168.42	36	2812	0.18	0.020	0.01	8.63	0.01	0.000
38.88	2.08	118.26	1.42	167.68	36	2800	0.18	0.021	0.01	8.63	0.01	0.000
39.04	2.08	113.76	1.43	162.44	35	2726	0.18	0.021	0.01	8.63	0.01	0.000
39.21	2.10	107.08	1.46	156.61	34	2655	0.18	0.022	0.01	8.63	0.01	0.000
39.37	2.12	103.44	1.49	153.97	34	2630	0.18	0.022	0.01	8.63	0.01	0.000
39.54	2.07	114.80	1.41	161.60	35	2723	0.18	0.022	0.01	8.63	0.01	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
39.70	1.98	142.55	1.27	181.66	38	2919	0.18	0.020	0.01	8.63	0.01	0.000
39.86	1.92	169.81	1.21	205.02	41	3163	0.18	0.018	0.01	8.63	0.01	0.000
40.03	1.92	181.54	1.20	218.68	44	3375	0.18	0.017	0.01	8.63	0.01	0.000
40.19	1.93	178.99	1.22	218.95	44	3436	0.18	0.017	0.01	8.63	0.00	0.000
40.36	1.92	178.58	1.21	215.85	44	3360	0.18	0.017	0.01	8.63	0.01	0.000
40.52	1.87	187.23	1.16	217.18	43	3244	0.18	0.018	0.01	8.63	0.01	0.000
40.68	1.79	202.30	1.10	222.78	43	3111	0.18	0.019	0.01	8.63	0.01	0.000
40.85	1.75	206.93	1.07	221.48	42	2969	0.18	0.020	0.01	8.63	0.01	0.000
41.01	1.71	201.01	1.05	210.53	39	2736	0.18	0.022	0.01	8.63	0.01	0.000
41.18	1.71	185.80	1.04	193.83	36	2510	0.18	0.025	0.01	8.63	0.01	0.000
41.34	1.69	177.99	1.03	184.01	34	2356	0.18	0.027	0.01	8.63	0.01	0.000
41.50	1.72	168.63	1.05	176.93	33	2321	0.18	0.027	0.01	8.63	0.01	0.000
41.67	1.73	165.15	1.06	175.23	33	2344	0.18	0.027	0.01	8.63	0.01	0.000
41.83	1.74	165.82	1.07	177.06	34	2397	0.18	0.026	0.01	8.63	0.01	0.000
42.00	1.73	171.13	1.06	181.01	34	2419	0.18	0.026	0.01	8.63	0.01	0.000
42.16	1.73	170.29	1.05	179.64	34	2396	0.18	0.026	0.01	8.63	0.01	0.000
42.32	1.73	164.53	1.06	174.18	33	2341	0.18	0.027	0.02	8.63	0.01	0.000
42.49	1.76	153.00	1.08	164.70	31	2277	0.18	0.028	0.02	8.63	0.01	0.001
42.65	1.79	139.35	1.10	152.92	29	2183	0.18	0.030	0.02	8.63	0.01	0.001
42.82	1.82	128.44	1.12	143.74	28	2117	0.18	0.031	0.02	8.63	0.02	0.001
42.98	1.84	123.88	1.13	140.49	28	2112	0.18	0.031	0.02	8.63	0.02	0.001
43.15	1.87	121.81	1.16	141.22	28	2189	0.18	0.030	0.02	8.63	0.02	0.001
43.31	1.93	112.00	1.22	136.49	28	2237	0.18	0.029	0.02	8.63	0.02	0.001
43.47	2.01	95.87	1.32	126.19	26	2196	0.18	0.030	0.02	8.63	0.02	0.001
43.64	2.11	79.13	1.47	116.19	25	2124	0.17	0.031	0.02	8.63	0.02	0.001
43.80	2.19	68.30	1.64	111.89	25	2099	0.17	0.032	0.02	8.63	0.02	0.001
43.97	2.23	66.05	1.74	115.03	26	2178	0.17	0.030	0.02	8.63	0.02	0.001
44.13	2.26	67.37	1.82	122.43	28	2330	0.17	0.028	0.02	8.63	0.01	0.001
44.29	2.30	68.10	1.94	132.04	31	2524	0.17	0.025	0.01	8.63	0.01	0.000
44.46	2.36	65.51	2.16	141.31	34	2702	0.17	0.023	0.01	8.63	0.01	0.000
44.62	2.46	57.17	2.57	146.70	37	2781	0.17	0.023	0.01	8.63	0.01	0.000
44.79	2.58	45.76	3.19	146.06	39	2719	0.17	0.023	0.01	8.63	0.01	0.000
44.95	2.69	35.58	3.91	139.28	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.11	2.71	32.25	4.04	130.37	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.28	2.74	28.62	4.27	122.09	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.44	2.79	25.21	4.74	119.41	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.61	2.77	26.75	4.50	120.48	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.77	2.74	27.88	4.32	120.34	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.93	2.73	27.70	4.19	116.01	0	0	0.17	0.000	0.00	0.00	0.00	0.000
46.10	2.84	21.66	5.11	110.56	0	0	0.17	0.000	0.00	0.00	0.00	0.000
46.26	2.92	20.11	5.94	119.55	0	0	0.17	0.000	0.00	0.00	0.00	0.000
46.43	2.92	23.45	5.87	137.66	0	0	0.17	0.000	0.00	0.00	0.00	0.000
46.59	2.79	33.45	4.67	156.34	0	0	0.17	0.000	0.00	0.00	0.00	0.000
46.75	2.62	47.93	3.48	166.66	0	0	0.17	0.000	0.00	0.00	0.00	0.000
46.92	2.38	78.09	2.24	175.00	43	3486	0.17	0.018	0.01	8.63	0.01	0.000
47.08	2.22	109.05	1.73	188.26	43	3744	0.17	0.016	0.01	8.63	0.01	0.000
47.25	2.09	137.68	1.44	198.62	43	3812	0.17	0.016	0.01	8.63	0.01	0.000
47.41	2.05	142.98	1.37	196.10	42	3693	0.17	0.017	0.01	8.63	0.01	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
47.57	2.06	136.08	1.38	188.13	40	3565	0.17	0.017	0.01	8.63	0.01	0.000
47.74	2.09	129.18	1.43	184.76	40	3561	0.17	0.017	0.01	8.63	0.01	0.000
47.90	2.12	123.86	1.49	184.09	40	3603	0.17	0.017	0.01	8.63	0.01	0.000
48.07	2.23	85.76	1.73	148.52	34	4054	0.17	0.015	0.01	8.63	0.01	0.000
48.23	2.23	84.68	1.73	146.71	33	4018	0.17	0.015	0.01	8.63	0.01	0.000
48.39	2.22	84.76	1.71	145.04	33	3995	0.17	0.015	0.01	8.63	0.01	0.000
48.56	2.21	85.63	1.69	144.91	33	4013	0.17	0.015	0.01	8.63	0.01	0.000
48.72	2.21	86.50	1.69	146.56	33	4072	0.17	0.015	0.01	8.63	0.01	0.000
48.89	2.22	87.08	1.73	150.58	34	4185	0.17	0.015	0.01	8.63	0.01	0.000
49.05	2.25	88.00	1.79	157.68	36	4370	0.17	0.014	0.01	8.63	0.01	0.000
49.22	2.26	91.30	1.84	168.09	39	4650	0.17	0.013	0.01	8.63	0.00	0.000
49.38	2.25	99.16	1.81	179.27	41	4995	0.17	0.012	0.01	8.63	0.00	0.000
49.54	2.24	106.26	1.77	187.86	43	5274	0.17	0.011	0.00	8.63	0.00	0.000
49.71	2.25	106.85	1.81	193.26	45	5422	0.17	0.011	0.00	8.63	0.00	0.000
49.87	2.28	102.11	1.89	193.00	45	5384	0.17	0.011	0.00	8.63	0.00	0.000

Total estimated settlement: 0.11

Abbreviations

Q_{tn}: Equivalent clean sand normalized cone resistance
K_c: Fines correction factor
$Q_{tn,cs}$: Post-liquefaction volumentric strain
G_{max}: Small strain shear modulus
CSR: Soil cyclic stress ratio
γ: Cyclic shear strain
$e_{vol(15)}$: Volumetric strain after 15 cycles
N_c: Equivalent number of cycles
e_v: Volumetric strain
Settle.: Calculated settlement

:: Post-earthquake settlement due to soil liquefaction ::

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
50.04	186.73	2.00	0.00	1.00	0.00	50.20	178.61	2.00	0.00	1.00	0.00

Total estimated settlement: 0.00

Abbreviations

$Q_{tn,cs}$: Equivalent clean sand normalized cone resistance
FS: Factor of safety against liquefaction
e_v (%): Post-liquefaction volumentric strain
DF: e_v depth weighting factor
Settlement: Calculated settlement

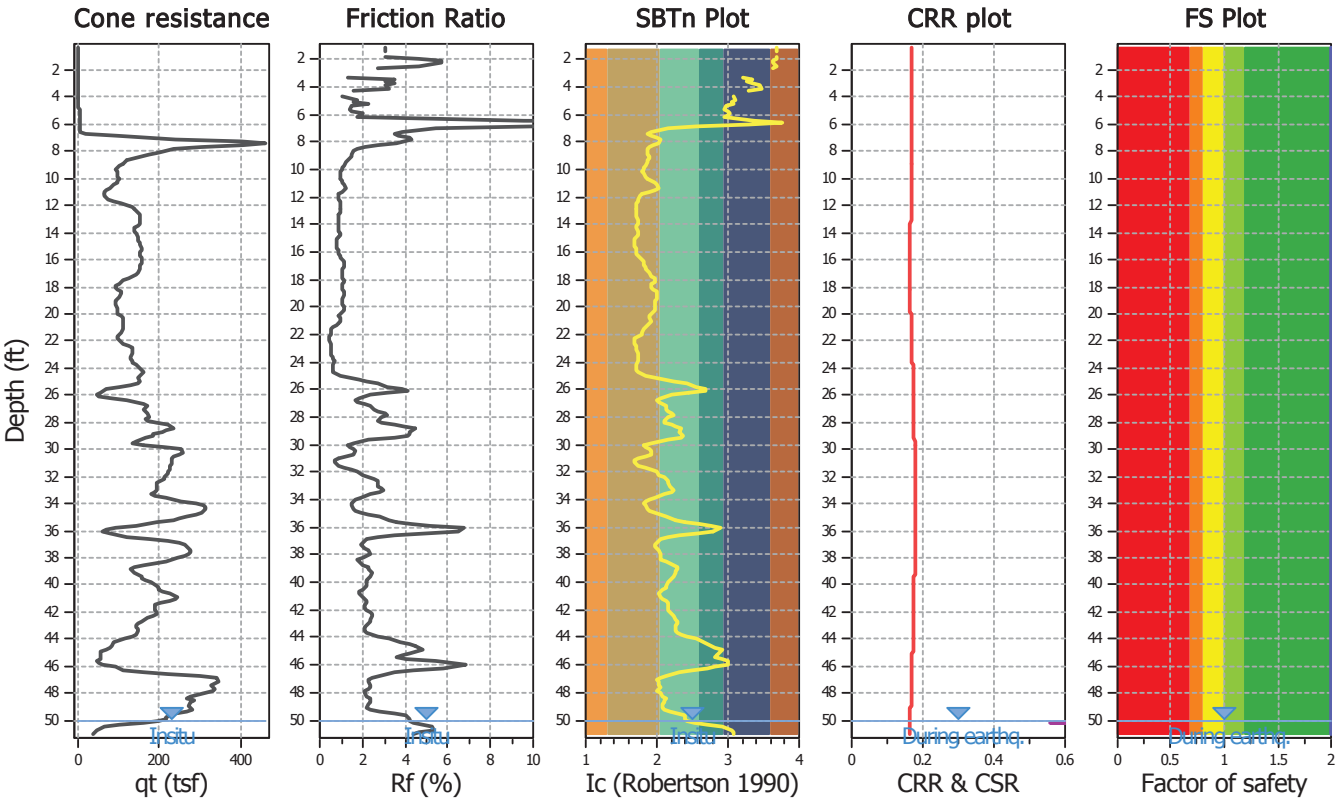
LIQUEFACTION ANALYSIS REPORT

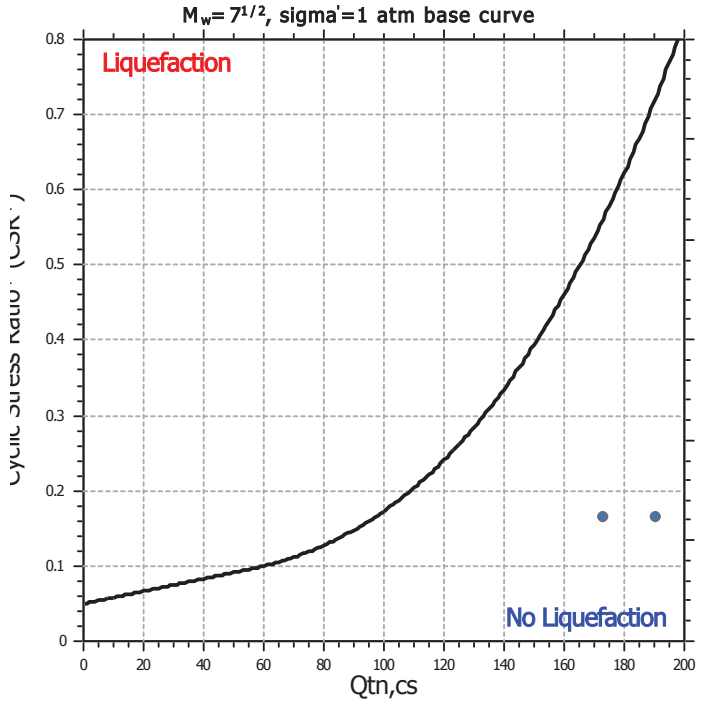
Project title : Kaiser Fresno MOB **Location : Fresno, CA**

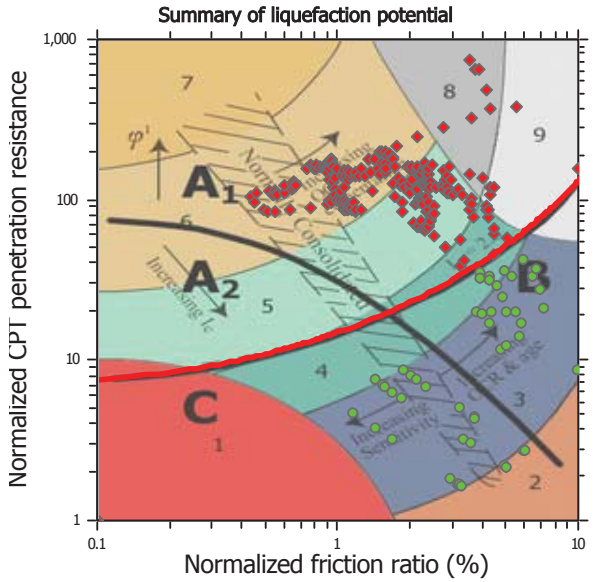
CPT file : CPT-07

Input parameters and analysis data

Analysis method:	NCEER (1998)	**G.W.T. (in-situ):**	50.00 ft	**Use fill:**	No	**Clay like behavior applied:**	Sands only
Fines correction method:	NCEER (1998)	**G.W.T. (earthq.):**	50.00 ft	**Fill height:**	N/A	**Limit depth applie**	No
Points to test:	Based on Ic value	**Average results interva**	3	**Fill weight:**	N/A	**Limit depth:**	N/A
Earthquake magnitude M_w:	6.70	**Ic cut-off value:**	2.60	**Trans. detect. applied:**	No	**MSF method:**	Method based
Peak ground acceleration:	0.35	**Unit weight calculation**	Based on SBT	**K_σ applied:**	Yes		

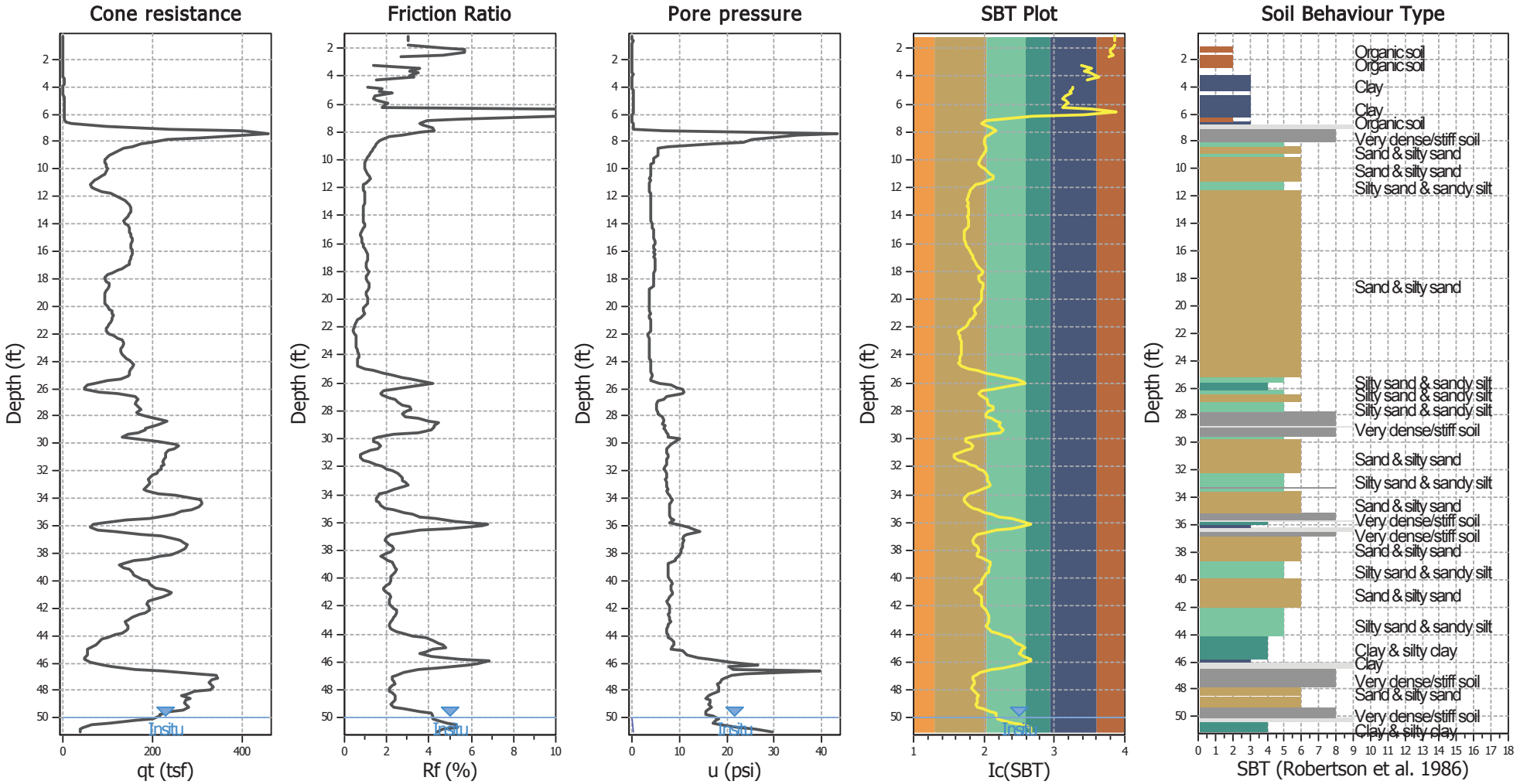






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



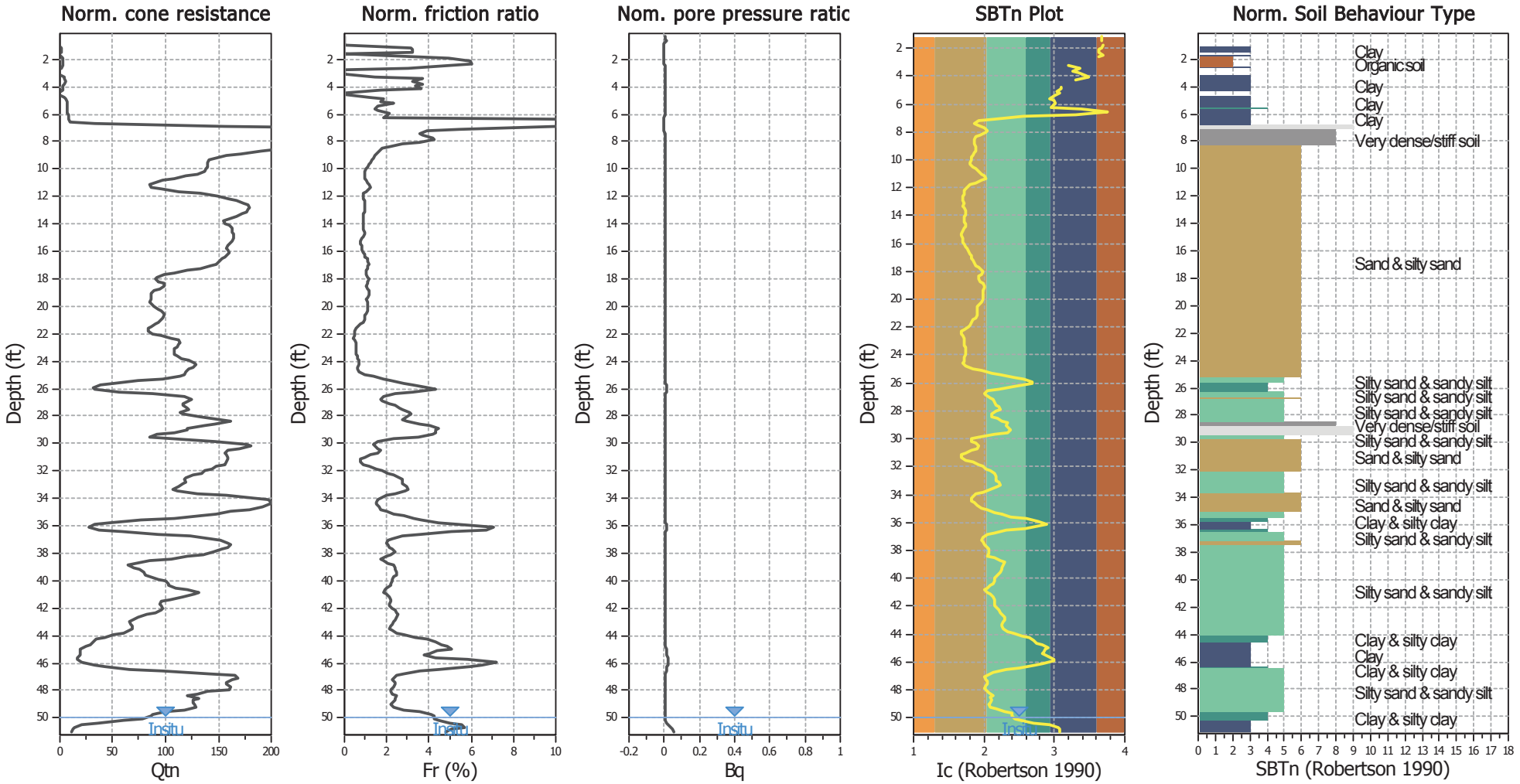
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



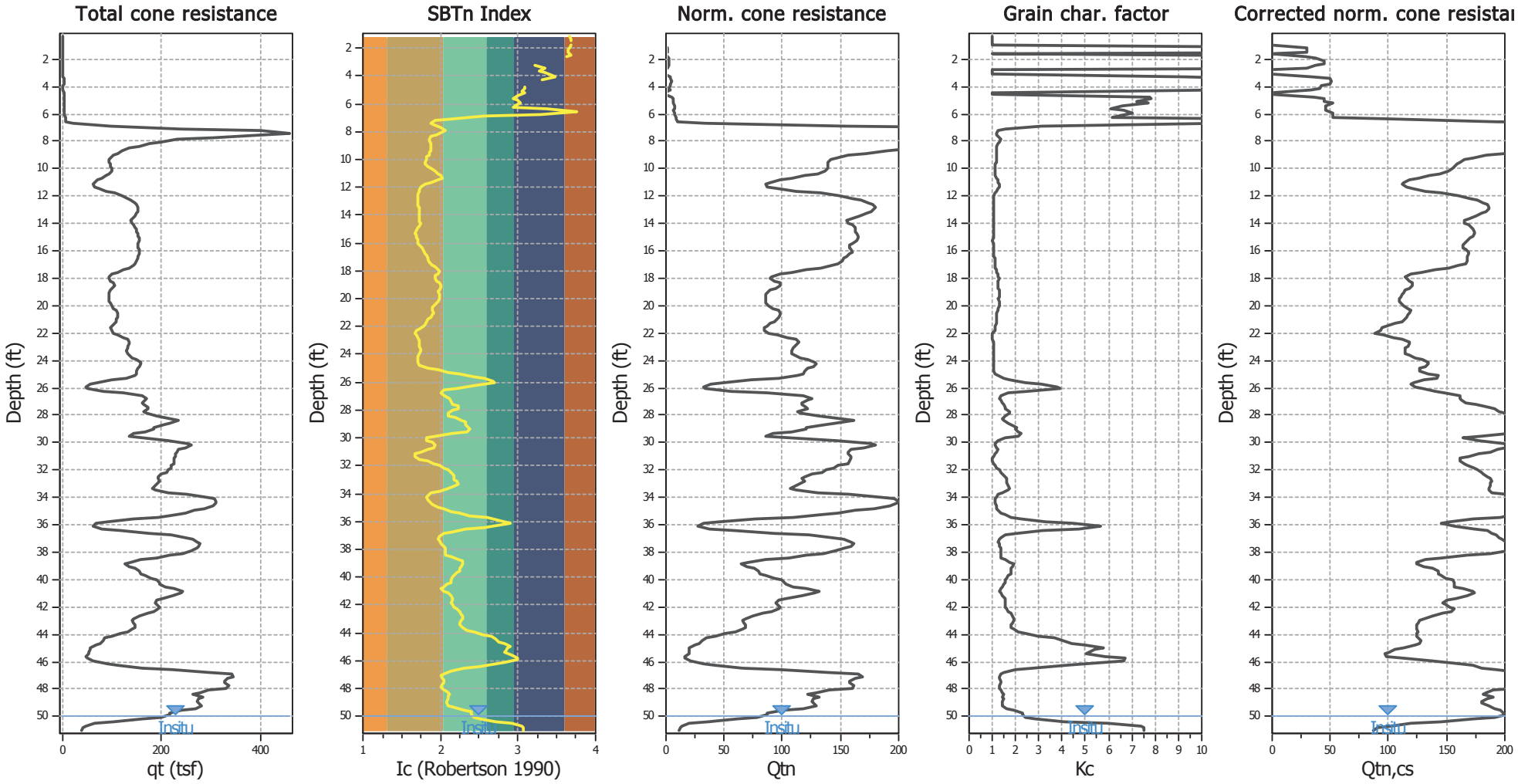
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

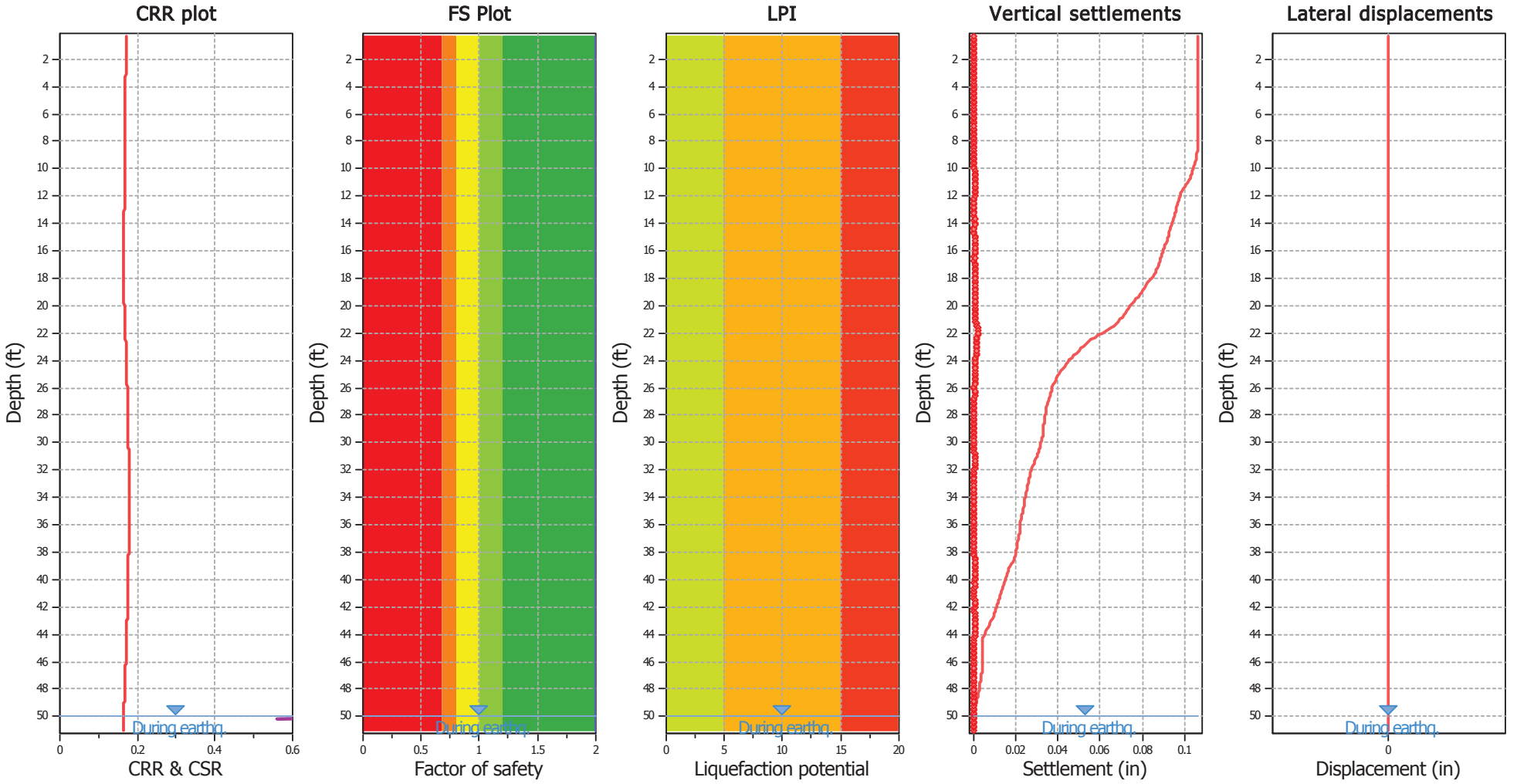
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

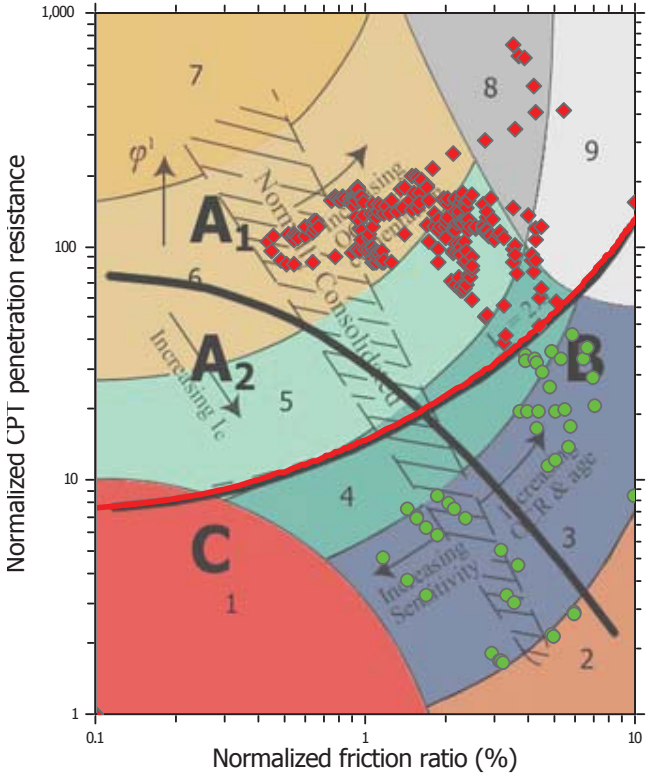
F.S. color scheme

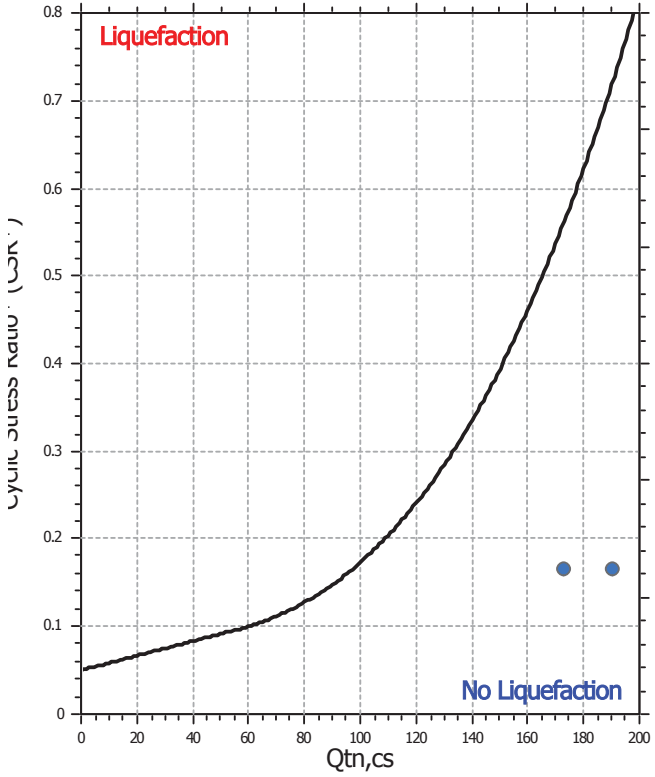
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

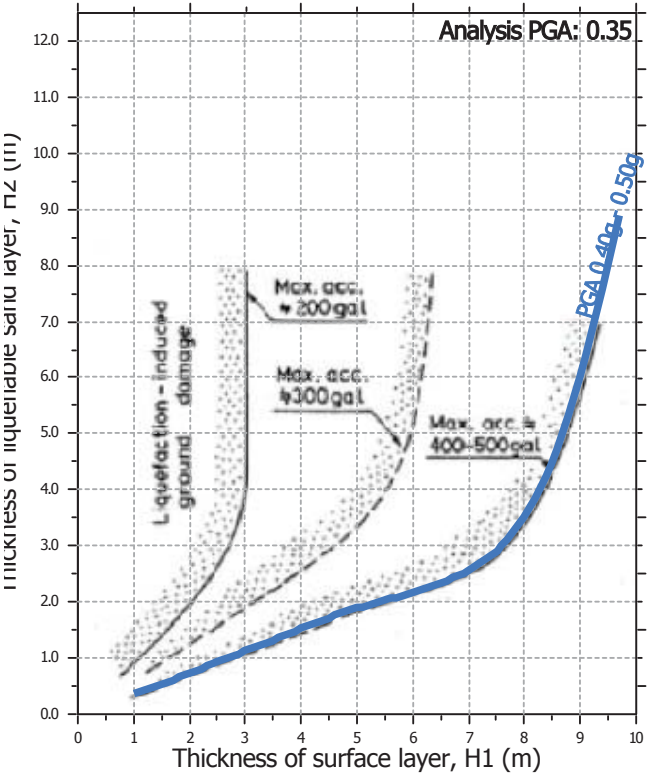
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



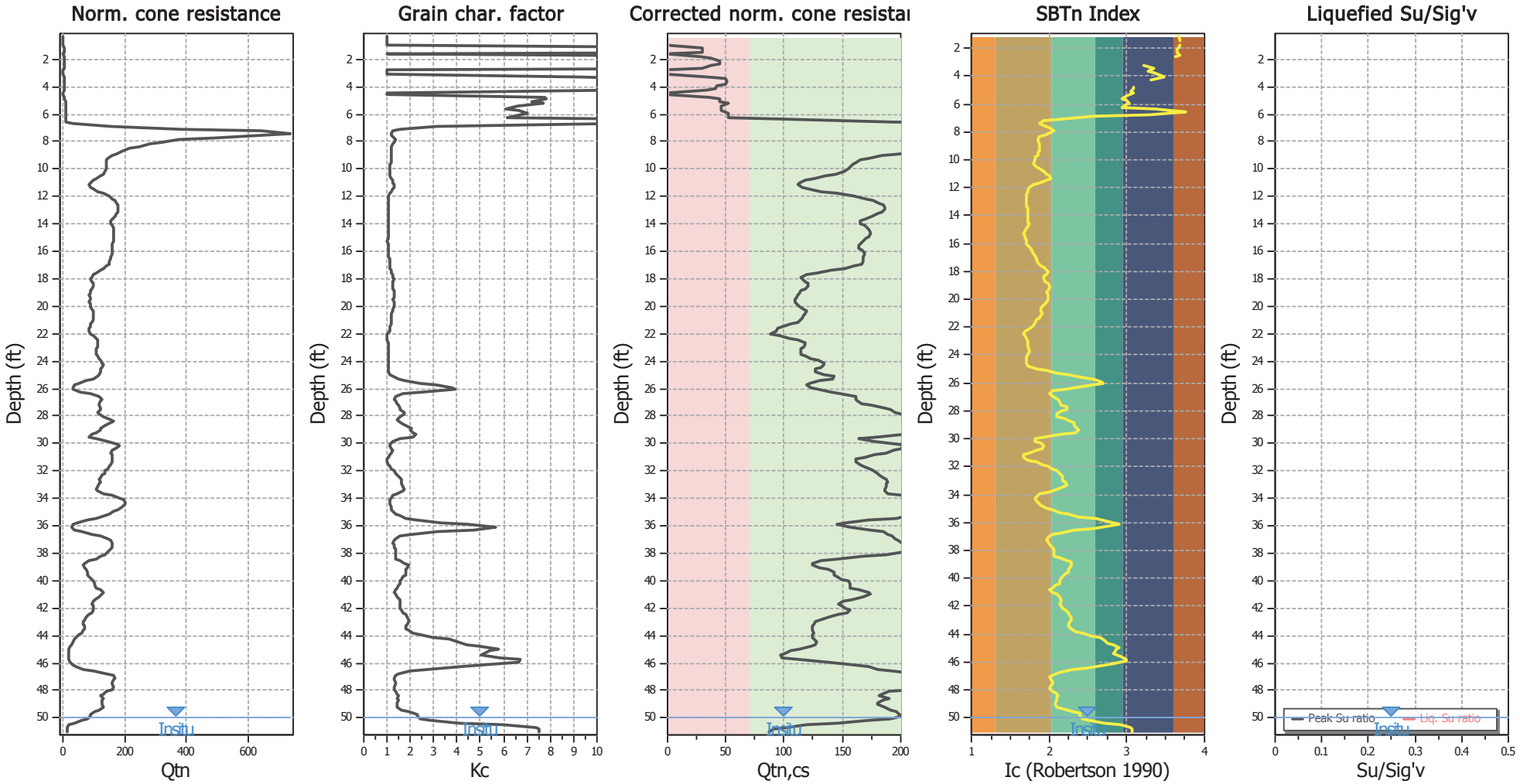




Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

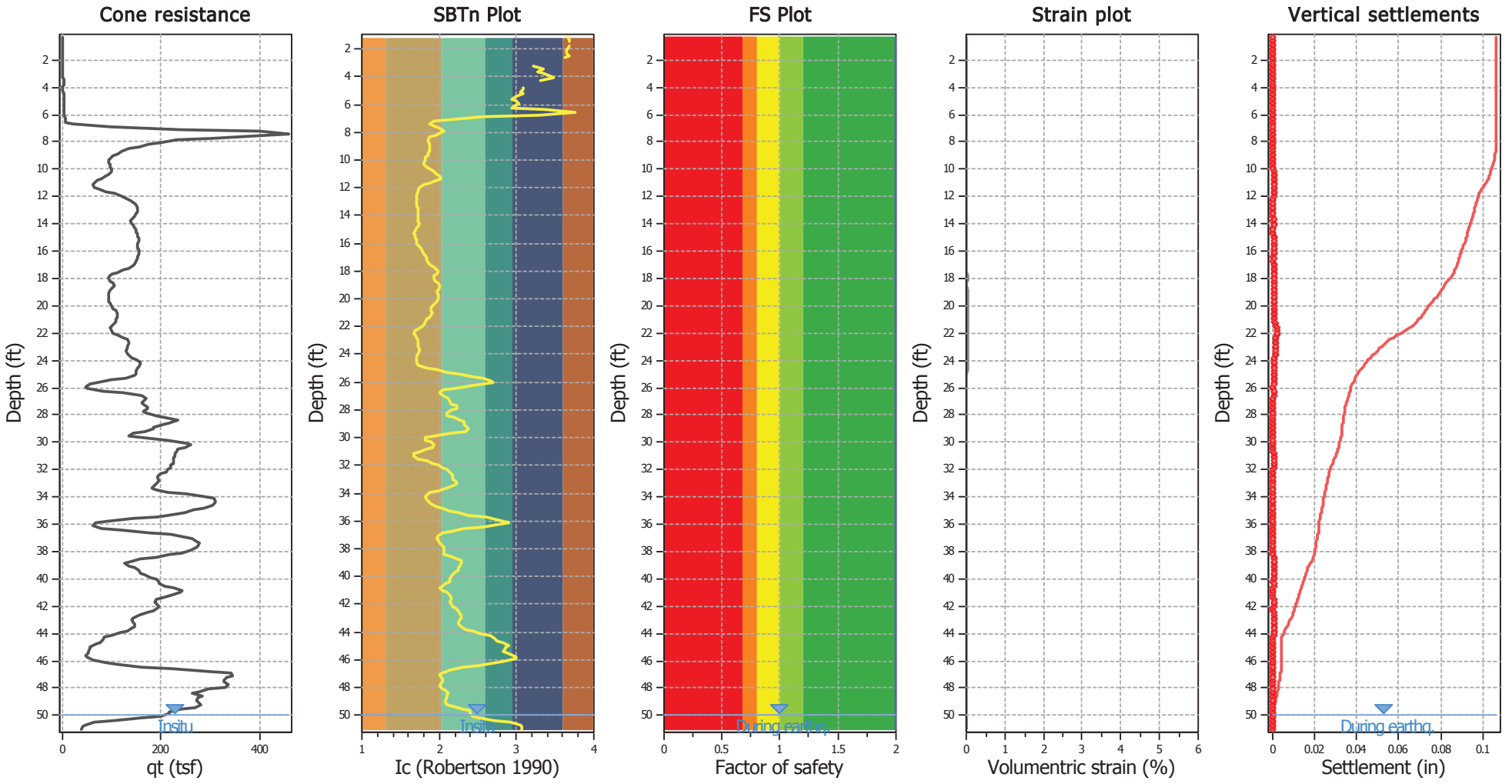
Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement of dry sands ::

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
0.33	-1.00	-1.00	1.00	-1.00	0	0	0.17	0.000	0.00	0.00	0.00	0.000
0.49	-1.00	-1.00	1.00	-1.00	0	0	0.17	0.000	0.00	0.00	0.00	0.000
0.66	-1.00	-1.00	1.00	-1.00	0	0	0.17	0.000	0.00	0.00	0.00	0.000
0.82	-1.00	-1.00	1.00	-1.00	0	0	0.17	0.000	0.00	0.00	0.00	0.000
0.98	-1.00	-1.00	1.00	-1.00	0	0	0.17	0.000	0.00	0.00	0.00	0.000
1.15	3.67	1.69	17.45	29.43	0	0	0.17	0.000	0.00	0.00	0.00	0.000
1.31	3.68	1.68	17.53	29.37	0	0	0.17	0.000	0.00	0.00	0.00	0.000
1.48	3.68	1.66	17.62	29.31	0	0	0.17	0.000	0.00	0.00	0.00	0.000
1.64	-1.00	-1.00	1.00	-1.00	0	0	0.17	0.000	0.00	0.00	0.00	0.000
1.80	3.69	1.64	17.79	29.19	0	0	0.17	0.000	0.00	0.00	0.00	0.000
1.97	3.67	2.16	17.48	37.83	0	0	0.17	0.000	0.00	0.00	0.00	0.000
2.13	3.64	2.69	16.75	45.01	0	0	0.17	0.000	0.00	0.00	0.00	0.000
2.30	3.64	2.68	16.80	44.95	0	0	0.17	0.000	0.00	0.00	0.00	0.000
2.46	3.68	2.13	17.69	37.65	0	0	0.17	0.000	0.00	0.00	0.00	0.000
2.62	3.63	1.80	16.69	29.98	0	0	0.17	0.000	0.00	0.00	0.00	0.000
2.79	-1.00	-1.00	1.00	-1.00	0	0	0.17	0.000	0.00	0.00	0.00	0.000
2.95	-1.00	-1.00	1.00	-1.00	0	0	0.17	0.000	0.00	0.00	0.00	0.000
3.12	-1.00	-1.00	1.00	-1.00	0	0	0.17	0.000	0.00	0.00	0.00	0.000
3.28	3.21	3.73	9.37	34.96	0	0	0.17	0.000	0.00	0.00	0.00	0.000
3.45	3.35	4.31	11.57	49.86	0	0	0.17	0.000	0.00	0.00	0.00	0.000
3.61	3.27	4.99	10.20	50.93	0	0	0.17	0.000	0.00	0.00	0.00	0.000
3.77	3.35	4.34	11.51	49.91	0	0	0.17	0.000	0.00	0.00	0.00	0.000
3.94	3.44	3.20	13.02	41.65	0	0	0.17	0.000	0.00	0.00	0.00	0.000
4.10	3.48	2.97	13.79	41.01	0	0	0.17	0.000	0.00	0.00	0.00	0.000
4.27	3.30	3.18	10.74	34.14	0	0	0.17	0.000	0.00	0.00	0.00	0.000
4.43	-1.00	-1.00	1.00	-1.00	0	0	0.17	0.000	0.00	0.00	0.00	0.000
4.59	-1.00	-1.00	1.00	-1.00	0	0	0.17	0.000	0.00	0.00	0.00	0.000
4.76	3.09	4.59	7.79	35.76	0	0	0.17	0.000	0.00	0.00	0.00	0.000
4.92	3.09	5.76	7.83	45.08	0	0	0.17	0.000	0.00	0.00	0.00	0.000
5.09	3.04	6.28	7.21	45.29	0	0	0.17	0.000	0.00	0.00	0.00	0.000
5.25	3.08	6.80	7.69	52.34	0	0	0.17	0.000	0.00	0.00	0.00	0.000
5.41	2.99	6.90	6.59	45.44	0	0	0.17	0.000	0.00	0.00	0.00	0.000
5.58	2.94	7.47	6.09	45.49	0	0	0.17	0.000	0.00	0.00	0.00	0.000
5.74	2.99	6.82	6.66	45.42	0	0	0.17	0.000	0.00	0.00	0.00	0.000
5.91	3.02	7.50	7.00	52.53	0	0	0.17	0.000	0.00	0.00	0.00	0.000
6.07	2.99	7.86	6.69	52.58	0	0	0.17	0.000	0.00	0.00	0.00	0.000
6.23	2.95	8.54	6.16	52.61	0	0	0.17	0.000	0.00	0.00	0.00	0.000
6.40	3.37	8.53	11.90	101.47	0	0	0.17	0.000	0.00	0.00	0.00	0.000
6.56	3.75	10.12	19.19	194.23	0	0	0.17	0.000	0.00	0.00	0.00	0.000
6.73	3.30	33.08	10.72	354.61	0	0	0.17	0.000	0.00	0.00	0.00	0.000
6.89	2.56	155.49	3.11	482.84	128	2235	0.17	0.003	0.00	8.63	0.00	0.000
7.05	2.15	383.50	1.55	595.92	132	3272	0.17	0.002	0.00	8.63	0.00	0.000
7.22	1.93	642.11	1.22	781.56	158	4137	0.17	0.002	0.00	8.63	0.00	0.000
7.38	1.87	736.67	1.16	855.73	170	4404	0.17	0.002	0.00	8.63	0.00	0.000
7.55	1.91	651.83	1.20	779.89	157	4090	0.17	0.002	0.00	8.63	0.00	0.000
7.71	2.00	487.20	1.30	634.16	132	3441	0.17	0.003	0.00	8.63	0.00	0.000
7.87	2.06	373.30	1.38	516.04	110	2830	0.17	0.003	0.00	8.63	0.00	0.000
8.04	2.02	319.58	1.33	424.19	89	2312	0.17	0.004	0.00	8.63	0.00	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
8.20	1.95	282.32	1.24	350.04	71	1868	0.17	0.005	0.00	8.63	0.00	0.000
8.37	1.89	248.63	1.18	292.17	58	1516	0.17	0.007	0.00	8.63	0.00	0.000
8.53	1.86	215.59	1.15	247.81	49	1283	0.17	0.009	0.00	8.63	0.00	0.000
8.69	1.86	190.49	1.15	219.62	43	1153	0.17	0.010	0.00	8.63	0.00	0.000
8.86	1.87	170.93	1.16	198.24	39	1057	0.17	0.012	0.01	8.63	0.00	0.000
9.02	1.88	157.08	1.17	184.28	37	998	0.17	0.013	0.01	8.63	0.00	0.000
9.19	1.88	146.91	1.17	172.30	34	946	0.17	0.014	0.01	8.63	0.01	0.000
9.35	1.88	141.30	1.17	165.16	33	916	0.17	0.015	0.01	8.63	0.01	0.000
9.51	1.86	139.37	1.16	161.25	32	903	0.17	0.016	0.01	8.63	0.01	0.000
9.68	1.85	139.08	1.15	159.49	31	901	0.17	0.016	0.01	8.63	0.01	0.000
9.84	1.83	139.23	1.13	156.98	31	891	0.17	0.017	0.01	8.63	0.01	0.000
10.01	1.81	139.04	1.12	155.39	30	888	0.17	0.018	0.01	8.63	0.01	0.000
10.17	1.80	136.55	1.11	151.34	29	870	0.17	0.018	0.01	8.63	0.01	0.000
10.34	1.81	129.82	1.11	144.63	28	843	0.17	0.020	0.01	8.63	0.01	0.000
10.50	1.84	119.83	1.13	135.90	27	807	0.17	0.022	0.02	8.63	0.01	0.000
10.66	1.88	108.00	1.17	126.07	25	765	0.17	0.024	0.02	8.63	0.01	0.001
10.83	1.93	97.57	1.21	118.53	24	736	0.17	0.026	0.02	8.63	0.02	0.001
10.99	1.97	89.33	1.26	112.52	23	710	0.17	0.028	0.02	8.63	0.02	0.001
11.16	2.01	85.18	1.31	111.74	23	714	0.17	0.029	0.02	8.63	0.02	0.001
11.32	2.02	86.48	1.33	115.01	24	743	0.17	0.027	0.02	8.63	0.02	0.001
11.48	1.97	95.51	1.26	120.22	25	782	0.17	0.026	0.02	8.63	0.02	0.001
11.65	1.88	112.28	1.17	131.59	26	848	0.17	0.023	0.02	8.63	0.01	0.001
11.81	1.79	132.37	1.10	145.88	28	918	0.17	0.021	0.01	8.63	0.01	0.000
11.98	1.75	149.16	1.07	160.14	30	999	0.17	0.019	0.01	8.63	0.01	0.000
12.14	1.73	160.75	1.06	169.97	32	1058	0.17	0.018	0.01	8.63	0.01	0.000
12.30	1.72	167.67	1.05	176.76	33	1107	0.17	0.017	0.01	8.63	0.01	0.000
12.47	1.71	173.65	1.05	181.96	34	1144	0.17	0.016	0.01	8.63	0.01	0.000
12.63	1.71	177.54	1.04	184.95	35	1167	0.17	0.016	0.01	8.63	0.01	0.000
12.80	1.70	179.56	1.04	186.77	35	1187	0.17	0.016	0.01	8.63	0.01	0.000
12.96	1.70	178.59	1.04	185.89	35	1191	0.17	0.016	0.01	8.63	0.01	0.000
13.12	1.71	176.23	1.05	184.17	34	1192	0.17	0.017	0.01	8.63	0.01	0.000
13.29	1.71	172.11	1.04	179.60	34	1170	0.17	0.017	0.01	8.63	0.01	0.000
13.45	1.72	166.63	1.05	175.08	33	1155	0.17	0.018	0.01	8.63	0.01	0.000
13.62	1.73	159.09	1.06	168.38	32	1125	0.17	0.019	0.01	8.63	0.01	0.000
13.78	1.74	155.24	1.06	164.86	31	1113	0.17	0.019	0.01	8.63	0.01	0.000
13.94	1.73	156.13	1.06	165.21	31	1119	0.17	0.020	0.01	8.63	0.01	0.000
14.11	1.72	160.49	1.05	168.56	32	1144	0.17	0.019	0.01	8.63	0.01	0.000
14.27	1.72	162.63	1.05	171.38	32	1174	0.17	0.019	0.01	8.63	0.01	0.000
14.44	1.73	163.00	1.06	172.20	32	1190	0.17	0.019	0.01	8.63	0.01	0.000
14.60	1.74	162.82	1.07	173.48	33	1216	0.17	0.019	0.01	8.63	0.01	0.000
14.76	1.73	163.85	1.06	173.91	33	1223	0.17	0.019	0.01	8.63	0.01	0.000
14.93	1.71	164.73	1.05	172.61	32	1209	0.17	0.019	0.01	8.63	0.01	0.000
15.09	1.69	164.88	1.03	169.94	32	1182	0.17	0.020	0.01	8.63	0.01	0.000
15.26	1.68	163.66	1.02	167.20	31	1162	0.17	0.021	0.01	8.63	0.01	0.000
15.42	1.69	160.67	1.03	165.22	31	1161	0.16	0.021	0.01	8.63	0.01	0.000
15.58	1.69	158.33	1.03	163.61	30	1162	0.16	0.022	0.01	8.63	0.01	0.000
15.75	1.70	157.93	1.04	164.04	31	1177	0.16	0.021	0.01	8.63	0.01	0.000
15.91	1.71	159.56	1.04	166.52	31	1207	0.16	0.021	0.01	8.63	0.01	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
16.08	1.72	160.77	1.05	168.69	32	1236	0.16	0.021	0.01	8.63	0.01	0.000
16.24	1.74	158.38	1.06	168.51	32	1257	0.16	0.020	0.01	8.63	0.01	0.000
16.40	1.76	155.56	1.08	167.97	32	1278	0.16	0.020	0.01	8.63	0.01	0.000
16.57	1.79	152.92	1.10	168.17	32	1309	0.16	0.020	0.01	8.63	0.01	0.000
16.73	1.81	151.27	1.11	168.28	33	1330	0.16	0.020	0.01	8.63	0.01	0.000
16.90	1.82	147.92	1.12	165.88	32	1329	0.16	0.020	0.01	8.63	0.01	0.000
17.06	1.83	142.29	1.13	160.63	31	1301	0.16	0.021	0.01	8.63	0.01	0.000
17.23	1.84	132.85	1.14	151.48	30	1245	0.16	0.022	0.01	8.63	0.01	0.000
17.39	1.86	121.02	1.16	140.01	28	1169	0.16	0.025	0.02	8.63	0.01	0.000
17.55	1.89	108.37	1.18	127.94	26	1089	0.16	0.028	0.02	8.63	0.02	0.001
17.72	1.92	98.06	1.21	118.97	24	1034	0.16	0.030	0.02	8.63	0.02	0.001
17.88	1.97	91.11	1.26	114.87	24	1020	0.16	0.031	0.03	8.63	0.02	0.001
18.05	1.98	89.76	1.28	114.94	24	1033	0.16	0.031	0.03	8.63	0.02	0.001
18.21	1.96	93.78	1.26	117.84	24	1059	0.16	0.030	0.02	8.63	0.02	0.001
18.37	1.93	98.54	1.22	120.35	24	1075	0.16	0.030	0.02	8.63	0.02	0.001
18.54	1.93	98.40	1.22	120.10	24	1078	0.16	0.030	0.02	8.63	0.02	0.001
18.70	1.95	94.53	1.25	117.72	24	1073	0.16	0.031	0.02	8.63	0.02	0.001
18.87	1.99	89.31	1.28	114.72	24	1063	0.16	0.031	0.03	8.63	0.02	0.001
19.03	2.00	86.86	1.30	113.29	24	1061	0.16	0.032	0.03	8.63	0.02	0.001
19.19	2.00	85.64	1.30	111.53	23	1050	0.16	0.033	0.03	8.63	0.02	0.001
19.36	1.99	85.97	1.29	110.55	23	1043	0.16	0.034	0.03	8.63	0.02	0.001
19.52	1.98	86.29	1.27	109.61	23	1036	0.17	0.034	0.03	8.63	0.02	0.001
19.69	1.98	85.60	1.27	109.07	23	1038	0.17	0.035	0.03	8.63	0.02	0.001
19.85	1.98	85.99	1.28	110.07	23	1054	0.17	0.034	0.03	8.63	0.02	0.001
20.01	1.98	88.58	1.28	113.13	23	1089	0.17	0.033	0.03	8.63	0.02	0.001
20.18	1.97	92.49	1.26	116.84	24	1126	0.17	0.031	0.03	8.63	0.02	0.001
20.34	1.94	96.58	1.23	118.98	24	1141	0.17	0.031	0.02	8.63	0.02	0.001
20.51	1.91	98.37	1.20	118.26	24	1125	0.17	0.032	0.03	8.63	0.02	0.001
20.67	1.90	98.29	1.19	116.50	23	1104	0.17	0.033	0.03	8.63	0.02	0.001
20.83	1.90	97.31	1.19	115.76	23	1105	0.17	0.034	0.03	8.63	0.02	0.001
21.00	1.91	95.50	1.20	114.52	23	1104	0.17	0.034	0.03	8.63	0.02	0.001
21.16	1.90	93.67	1.19	111.66	22	1078	0.17	0.036	0.03	8.63	0.02	0.001
21.33	1.88	89.85	1.17	105.03	21	1005	0.17	0.040	0.04	8.63	0.03	0.001
21.49	1.84	86.38	1.14	98.44	19	927	0.17	0.047	0.05	8.63	0.04	0.001
21.65	1.82	84.08	1.12	94.20	18	877	0.17	0.053	0.06	8.63	0.05	0.002
21.82	1.80	84.22	1.11	93.32	18	863	0.17	0.055	0.06	8.63	0.05	0.002
21.98	1.78	87.62	1.00	87.62	17	873	0.17	0.054	0.07	8.63	0.05	0.002
22.15	1.72	95.79	1.00	95.79	18	893	0.17	0.053	0.06	8.63	0.05	0.002
22.31	1.68	104.97	1.00	104.97	19	931	0.17	0.049	0.05	8.63	0.04	0.002
22.47	1.67	111.83	1.00	111.83	21	980	0.17	0.045	0.04	8.63	0.03	0.001
22.64	1.70	113.79	1.04	117.85	22	1034	0.17	0.042	0.04	8.63	0.03	0.001
22.80	1.71	112.84	1.05	118.01	22	1050	0.17	0.041	0.04	8.63	0.03	0.001
22.97	1.72	110.71	1.05	116.55	22	1049	0.17	0.041	0.04	8.63	0.03	0.001
23.13	1.72	108.87	1.05	114.46	22	1033	0.17	0.043	0.04	8.63	0.03	0.001
23.30	1.72	107.79	1.05	113.68	21	1034	0.17	0.043	0.04	8.63	0.03	0.001
23.46	1.73	108.30	1.06	114.75	22	1053	0.17	0.042	0.04	8.63	0.03	0.001
23.62	1.74	110.99	1.06	118.02	22	1091	0.17	0.040	0.04	8.63	0.03	0.001
23.79	1.74	115.71	1.07	123.30	23	1148	0.17	0.037	0.03	8.63	0.02	0.001

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
23.95	1.74	122.02	1.06	129.55	24	1205	0.17	0.035	0.03	8.63	0.02	0.001
24.12	1.72	127.66	1.05	133.86	25	1233	0.17	0.034	0.03	8.63	0.02	0.001
24.28	1.71	128.90	1.04	134.58	25	1238	0.17	0.034	0.03	8.63	0.02	0.001
24.44	1.71	126.29	1.05	132.10	25	1222	0.17	0.035	0.03	8.63	0.02	0.001
24.61	1.70	122.27	1.04	127.21	24	1175	0.17	0.038	0.03	8.63	0.02	0.001
24.77	1.74	119.17	1.06	126.56	24	1201	0.17	0.037	0.03	8.63	0.02	0.001
24.94	1.85	117.47	1.14	134.22	26	1386	0.17	0.030	0.02	8.63	0.02	0.001
25.10	1.97	113.09	1.26	142.42	29	1583	0.17	0.025	0.02	8.63	0.01	0.000
25.26	2.10	96.73	1.46	141.24	31	1642	0.17	0.024	0.01	8.63	0.01	0.000
25.43	2.24	73.89	1.77	130.68	30	1524	0.17	0.027	0.02	8.63	0.01	0.001
25.59	2.43	50.14	2.44	122.23	30	1355	0.17	0.032	0.02	8.63	0.01	0.001
25.76	2.56	38.44	3.09	118.69	31	1253	0.17	0.036	0.02	8.63	0.02	0.001
25.92	2.67	32.10	3.82	122.51	0	0	0.17	0.000	0.00	0.00	0.00	0.000
26.08	2.69	33.03	3.93	129.71	0	0	0.17	0.000	0.00	0.00	0.00	0.000
26.25	2.44	56.43	2.48	140.07	35	1582	0.17	0.026	0.01	8.63	0.01	0.000
26.41	2.21	87.43	1.69	147.83	33	1782	0.17	0.023	0.01	8.63	0.01	0.000
26.58	2.05	118.07	1.36	161.05	34	1919	0.17	0.021	0.01	8.63	0.01	0.000
26.74	2.00	124.87	1.30	161.91	34	1905	0.17	0.021	0.01	8.63	0.01	0.000
26.90	2.03	121.36	1.34	162.18	34	1938	0.17	0.021	0.01	8.63	0.01	0.000
27.07	2.09	116.45	1.43	166.81	36	2036	0.17	0.020	0.01	8.63	0.01	0.000
27.23	2.13	116.69	1.51	175.76	38	2169	0.17	0.018	0.01	8.63	0.01	0.000
27.40	2.14	121.10	1.54	185.97	41	2309	0.17	0.017	0.01	8.63	0.01	0.000
27.56	2.16	121.34	1.58	191.61	43	2393	0.17	0.017	0.01	8.63	0.01	0.000
27.72	2.22	113.51	1.72	195.21	44	2446	0.18	0.016	0.01	8.63	0.00	0.000
27.89	2.22	115.87	1.73	200.11	46	2520	0.18	0.016	0.01	8.63	0.00	0.000
28.05	2.16	132.25	1.58	209.15	46	2650	0.18	0.015	0.01	8.63	0.00	0.000
28.22	2.10	152.09	1.46	221.67	48	2802	0.18	0.014	0.00	8.63	0.00	0.000
28.38	2.10	161.47	1.46	236.33	51	3003	0.18	0.013	0.00	8.63	0.00	0.000
28.54	2.20	145.90	1.66	242.53	55	3118	0.18	0.013	0.00	8.63	0.00	0.000
28.71	2.26	137.00	1.82	249.88	58	3212	0.18	0.012	0.00	8.63	0.00	0.000
28.87	2.33	121.12	2.05	247.79	59	3158	0.18	0.013	0.00	8.63	0.00	0.000
29.04	2.32	120.42	2.00	240.91	57	3096	0.18	0.013	0.00	8.63	0.00	0.000
29.20	2.34	107.92	2.10	226.30	54	2903	0.18	0.014	0.00	8.63	0.00	0.000
29.36	2.38	92.14	2.22	204.12	50	2609	0.18	0.016	0.01	8.63	0.00	0.000
29.53	2.34	85.52	2.09	178.79	43	2318	0.18	0.019	0.01	8.63	0.01	0.000
29.69	2.15	105.68	1.55	163.54	36	2167	0.18	0.020	0.01	8.63	0.01	0.000
29.86	1.92	146.90	1.21	178.15	36	2184	0.18	0.020	0.01	8.63	0.01	0.000
30.02	1.82	176.80	1.12	198.61	39	2272	0.18	0.019	0.01	8.63	0.01	0.000
30.19	1.83	180.65	1.13	203.86	40	2353	0.18	0.019	0.01	8.63	0.01	0.000
30.35	1.89	169.83	1.18	199.59	40	2410	0.18	0.018	0.01	8.63	0.01	0.000
30.51	1.93	158.96	1.22	193.67	39	2418	0.18	0.018	0.01	8.63	0.01	0.000
30.68	1.91	156.12	1.20	187.07	38	2314	0.18	0.019	0.01	8.63	0.01	0.000
30.84	1.83	156.93	1.13	177.41	35	2080	0.18	0.022	0.01	8.63	0.01	0.000
31.01	1.74	159.20	1.06	169.16	32	1840	0.18	0.026	0.01	8.63	0.01	0.000
31.17	1.67	158.59	1.02	161.89	30	1678	0.18	0.030	0.02	8.63	0.01	0.001
31.33	1.68	157.67	1.02	161.24	30	1680	0.18	0.030	0.02	8.63	0.01	0.001
31.50	1.73	156.22	1.06	165.45	31	1808	0.18	0.027	0.02	8.63	0.01	0.001
31.66	1.84	148.20	1.13	167.93	33	2007	0.18	0.024	0.01	8.63	0.01	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
31.83	1.92	144.44	1.20	173.86	35	2211	0.18	0.021	0.01	8.63	0.01	0.000
31.99	1.99	137.48	1.28	176.57	37	2353	0.18	0.020	0.01	8.63	0.01	0.000
32.15	2.03	133.91	1.35	180.44	38	2465	0.18	0.019	0.01	8.63	0.01	0.000
32.32	2.10	125.57	1.45	181.57	39	2541	0.18	0.018	0.01	8.63	0.01	0.000
32.48	2.14	119.81	1.54	184.58	41	2619	0.18	0.018	0.01	8.63	0.01	0.000
32.65	2.17	117.36	1.59	187.03	42	2673	0.18	0.017	0.01	8.63	0.01	0.000
32.81	2.17	118.89	1.59	188.76	42	2708	0.18	0.017	0.01	8.63	0.01	0.000
32.97	2.18	116.61	1.61	187.71	42	2705	0.18	0.017	0.01	8.63	0.01	0.000
33.14	2.20	111.82	1.68	187.53	42	2718	0.18	0.017	0.01	8.63	0.01	0.000
33.30	2.23	107.20	1.74	186.55	43	2715	0.18	0.017	0.01	8.63	0.01	0.000
33.47	2.20	111.64	1.66	185.75	42	2714	0.18	0.017	0.01	8.63	0.01	0.000
33.63	2.09	130.76	1.44	188.45	41	2717	0.18	0.018	0.01	8.63	0.01	0.000
33.79	1.98	157.82	1.27	200.95	41	2771	0.18	0.017	0.01	8.63	0.01	0.000
33.96	1.88	183.80	1.17	215.69	43	2802	0.18	0.017	0.01	8.63	0.01	0.000
34.12	1.84	196.74	1.14	223.64	44	2816	0.18	0.017	0.01	8.63	0.01	0.000
34.29	1.82	199.68	1.12	223.84	44	2780	0.18	0.017	0.01	8.63	0.01	0.000
34.45	1.83	198.75	1.13	224.40	44	2820	0.18	0.017	0.01	8.63	0.01	0.000
34.61	1.86	192.24	1.15	221.45	44	2857	0.18	0.017	0.01	8.63	0.01	0.000
34.78	1.89	179.42	1.18	212.31	42	2825	0.18	0.017	0.01	8.63	0.01	0.000
34.94	1.97	162.13	1.26	204.43	42	2869	0.18	0.017	0.01	8.63	0.01	0.000
35.11	2.05	148.05	1.37	203.09	43	2981	0.18	0.016	0.01	8.63	0.01	0.000
35.27	2.14	134.44	1.54	206.60	45	3126	0.18	0.016	0.01	8.63	0.00	0.000
35.43	2.25	108.71	1.80	195.68	45	2996	0.18	0.016	0.01	8.63	0.00	0.000
35.60	2.38	77.06	2.24	172.92	42	2612	0.18	0.019	0.01	8.63	0.01	0.000
35.76	2.60	45.94	3.32	152.56	41	2180	0.18	0.024	0.01	8.63	0.01	0.000
35.93	2.76	32.75	4.45	145.69	0	0	0.18	0.000	0.00	0.00	0.00	0.000
36.09	2.90	27.52	5.68	156.32	0	0	0.18	0.000	0.00	0.00	0.00	0.000
36.26	2.80	36.73	4.75	174.38	0	0	0.18	0.000	0.00	0.00	0.00	0.000
36.42	2.57	58.42	3.16	184.69	49	2706	0.18	0.019	0.01	8.63	0.01	0.000
36.58	2.33	93.01	2.03	189.01	45	2951	0.18	0.017	0.01	8.63	0.01	0.000
36.75	2.15	123.29	1.56	192.67	43	3016	0.18	0.017	0.01	8.63	0.01	0.000
36.91	2.05	142.47	1.37	194.91	41	2964	0.18	0.017	0.01	8.63	0.01	0.000
37.08	2.00	152.42	1.30	197.39	41	2935	0.18	0.017	0.01	8.63	0.01	0.000
37.24	1.97	158.94	1.27	201.41	42	2965	0.18	0.017	0.01	8.63	0.01	0.000
37.40	1.98	160.98	1.28	205.70	43	3053	0.18	0.017	0.01	8.63	0.01	0.000
37.57	2.01	158.54	1.31	207.35	43	3129	0.18	0.016	0.01	8.63	0.01	0.000
37.73	2.03	153.65	1.35	206.66	44	3171	0.18	0.016	0.01	8.63	0.00	0.000
37.90	2.06	145.48	1.39	202.60	43	3162	0.18	0.016	0.01	8.63	0.01	0.000
38.06	2.06	135.17	1.39	187.31	40	2928	0.18	0.018	0.01	8.63	0.01	0.000
38.22	2.06	120.95	1.38	167.45	36	2624	0.18	0.021	0.01	8.63	0.01	0.000
38.39	2.05	105.71	1.38	145.62	31	2285	0.18	0.024	0.01	8.63	0.01	0.000
38.55	2.14	85.47	1.54	131.42	29	2130	0.18	0.027	0.02	8.63	0.01	0.001
38.72	2.23	71.36	1.74	124.51	28	2048	0.18	0.028	0.02	8.63	0.01	0.001
38.88	2.29	64.52	1.93	124.24	29	2048	0.18	0.028	0.02	8.63	0.01	0.001
39.04	2.28	69.30	1.88	130.53	30	2161	0.18	0.027	0.02	8.63	0.01	0.000
39.21	2.26	75.43	1.83	138.06	32	2294	0.18	0.025	0.01	8.63	0.01	0.000
39.37	2.26	78.94	1.81	143.16	33	2387	0.18	0.024	0.01	8.63	0.01	0.000
39.54	2.24	80.67	1.78	143.33	33	2397	0.18	0.024	0.01	8.63	0.01	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
39.70	2.21	85.17	1.70	144.83	33	2426	0.18	0.023	0.01	8.63	0.01	0.000
39.86	2.17	92.77	1.61	149.06	33	2493	0.18	0.023	0.01	8.63	0.01	0.000
40.03	2.15	99.67	1.56	155.25	34	2593	0.18	0.022	0.01	8.63	0.01	0.000
40.19	2.14	102.19	1.54	156.97	35	2624	0.18	0.021	0.01	8.63	0.01	0.000
40.36	2.13	103.03	1.52	156.17	34	2612	0.18	0.021	0.01	8.63	0.01	0.000
40.52	2.09	109.32	1.44	156.89	34	2596	0.18	0.022	0.01	8.63	0.01	0.000
40.68	2.04	120.88	1.36	164.16	35	2669	0.18	0.021	0.01	8.63	0.01	0.000
40.85	2.01	131.08	1.32	172.72	36	2775	0.18	0.020	0.01	8.63	0.01	0.000
41.01	2.04	127.75	1.36	173.89	37	2847	0.18	0.020	0.01	8.63	0.01	0.000
41.18	2.09	116.66	1.44	167.82	36	2812	0.17	0.020	0.01	8.63	0.01	0.000
41.34	2.14	103.47	1.53	158.02	35	2696	0.17	0.021	0.01	8.63	0.01	0.000
41.50	2.15	96.46	1.56	150.49	33	2585	0.17	0.022	0.01	8.63	0.01	0.000
41.67	2.15	94.30	1.55	146.63	32	2525	0.17	0.023	0.01	8.63	0.01	0.000
41.83	2.15	96.27	1.54	148.65	33	2564	0.17	0.023	0.01	8.63	0.01	0.000
42.00	2.16	97.80	1.57	153.28	34	2659	0.17	0.022	0.01	8.63	0.01	0.000
42.16	2.18	96.28	1.62	156.31	35	2733	0.17	0.021	0.01	8.63	0.01	0.000
42.32	2.21	90.64	1.70	154.35	35	2719	0.17	0.021	0.01	8.63	0.01	0.000
42.49	2.24	82.69	1.78	147.04	34	2605	0.17	0.022	0.01	8.63	0.01	0.000
42.65	2.27	74.36	1.85	137.60	32	2447	0.17	0.024	0.01	8.63	0.01	0.000
42.82	2.29	68.37	1.90	130.13	30	2322	0.17	0.026	0.02	8.63	0.01	0.000
42.98	2.29	65.93	1.92	126.64	30	2266	0.17	0.027	0.02	8.63	0.01	0.000
43.15	2.28	66.94	1.87	125.49	29	2253	0.17	0.027	0.02	8.63	0.01	0.001
43.31	2.25	68.78	1.81	124.58	29	2242	0.17	0.027	0.02	8.63	0.01	0.001
43.47	2.25	68.68	1.80	123.83	29	2234	0.17	0.027	0.02	8.63	0.01	0.001
43.64	2.28	65.51	1.90	124.15	29	2249	0.17	0.027	0.02	8.63	0.01	0.001
43.80	2.34	59.64	2.09	124.85	30	2262	0.17	0.027	0.02	8.63	0.01	0.001
43.97	2.43	51.25	2.42	124.10	31	2232	0.17	0.028	0.02	8.63	0.01	0.001
44.13	2.54	41.78	2.99	124.74	33	2201	0.17	0.028	0.02	8.63	0.01	0.000
44.29	2.65	34.36	3.66	125.65	0	0	0.17	0.000	0.00	0.00	0.00	0.000
44.46	2.71	31.62	4.05	127.97	0	0	0.17	0.000	0.00	0.00	0.00	0.000
44.62	2.75	28.89	4.40	127.19	0	0	0.17	0.000	0.00	0.00	0.00	0.000
44.79	2.82	24.79	4.94	122.54	0	0	0.17	0.000	0.00	0.00	0.00	0.000
44.95	2.91	19.52	5.78	112.81	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.11	2.87	19.61	5.38	105.55	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.28	2.84	19.42	5.18	100.53	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.44	2.83	19.50	5.00	97.51	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.61	2.91	16.69	5.84	97.53	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.77	3.00	16.73	6.70	112.16	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.93	2.99	20.66	6.66	137.57	0	0	0.17	0.000	0.00	0.00	0.00	0.000
46.10	2.82	32.59	4.97	162.00	0	0	0.17	0.000	0.00	0.00	0.00	0.000
46.26	2.72	41.85	4.13	173.02	0	0	0.17	0.000	0.00	0.00	0.00	0.000
46.43	2.50	65.59	2.75	180.33	46	3357	0.17	0.017	0.01	8.63	0.00	0.000
46.59	2.31	97.70	1.97	192.30	45	3667	0.17	0.016	0.01	8.63	0.00	0.000
46.75	2.13	140.83	1.51	213.08	47	3970	0.17	0.014	0.01	8.63	0.00	0.000
46.92	2.04	165.76	1.36	224.94	48	4040	0.17	0.014	0.01	8.63	0.00	0.000
47.08	2.01	168.61	1.32	221.93	46	3930	0.17	0.015	0.01	8.63	0.00	0.000
47.25	2.02	162.63	1.33	215.63	45	3845	0.17	0.015	0.01	8.63	0.00	0.000
47.41	2.04	157.66	1.35	213.56	45	3862	0.17	0.015	0.01	8.63	0.00	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
47.57	2.04	157.58	1.36	214.56	45	3899	0.17	0.015	0.01	8.63	0.00	0.000
47.74	2.02	161.86	1.33	215.28	45	3874	0.17	0.015	0.01	8.63	0.00	0.000
47.90	2.00	159.92	1.31	208.93	44	3728	0.17	0.016	0.01	8.63	0.00	0.000
48.07	2.04	140.03	1.36	190.30	40	3481	0.17	0.017	0.01	8.63	0.01	0.000
48.23	2.08	129.54	1.42	183.31	39	3423	0.17	0.017	0.01	8.63	0.01	0.000
48.39	2.12	121.18	1.50	181.30	40	3458	0.17	0.017	0.01	8.63	0.01	0.000
48.56	2.10	131.12	1.45	189.89	41	3595	0.17	0.016	0.01	8.63	0.01	0.000
48.72	2.11	126.60	1.47	185.53	40	3535	0.17	0.017	0.01	8.63	0.01	0.000
48.89	2.09	125.50	1.44	180.33	39	3421	0.17	0.017	0.01	8.63	0.01	0.000
49.05	2.08	127.25	1.41	179.67	39	3394	0.17	0.018	0.01	8.63	0.01	0.000
49.22	2.09	129.15	1.44	186.23	40	3556	0.17	0.017	0.01	8.63	0.01	0.000
49.38	2.18	118.14	1.62	191.40	43	3774	0.17	0.016	0.01	8.63	0.00	0.000
49.54	2.30	100.65	1.95	196.61	46	3947	0.17	0.015	0.01	8.63	0.00	0.000
49.71	2.39	87.24	2.27	198.20	49	3979	0.16	0.015	0.01	8.63	0.00	0.000
49.87	2.40	86.66	2.32	200.91	49	4040	0.16	0.015	0.00	8.63	0.00	0.000

Total estimated settlement: 0.11

Abbreviations

Q_{tn}: Equivalent clean sand normalized cone resistance
K_c: Fines correction factor
$Q_{tn,cs}$: Post-liquefaction volumentric strain
G_{max}: Small strain shear modulus
CSR: Soil cyclic stress ratio
γ: Cyclic shear strain
$e_{vol(15)}$: Volumetric strain after 15 cycles
N_c: Equivalent number of cycles
e_v: Volumetric strain
Settle.: Calculated settlement

:: Post-earthquake settlement due to soil liquefaction ::

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
50.04	190.87	2.00	0.00	1.00	0.00	50.20	172.86	2.00	0.00	1.00	0.00
50.36	145.24	2.00	0.00	1.00	0.00	50.53	119.06	2.00	0.00	1.00	0.00
50.69	101.84	2.00	0.00	1.00	0.00	50.86	91.11	2.00	0.00	1.00	0.00
51.02	86.74	2.00	0.00	1.00	0.00						

Total estimated settlement: 0.00

Abbreviations

$Q_{tn,cs}$: Equivalent clean sand normalized cone resistance
FS: Factor of safety against liquefaction
e_v (%): Post-liquefaction volumentric strain
DF: e_v depth weighting factor
Settlement: Calculated settlement

GEOLOGISMIKI Geotechnical Software

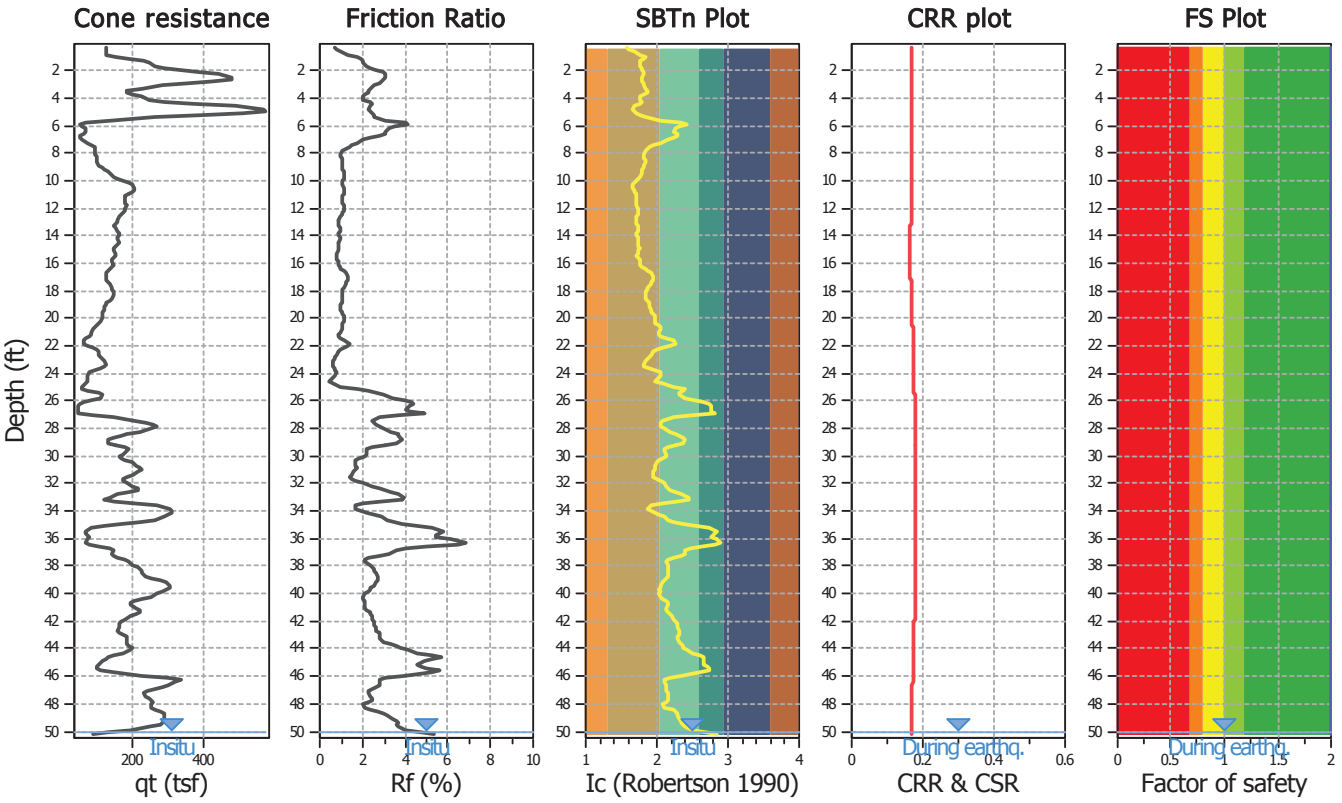
LIQUEFACTION ANALYSIS REPORT

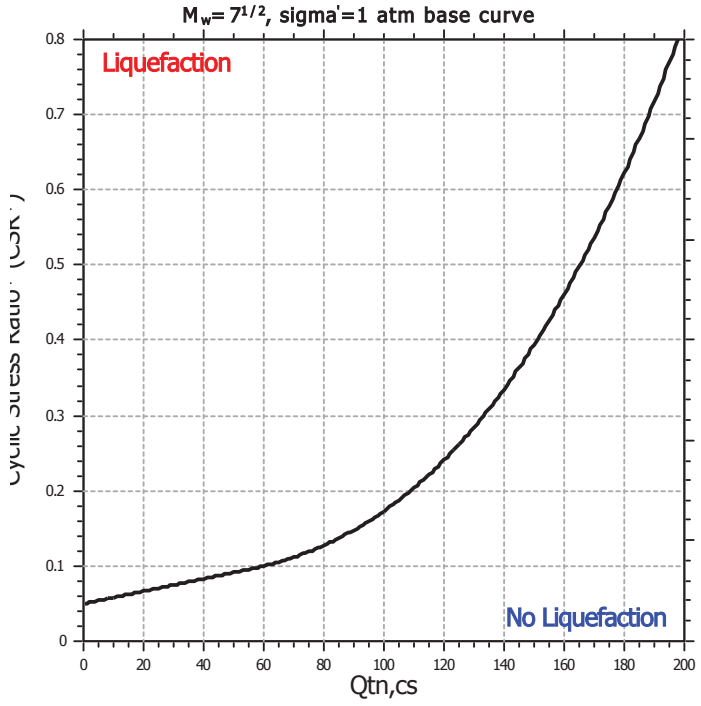
Project title : Kaiser Fresno MOB **Location : Fresno, CA**

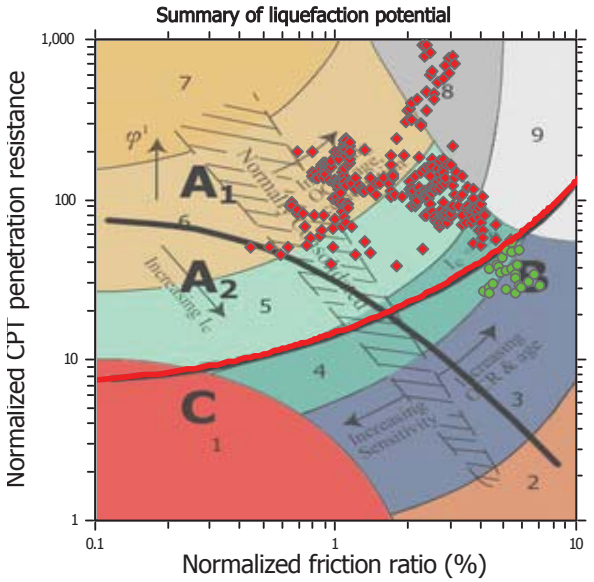
CPT file : CPT-08

Input parameters and analysis data

Analysis method:	NCEER (1998)	**G.W.T. (in-situ):**	50.00 ft	**Use fill:**	No	**Clay like behavior applied:**	Sands only
Fines correction method:	NCEER (1998)	**G.W.T. (earthq.):**	50.00 ft	**Fill height:**	N/A	**Limit depth applie**	No
Points to test:	Based on Ic value	**Average results interva**	3	**Fill weight:**	N/A	**Limit depth:**	N/A
Earthquake magnitude M_w:	6.70	**Ic cut-off value:**	2.60	**Trans. detect. applied:**	No	**MSF method:**	Method based
Peak ground acceleration:	0.35	**Unit weight calculation**	Based on SBT	**K_σ applied:**	Yes		

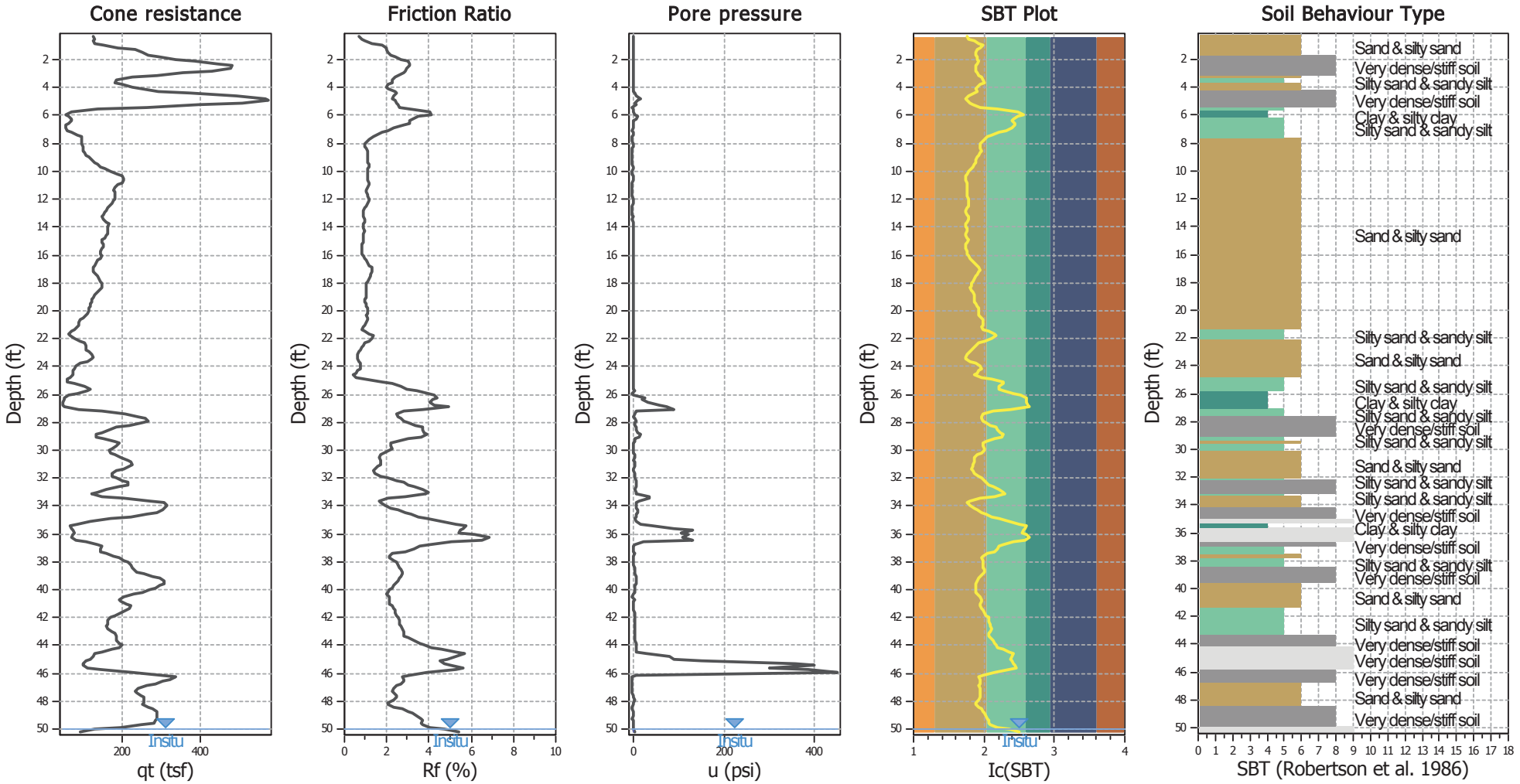






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



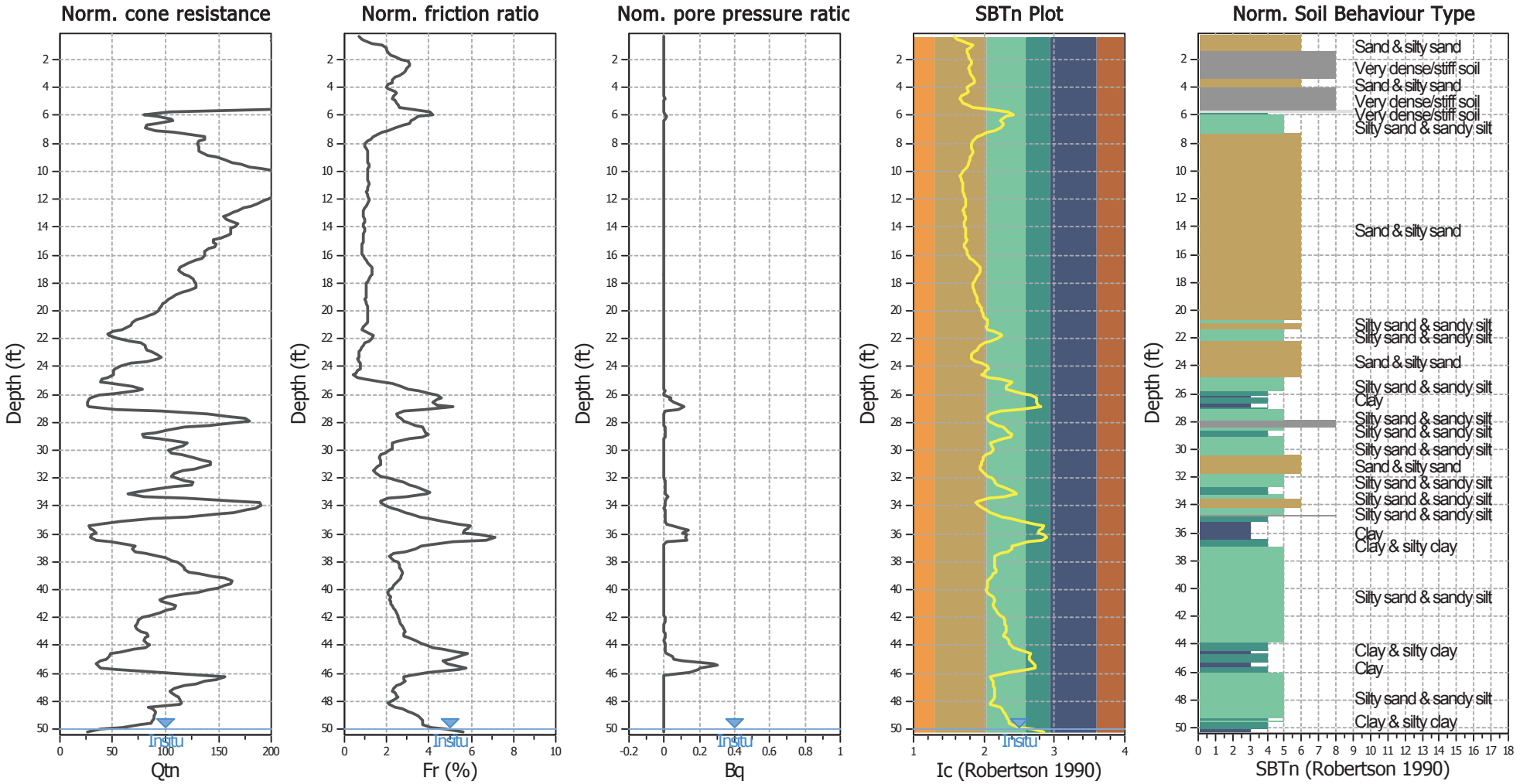
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



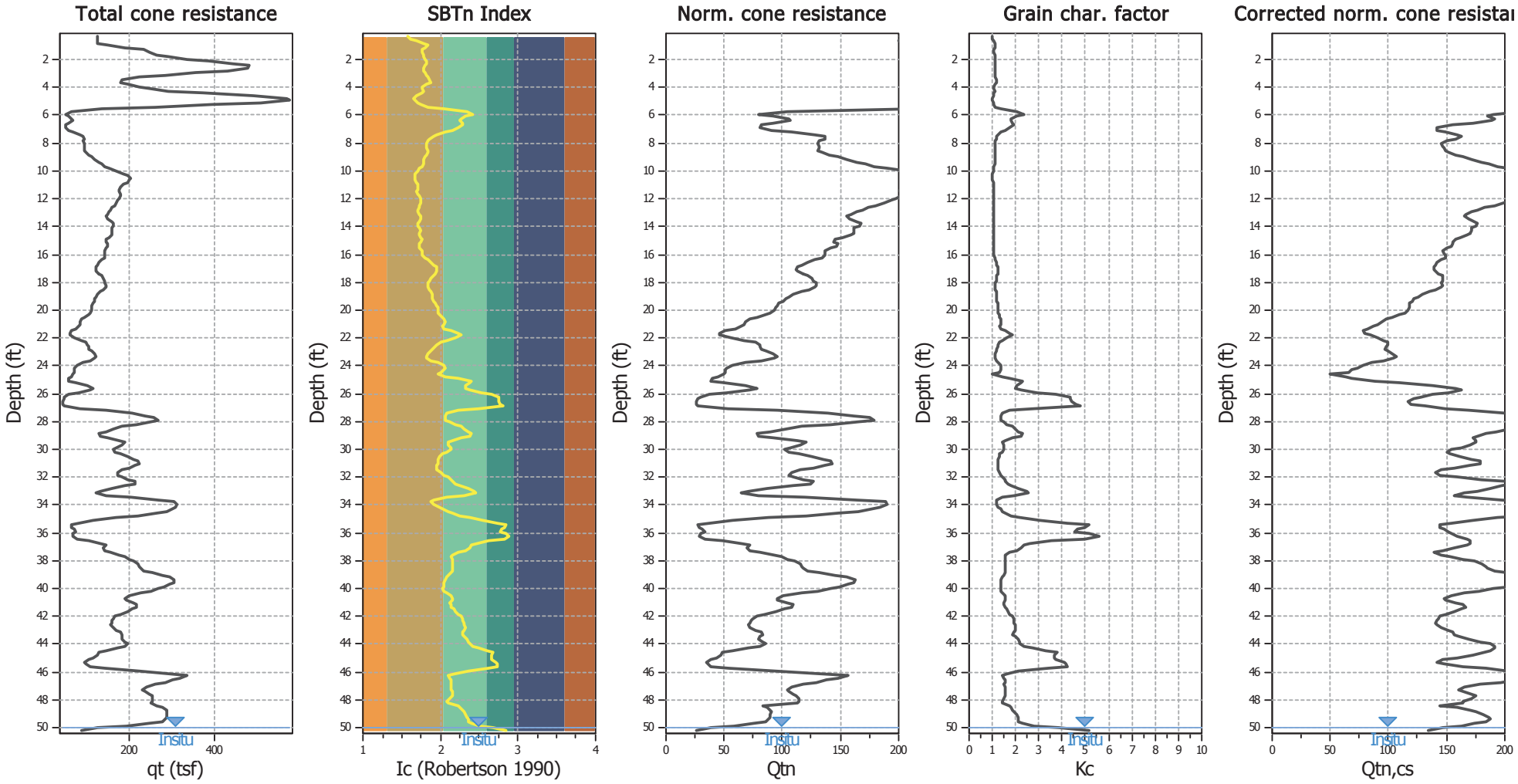
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

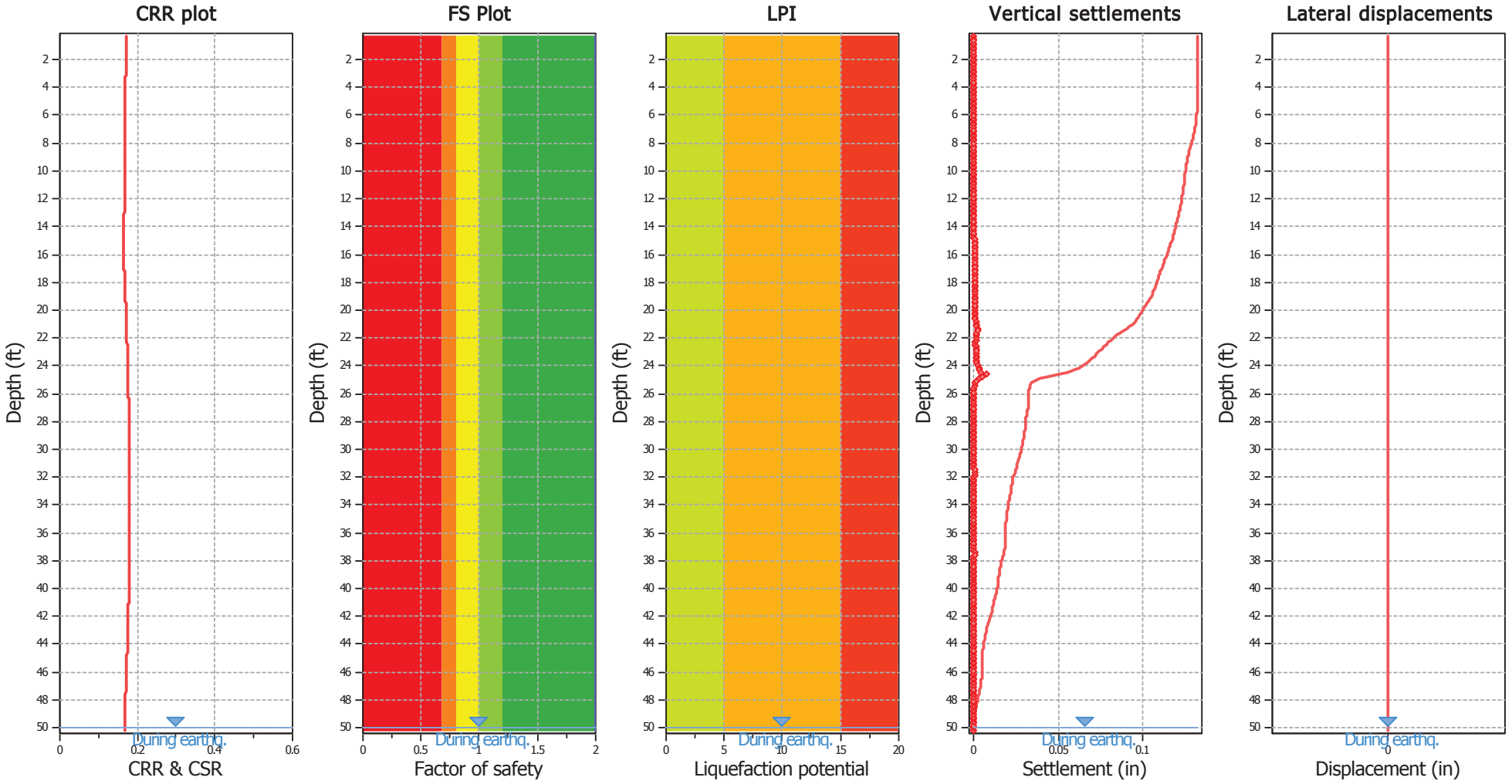
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

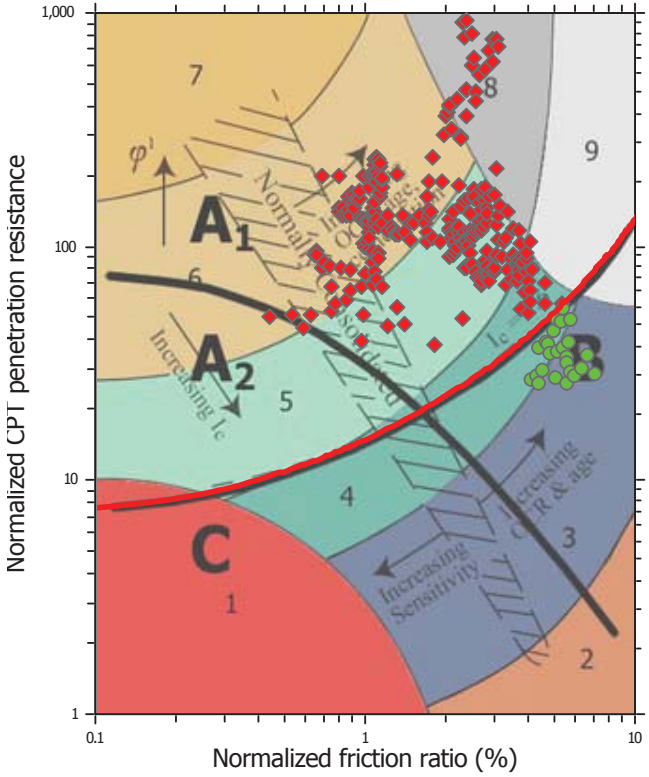
F.S. color scheme

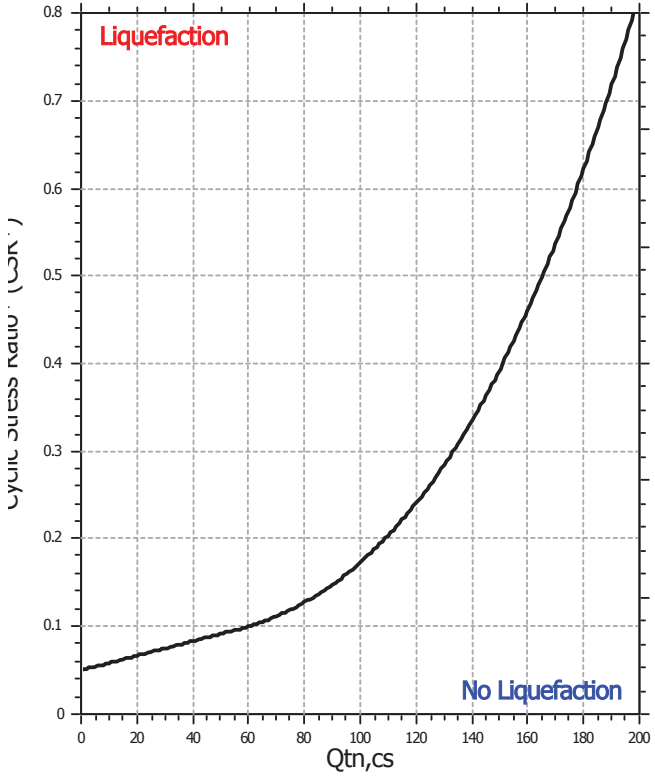
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

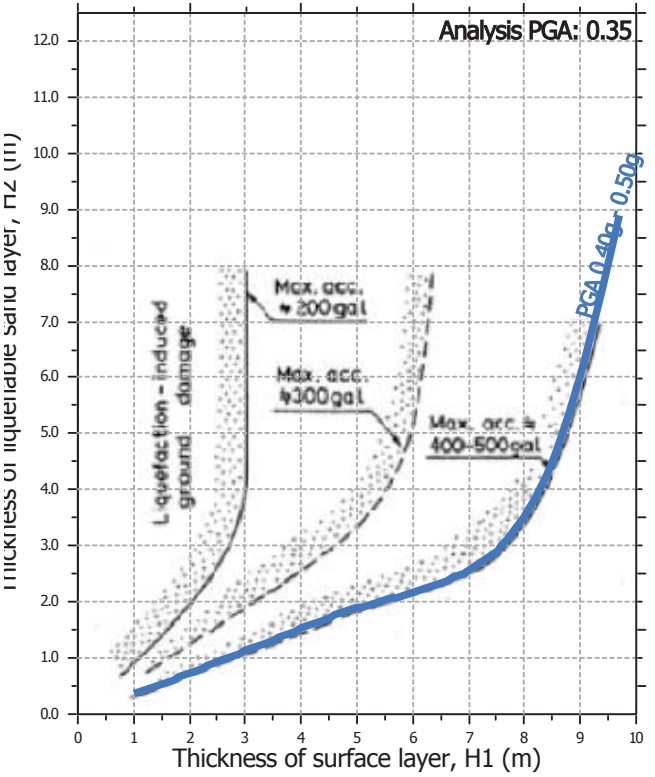
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



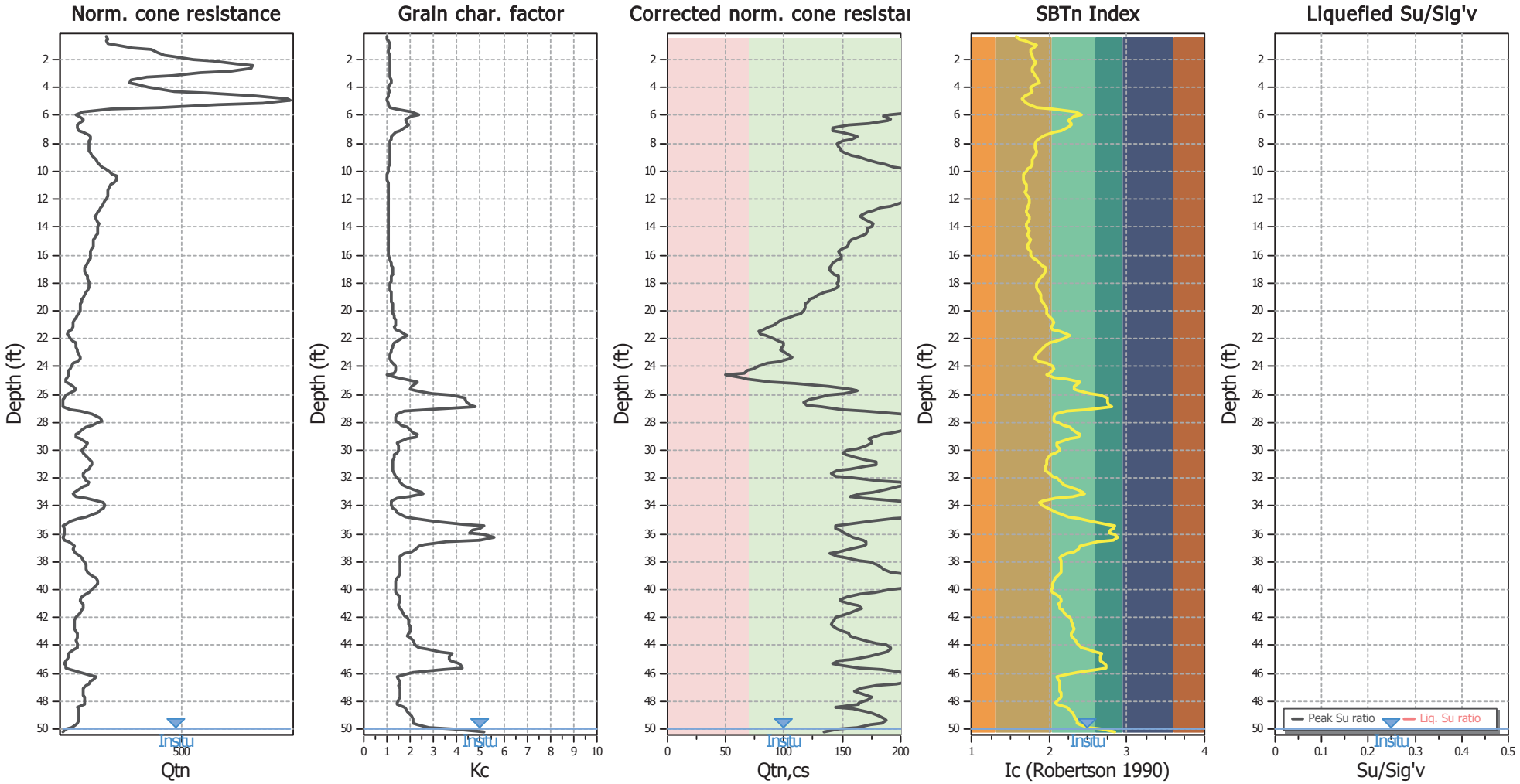




Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

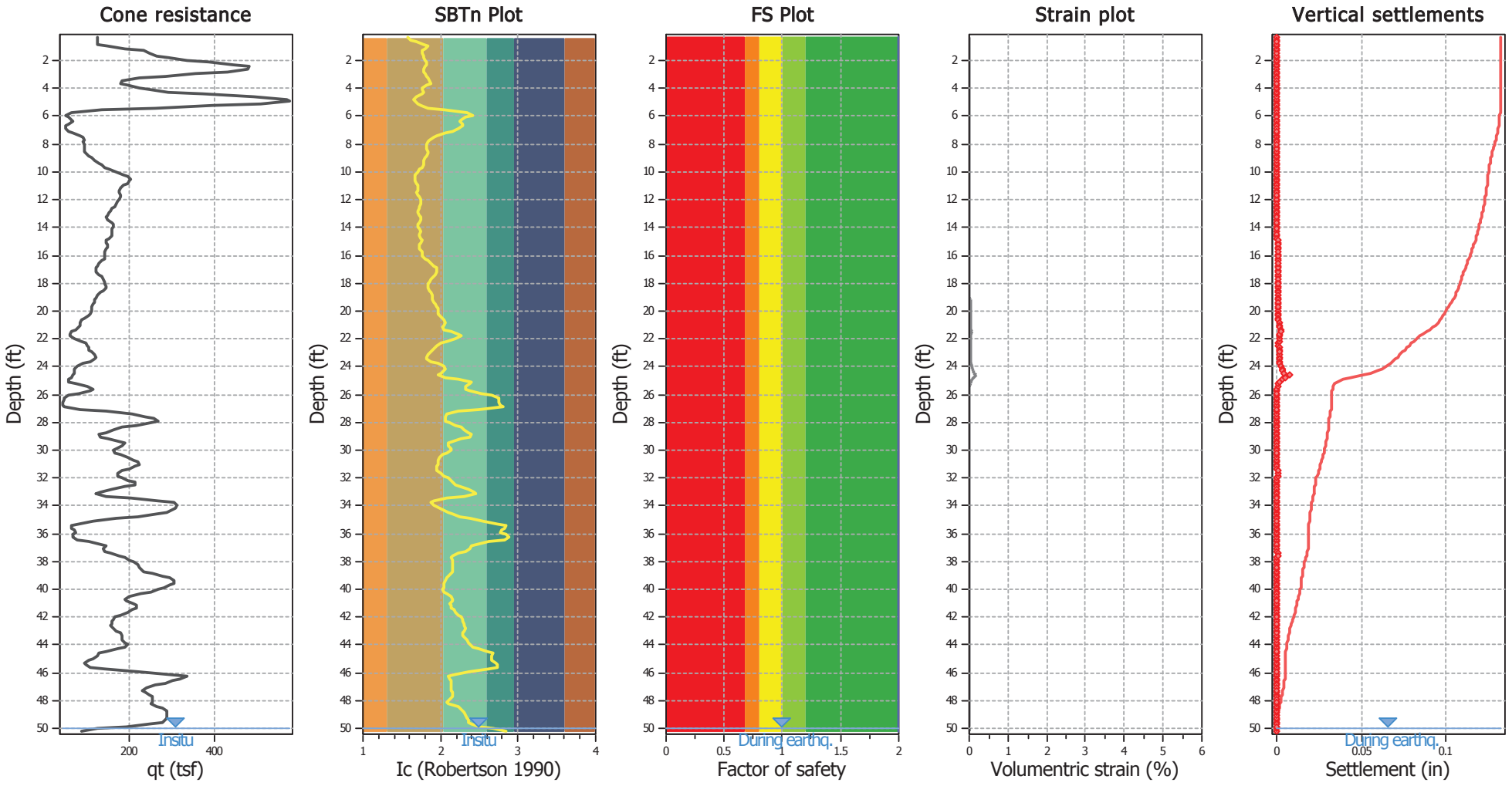
Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	50.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement of dry sands ::

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
0.33	1.58	200.64	1.00	200.64	36	829	0.17	0.001	0.00	8.63	0.00	0.000
0.49	1.62	202.01	1.00	202.01	37	876	0.17	0.001	0.00	8.63	0.00	0.000
0.66	1.69	199.91	1.03	205.72	38	948	0.17	0.001	0.00	8.63	0.00	0.000
0.82	1.77	203.11	1.09	220.99	42	1075	0.17	0.001	0.00	8.63	0.00	0.000
0.98	1.83	239.40	1.13	270.84	53	1366	0.17	0.001	0.00	8.63	0.00	0.000
1.15	1.81	303.22	1.11	337.03	65	1674	0.17	0.001	0.00	8.63	0.00	0.000
1.31	1.77	374.33	1.08	405.99	78	1970	0.17	0.001	0.00	8.63	0.00	0.000
1.48	1.76	400.87	1.08	432.72	82	2090	0.17	0.001	0.00	8.63	0.00	0.000
1.64	1.77	426.29	1.09	463.80	89	2257	0.17	0.001	0.00	8.63	0.00	0.000
1.80	1.78	468.69	1.10	513.58	99	2517	0.17	0.001	0.00	8.63	0.00	0.000
1.97	1.80	541.72	1.11	600.30	116	2973	0.17	0.001	0.00	8.63	0.00	0.000
2.13	1.82	623.27	1.12	700.94	137	3517	0.17	0.001	0.00	8.63	0.00	0.000
2.30	1.82	714.52	1.12	801.47	156	4012	0.17	0.001	0.00	8.63	0.00	0.000
2.46	1.80	778.56	1.11	862.37	167	4269	0.17	0.001	0.00	8.63	0.00	0.000
2.62	1.79	772.58	1.10	847.60	163	4158	0.17	0.001	0.00	8.63	0.00	0.000
2.79	1.79	692.17	1.10	761.58	147	3746	0.17	0.001	0.00	8.63	0.00	0.000
2.95	1.81	574.87	1.11	640.47	124	3187	0.17	0.001	0.00	8.63	0.00	0.000
3.12	1.82	460.62	1.12	516.08	100	2581	0.17	0.002	0.00	8.63	0.00	0.000
3.28	1.84	361.68	1.14	411.00	81	2080	0.17	0.002	0.00	8.63	0.00	0.000
3.45	1.86	296.60	1.16	342.89	68	1759	0.17	0.003	0.00	8.63	0.00	0.000
3.61	1.87	289.36	1.16	336.73	67	1735	0.17	0.003	0.00	8.63	0.00	0.000
3.77	1.82	317.41	1.12	355.19	69	1774	0.17	0.003	0.00	8.63	0.00	0.000
3.94	1.77	362.80	1.08	393.40	75	1908	0.17	0.003	0.00	8.63	0.00	0.000
4.10	1.76	399.10	1.08	430.85	82	2081	0.17	0.003	0.00	8.63	0.00	0.000
4.27	1.79	467.21	1.10	512.57	99	2514	0.17	0.003	0.00	8.63	0.00	0.000
4.43	1.76	600.85	1.08	646.27	123	3110	0.17	0.002	0.00	8.63	0.00	0.000
4.59	1.69	792.88	1.03	816.50	152	3766	0.17	0.002	0.00	8.63	0.00	0.000
4.76	1.66	918.82	1.01	927.90	171	4208	0.17	0.002	0.00	8.63	0.00	0.000
4.92	1.67	928.76	1.02	946.12	175	4322	0.17	0.002	0.00	8.63	0.00	0.000
5.09	1.71	821.88	1.04	857.25	160	4002	0.17	0.002	0.00	8.63	0.00	0.000
5.25	1.75	640.65	1.07	687.65	131	3302	0.17	0.002	0.00	8.63	0.00	0.000
5.41	1.84	417.97	1.14	474.76	93	2402	0.17	0.004	0.00	8.63	0.00	0.000
5.58	2.05	215.47	1.37	295.22	63	1617	0.17	0.006	0.00	8.63	0.00	0.000
5.74	2.34	104.09	2.07	215.31	51	1123	0.17	0.009	0.00	8.63	0.00	0.000
5.91	2.42	79.62	2.39	190.16	47	953	0.17	0.011	0.00	8.63	0.00	0.000
6.07	2.32	91.49	2.02	185.03	44	970	0.17	0.012	0.00	8.63	0.00	0.000
6.23	2.26	105.00	1.83	191.64	44	1028	0.17	0.011	0.00	8.63	0.00	0.000
6.40	2.24	106.40	1.77	188.61	43	1018	0.17	0.011	0.00	8.63	0.00	0.000
6.56	2.28	92.09	1.88	173.03	40	923	0.17	0.013	0.01	8.63	0.00	0.000
6.73	2.28	81.68	1.90	155.05	36	825	0.17	0.016	0.01	8.63	0.01	0.000
6.89	2.23	80.90	1.75	141.92	32	767	0.17	0.018	0.01	8.63	0.01	0.000
7.05	2.16	90.63	1.56	141.80	31	778	0.17	0.018	0.01	8.63	0.01	0.000
7.22	2.05	108.22	1.38	149.03	32	821	0.17	0.018	0.01	8.63	0.01	0.000
7.38	1.96	127.37	1.25	159.02	33	892	0.17	0.016	0.01	8.63	0.01	0.000
7.55	1.91	136.62	1.19	163.19	33	921	0.17	0.016	0.01	8.63	0.01	0.000
7.71	1.86	137.12	1.16	158.38	31	896	0.17	0.017	0.01	8.63	0.01	0.000
7.87	1.85	131.22	1.14	149.93	29	854	0.17	0.018	0.01	8.63	0.01	0.000
8.04	1.81	130.57	1.12	145.77	28	831	0.17	0.019	0.01	8.63	0.01	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
8.20	1.82	131.47	1.12	147.13	29	849	0.17	0.019	0.01	8.63	0.01	0.000
8.37	1.83	131.09	1.13	147.65	29	864	0.17	0.019	0.01	8.63	0.01	0.000
8.53	1.84	130.98	1.14	149.44	29	889	0.17	0.019	0.01	8.63	0.01	0.000
8.69	1.84	133.86	1.13	151.92	30	910	0.17	0.019	0.01	8.63	0.01	0.000
8.86	1.82	140.01	1.12	157.42	31	949	0.17	0.018	0.01	8.63	0.01	0.000
9.02	1.81	147.39	1.11	163.67	32	989	0.17	0.017	0.01	8.63	0.01	0.000
9.19	1.79	155.75	1.10	171.42	33	1041	0.17	0.016	0.01	8.63	0.01	0.000
9.35	1.79	163.57	1.10	179.65	35	1100	0.17	0.015	0.01	8.63	0.01	0.000
9.51	1.78	171.08	1.09	186.68	36	1148	0.17	0.015	0.01	8.63	0.01	0.000
9.68	1.76	179.45	1.08	194.14	37	1199	0.17	0.014	0.01	8.63	0.01	0.000
9.84	1.74	190.65	1.06	202.47	38	1245	0.17	0.014	0.01	8.63	0.00	0.000
10.01	1.70	207.12	1.04	215.56	40	1319	0.17	0.013	0.01	8.63	0.00	0.000
10.17	1.68	224.14	1.02	229.54	43	1402	0.17	0.012	0.01	8.63	0.00	0.000
10.34	1.67	235.91	1.01	239.32	44	1466	0.17	0.012	0.00	8.63	0.00	0.000
10.50	1.67	239.95	1.02	243.79	45	1506	0.17	0.012	0.00	8.63	0.00	0.000
10.66	1.67	236.73	1.02	241.51	45	1507	0.17	0.012	0.00	8.63	0.00	0.000
10.83	1.69	229.43	1.03	236.80	44	1502	0.17	0.012	0.00	8.63	0.00	0.000
10.99	1.70	218.44	1.04	227.42	43	1462	0.17	0.013	0.01	8.63	0.00	0.000
11.16	1.71	207.53	1.04	216.45	40	1404	0.17	0.014	0.01	8.63	0.00	0.000
11.32	1.71	201.39	1.04	209.96	39	1372	0.17	0.014	0.01	8.63	0.00	0.000
11.48	1.70	201.58	1.04	208.94	39	1369	0.17	0.015	0.01	8.63	0.01	0.000
11.65	1.71	202.33	1.05	211.45	40	1405	0.17	0.014	0.01	8.63	0.00	0.000
11.81	1.72	202.21	1.05	212.58	40	1429	0.17	0.014	0.01	8.63	0.00	0.000
11.98	1.74	197.74	1.06	210.18	40	1436	0.17	0.014	0.01	8.63	0.00	0.000
12.14	1.74	193.58	1.07	206.51	39	1425	0.17	0.015	0.01	8.63	0.01	0.000
12.30	1.74	187.12	1.06	199.19	38	1382	0.17	0.016	0.01	8.63	0.01	0.000
12.47	1.73	180.30	1.06	190.84	36	1328	0.17	0.017	0.01	8.63	0.01	0.000
12.63	1.72	173.99	1.05	182.74	34	1271	0.17	0.018	0.01	8.63	0.01	0.000
12.80	1.71	169.00	1.04	176.15	33	1226	0.17	0.019	0.01	8.63	0.01	0.000
12.96	1.71	163.73	1.04	171.01	32	1200	0.17	0.020	0.01	8.63	0.01	0.000
13.12	1.72	158.46	1.05	166.69	31	1184	0.17	0.020	0.01	8.63	0.01	0.000
13.29	1.74	155.21	1.06	165.22	31	1194	0.17	0.020	0.01	8.63	0.01	0.000
13.45	1.74	157.97	1.07	168.35	32	1225	0.17	0.020	0.01	8.63	0.01	0.000
13.62	1.73	164.31	1.06	173.72	33	1264	0.17	0.019	0.01	8.63	0.01	0.000
13.78	1.71	168.01	1.05	175.84	33	1276	0.17	0.019	0.01	8.63	0.01	0.000
13.94	1.72	166.37	1.05	174.61	33	1277	0.17	0.020	0.01	8.63	0.01	0.000
14.11	1.73	162.07	1.06	171.68	32	1274	0.17	0.020	0.01	8.63	0.01	0.000
14.27	1.74	161.18	1.06	171.66	32	1288	0.17	0.020	0.01	8.63	0.01	0.000
14.44	1.73	161.28	1.06	170.77	32	1282	0.17	0.020	0.01	8.63	0.01	0.000
14.60	1.73	158.88	1.06	168.30	32	1272	0.17	0.021	0.01	8.63	0.01	0.000
14.76	1.74	151.70	1.07	162.02	31	1241	0.17	0.022	0.01	8.63	0.01	0.000
14.93	1.76	145.65	1.08	157.17	30	1222	0.17	0.023	0.01	8.63	0.01	0.000
15.09	1.75	144.70	1.07	154.90	29	1202	0.17	0.023	0.01	8.63	0.01	0.000
15.26	1.73	147.37	1.06	155.69	29	1201	0.17	0.024	0.01	8.63	0.01	0.000
15.42	1.72	146.45	1.05	154.18	29	1191	0.16	0.024	0.02	8.63	0.01	0.000
15.58	1.73	141.29	1.06	149.94	28	1174	0.16	0.025	0.02	8.63	0.01	0.000
15.75	1.75	136.37	1.07	146.59	28	1168	0.16	0.026	0.02	8.63	0.01	0.001
15.91	1.76	136.65	1.08	147.38	28	1185	0.16	0.025	0.02	8.63	0.01	0.001

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
16.08	1.77	137.17	1.09	149.03	29	1213	0.16	0.025	0.02	8.63	0.01	0.001
16.24	1.80	134.52	1.10	148.56	29	1235	0.16	0.024	0.02	8.63	0.01	0.000
16.40	1.83	128.14	1.13	144.93	28	1237	0.16	0.025	0.02	8.63	0.01	0.000
16.57	1.88	121.79	1.17	142.10	28	1249	0.16	0.025	0.02	8.63	0.01	0.001
16.73	1.91	116.49	1.20	140.14	28	1262	0.16	0.025	0.02	8.63	0.01	0.000
16.90	1.94	113.52	1.23	139.71	28	1281	0.17	0.024	0.02	8.63	0.01	0.001
17.06	1.95	112.08	1.24	139.46	29	1292	0.17	0.024	0.02	8.63	0.01	0.000
17.23	1.95	113.22	1.24	139.88	29	1300	0.17	0.024	0.02	8.63	0.01	0.001
17.39	1.93	117.45	1.22	142.87	29	1325	0.17	0.024	0.02	8.63	0.01	0.000
17.55	1.91	122.20	1.20	146.24	29	1351	0.17	0.024	0.01	8.63	0.01	0.000
17.72	1.88	125.80	1.17	146.90	29	1343	0.17	0.024	0.02	8.63	0.01	0.000
17.88	1.86	127.20	1.15	146.29	29	1329	0.17	0.025	0.02	8.63	0.01	0.000
18.05	1.83	128.82	1.13	145.85	29	1315	0.17	0.025	0.02	8.63	0.01	0.001
18.21	1.84	129.20	1.13	146.62	29	1331	0.17	0.025	0.02	8.63	0.01	0.000
18.37	1.83	128.09	1.13	145.09	28	1321	0.17	0.026	0.02	8.63	0.01	0.001
18.54	1.85	122.51	1.15	140.63	28	1302	0.17	0.026	0.02	8.63	0.01	0.001
18.70	1.87	116.17	1.16	135.04	27	1269	0.17	0.028	0.02	8.63	0.02	0.001
18.87	1.89	109.53	1.18	129.27	26	1235	0.17	0.029	0.02	8.63	0.02	0.001
19.03	1.90	105.89	1.18	125.40	25	1207	0.17	0.030	0.02	8.63	0.02	0.001
19.19	1.89	103.06	1.18	122.02	24	1180	0.17	0.032	0.02	8.63	0.02	0.001
19.36	1.91	100.23	1.20	120.13	24	1177	0.17	0.032	0.03	8.63	0.02	0.001
19.52	1.93	97.01	1.22	118.05	24	1173	0.17	0.033	0.03	8.63	0.02	0.001
19.69	1.94	95.67	1.23	117.90	24	1185	0.17	0.032	0.03	8.63	0.02	0.001
19.85	1.96	93.88	1.25	117.53	24	1197	0.17	0.032	0.03	8.63	0.02	0.001
20.01	1.96	93.17	1.26	116.98	24	1198	0.17	0.032	0.03	8.63	0.02	0.001
20.18	1.98	89.67	1.27	114.08	24	1181	0.17	0.034	0.03	8.63	0.02	0.001
20.34	1.98	85.20	1.28	109.00	23	1137	0.17	0.036	0.03	8.63	0.02	0.001
20.51	2.02	78.38	1.32	103.53	22	1097	0.17	0.038	0.03	8.63	0.03	0.001
20.67	2.04	72.44	1.36	98.63	21	1058	0.17	0.041	0.04	8.63	0.03	0.001
20.83	2.06	68.64	1.38	94.76	20	1024	0.17	0.044	0.04	8.63	0.03	0.001
21.00	2.04	66.98	1.35	90.76	19	982	0.17	0.048	0.05	8.63	0.04	0.002
21.16	2.02	64.84	1.33	86.45	18	936	0.17	0.052	0.06	8.63	0.05	0.002
21.33	2.05	59.49	1.37	81.57	17	893	0.17	0.058	0.07	8.63	0.05	0.002
21.49	2.14	51.21	1.53	78.17	17	870	0.17	0.062	0.07	8.63	0.06	0.002
21.65	2.23	45.48	1.75	79.37	18	882	0.17	0.060	0.07	8.63	0.05	0.002
21.82	2.26	46.25	1.84	84.91	20	943	0.17	0.054	0.05	8.63	0.04	0.002
21.98	2.18	55.36	1.63	90.21	20	1018	0.17	0.047	0.05	8.63	0.04	0.001
22.15	2.08	67.48	1.43	96.22	21	1086	0.17	0.043	0.04	8.63	0.03	0.001
22.31	2.00	76.54	1.30	99.42	21	1102	0.17	0.042	0.04	8.63	0.03	0.001
22.47	1.95	80.20	1.24	99.64	20	1087	0.17	0.043	0.04	8.63	0.03	0.001
22.64	1.93	80.49	1.22	98.06	20	1062	0.17	0.045	0.05	8.63	0.04	0.001
22.80	1.90	82.12	1.19	97.37	19	1039	0.17	0.048	0.05	8.63	0.04	0.001
22.97	1.87	86.11	1.16	99.88	20	1051	0.17	0.047	0.05	8.63	0.04	0.002
23.13	1.83	91.61	1.13	103.48	20	1066	0.17	0.046	0.05	8.63	0.04	0.001
23.30	1.81	95.76	1.12	106.96	21	1093	0.17	0.045	0.04	8.63	0.03	0.001
23.46	1.82	92.62	1.12	104.04	20	1074	0.17	0.047	0.05	8.63	0.04	0.001
23.62	1.88	81.63	1.17	95.90	19	1037	0.17	0.050	0.05	8.63	0.04	0.002
23.79	1.97	67.72	1.26	85.55	18	974	0.17	0.056	0.07	8.63	0.05	0.002

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
23.95	2.04	57.61	1.36	78.07	16	916	0.17	0.064	0.08	8.63	0.06	0.002
24.12	2.06	52.60	1.39	73.34	16	870	0.18	0.071	0.10	8.63	0.07	0.003
24.28	2.04	50.95	1.35	68.86	15	814	0.18	0.083	0.12	8.63	0.10	0.004
24.44	2.00	51.12	1.30	66.46	14	778	0.18	0.093	0.14	8.63	0.11	0.004
24.61	1.97	50.26	1.00	50.26	10	736	0.18	0.107	0.24	8.63	0.18	0.008
24.77	2.07	45.13	1.40	63.29	14	764	0.18	0.099	0.16	8.63	0.12	0.005
24.94	2.23	39.43	1.74	68.44	16	837	0.18	0.081	0.11	8.63	0.08	0.003
25.10	2.40	38.25	2.30	87.85	22	1037	0.18	0.053	0.05	8.63	0.04	0.001
25.26	2.38	49.13	2.23	109.46	27	1306	0.18	0.037	0.03	8.63	0.02	0.001
25.43	2.33	68.16	2.03	138.49	33	1688	0.18	0.026	0.01	8.63	0.01	0.000
25.59	2.32	78.29	2.01	157.20	37	1928	0.18	0.022	0.01	8.63	0.01	0.000
25.76	2.39	72.06	2.26	163.00	40	1971	0.18	0.021	0.01	8.63	0.01	0.000
25.92	2.53	51.76	2.94	152.00	40	1750	0.18	0.025	0.01	8.63	0.01	0.000
26.08	2.66	36.88	3.74	137.80	0	0	0.18	0.000	0.00	0.00	0.00	0.000
26.25	2.75	29.27	4.36	127.48	0	0	0.18	0.000	0.00	0.00	0.00	0.000
26.41	2.75	27.71	4.38	121.28	0	0	0.18	0.000	0.00	0.00	0.00	0.000
26.58	2.75	26.68	4.38	116.91	0	0	0.18	0.000	0.00	0.00	0.00	0.000
26.74	2.77	25.98	4.58	118.87	0	0	0.18	0.000	0.00	0.00	0.00	0.000
26.90	2.80	27.30	4.81	131.33	0	0	0.18	0.000	0.00	0.00	0.00	0.000
27.07	2.50	53.92	2.76	148.63	38	1799	0.18	0.025	0.01	8.63	0.01	0.000
27.23	2.24	95.40	1.76	168.35	39	2194	0.18	0.020	0.01	8.63	0.01	0.000
27.40	2.09	139.57	1.43	199.49	43	2586	0.18	0.016	0.01	8.63	0.01	0.000
27.56	2.06	161.61	1.38	223.13	47	2881	0.18	0.014	0.01	8.63	0.00	0.000
27.72	2.06	175.24	1.38	241.75	51	3134	0.18	0.013	0.00	8.63	0.00	0.000
27.89	2.06	179.43	1.39	249.80	53	3260	0.18	0.013	0.00	8.63	0.00	0.000
28.05	2.11	165.52	1.48	244.54	53	3244	0.18	0.013	0.00	8.63	0.00	0.000
28.22	2.19	141.66	1.64	231.88	52	3114	0.18	0.014	0.00	8.63	0.00	0.000
28.38	2.27	117.16	1.87	218.50	51	2932	0.18	0.015	0.00	8.63	0.00	0.000
28.54	2.31	102.64	1.99	204.24	48	2735	0.18	0.016	0.01	8.63	0.00	0.000
28.71	2.36	89.97	2.14	192.66	46	2567	0.18	0.017	0.01	8.63	0.00	0.000
28.87	2.40	78.69	2.33	183.27	45	2421	0.18	0.019	0.01	8.63	0.01	0.000
29.04	2.38	79.49	2.23	176.87	43	2365	0.18	0.019	0.01	8.63	0.01	0.000
29.20	2.27	92.51	1.87	172.92	40	2372	0.18	0.019	0.01	8.63	0.01	0.000
29.36	2.15	112.59	1.55	174.63	39	2409	0.18	0.019	0.01	8.63	0.01	0.000
29.53	2.09	121.03	1.45	174.90	38	2398	0.18	0.019	0.01	8.63	0.01	0.000
29.69	2.11	115.92	1.47	169.89	37	2345	0.18	0.020	0.01	8.63	0.01	0.000
29.86	2.13	106.69	1.52	162.21	36	2260	0.18	0.021	0.01	8.63	0.01	0.000
30.02	2.13	102.22	1.51	154.62	34	2162	0.18	0.022	0.01	8.63	0.01	0.000
30.19	2.08	105.59	1.42	150.07	32	2082	0.18	0.023	0.01	8.63	0.01	0.000
30.35	2.02	114.40	1.33	152.53	32	2081	0.18	0.024	0.01	8.63	0.01	0.000
30.51	1.99	125.45	1.29	161.36	33	2173	0.18	0.022	0.01	8.63	0.01	0.000
30.68	1.98	135.20	1.27	171.87	35	2308	0.18	0.021	0.01	8.63	0.01	0.000
30.84	1.97	142.09	1.26	178.83	37	2395	0.18	0.020	0.01	8.63	0.01	0.000
31.01	1.96	142.60	1.25	178.53	37	2392	0.18	0.020	0.01	8.63	0.01	0.000
31.17	1.95	137.21	1.24	169.93	35	2268	0.18	0.022	0.01	8.63	0.01	0.000
31.33	1.95	127.00	1.24	156.85	32	2096	0.18	0.024	0.01	8.63	0.01	0.000
31.50	1.96	115.87	1.25	144.78	30	1957	0.18	0.027	0.02	8.63	0.01	0.001
31.66	2.00	107.64	1.30	139.91	29	1941	0.18	0.027	0.02	8.63	0.01	0.001

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
31.83	2.05	105.01	1.37	144.18	31	2054	0.18	0.025	0.02	8.63	0.01	0.000
31.99	2.10	109.44	1.45	159.21	34	2313	0.18	0.022	0.01	8.63	0.01	0.000
32.15	2.14	117.61	1.54	180.54	40	2656	0.18	0.018	0.01	8.63	0.01	0.000
32.32	2.16	126.61	1.58	199.43	44	2954	0.18	0.016	0.01	8.63	0.00	0.000
32.48	2.19	123.99	1.65	204.43	46	3049	0.18	0.016	0.01	8.63	0.00	0.000
32.65	2.26	108.75	1.82	197.72	46	2962	0.18	0.016	0.01	8.63	0.00	0.000
32.81	2.35	87.52	2.14	186.97	45	2777	0.18	0.018	0.01	8.63	0.01	0.000
32.97	2.44	71.34	2.47	176.48	44	2581	0.18	0.020	0.01	8.63	0.01	0.000
33.14	2.46	63.98	2.57	164.73	42	2405	0.18	0.021	0.01	8.63	0.01	0.000
33.30	2.30	79.87	1.96	156.19	37	2367	0.18	0.022	0.01	8.63	0.01	0.000
33.47	2.07	118.87	1.41	167.50	36	2492	0.18	0.021	0.01	8.63	0.01	0.000
33.63	1.91	164.55	1.20	197.96	40	2712	0.18	0.019	0.01	8.63	0.01	0.000
33.79	1.88	188.77	1.17	221.09	44	2962	0.18	0.017	0.01	8.63	0.01	0.000
33.96	1.92	190.62	1.21	229.72	46	3172	0.18	0.016	0.01	8.63	0.00	0.000
34.12	1.98	184.30	1.27	234.63	48	3383	0.18	0.015	0.01	8.63	0.00	0.000
34.29	2.03	177.25	1.34	238.06	50	3541	0.18	0.014	0.00	8.63	0.00	0.000
34.45	2.10	164.75	1.45	238.53	52	3650	0.18	0.014	0.00	8.63	0.00	0.000
34.61	2.16	148.07	1.57	232.07	51	3615	0.18	0.014	0.00	8.63	0.00	0.000
34.78	2.25	120.22	1.80	215.90	50	3399	0.18	0.015	0.00	8.63	0.00	0.000
34.94	2.37	88.30	2.20	194.18	47	3028	0.18	0.017	0.01	8.63	0.00	0.000
35.11	2.55	57.11	3.03	172.88	46	2590	0.18	0.021	0.01	8.63	0.01	0.000
35.27	2.73	36.74	4.21	154.54	0	0	0.18	0.000	0.00	0.00	0.00	0.000
35.43	2.85	27.69	5.19	143.58	0	0	0.18	0.000	0.00	0.00	0.00	0.000
35.60	2.82	28.89	4.98	143.95	0	0	0.18	0.000	0.00	0.00	0.00	0.000
35.76	2.79	31.66	4.68	148.12	0	0	0.18	0.000	0.00	0.00	0.00	0.000
35.93	2.77	33.58	4.51	151.49	0	0	0.18	0.000	0.00	0.00	0.00	0.000
36.09	2.84	30.00	5.14	154.21	0	0	0.18	0.000	0.00	0.00	0.00	0.000
36.26	2.89	28.42	5.61	159.49	0	0	0.18	0.000	0.00	0.00	0.00	0.000
36.42	2.82	33.75	4.97	167.59	0	0	0.18	0.000	0.00	0.00	0.00	0.000
36.58	2.63	48.45	3.52	170.42	0	0	0.18	0.000	0.00	0.00	0.00	0.000
36.75	2.47	64.42	2.64	169.91	43	2701	0.18	0.020	0.01	8.63	0.01	0.000
36.91	2.40	71.83	2.33	167.31	41	2711	0.18	0.020	0.01	8.63	0.01	0.000
37.08	2.39	69.01	2.26	156.21	38	2548	0.18	0.022	0.01	8.63	0.01	0.000
37.24	2.33	71.48	2.05	146.89	35	2425	0.18	0.023	0.01	8.63	0.01	0.000
37.40	2.23	80.39	1.74	139.69	32	2323	0.18	0.025	0.01	8.63	0.01	0.000
37.57	2.16	92.63	1.57	145.41	32	2405	0.18	0.024	0.01	8.63	0.01	0.000
37.73	2.14	99.85	1.54	153.39	34	2536	0.18	0.022	0.01	8.63	0.01	0.000
37.90	2.15	104.91	1.56	163.66	36	2721	0.18	0.021	0.01	8.63	0.01	0.000
38.06	2.16	110.82	1.57	174.31	39	2911	0.18	0.019	0.01	8.63	0.01	0.000
38.22	2.15	115.59	1.56	180.69	40	3024	0.18	0.018	0.01	8.63	0.01	0.000
38.39	2.15	117.27	1.56	183.23	41	3076	0.18	0.018	0.01	8.63	0.01	0.000
38.55	2.16	117.42	1.58	185.62	41	3132	0.18	0.018	0.01	8.63	0.01	0.000
38.72	2.16	121.43	1.58	191.47	42	3240	0.18	0.017	0.01	8.63	0.01	0.000
38.88	2.14	131.82	1.53	201.32	44	3398	0.18	0.016	0.01	8.63	0.00	0.000
39.04	2.11	144.73	1.47	212.70	46	3570	0.18	0.015	0.01	8.63	0.00	0.000
39.21	2.08	155.66	1.42	221.17	48	3687	0.18	0.015	0.01	8.63	0.00	0.000
39.37	2.06	162.48	1.38	224.04	48	3705	0.18	0.015	0.01	8.63	0.00	0.000
39.54	2.04	162.11	1.36	219.90	46	3622	0.18	0.015	0.01	8.63	0.00	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
39.70	2.04	156.49	1.35	211.92	45	3497	0.18	0.016	0.01	8.63	0.00	0.000
39.86	2.04	148.78	1.36	202.04	43	3348	0.18	0.017	0.01	8.63	0.01	0.000
40.03	2.03	141.42	1.35	190.41	40	3152	0.18	0.018	0.01	8.63	0.01	0.000
40.19	2.04	130.48	1.36	177.72	38	2966	0.18	0.019	0.01	8.63	0.01	0.000
40.36	2.07	117.13	1.41	165.26	35	2805	0.18	0.021	0.01	8.63	0.01	0.000
40.52	2.14	101.19	1.52	154.12	34	2680	0.18	0.022	0.01	8.63	0.01	0.000
40.68	2.15	95.10	1.56	148.35	33	2599	0.18	0.023	0.01	8.63	0.01	0.000
40.85	2.15	95.59	1.56	149.30	33	2624	0.18	0.023	0.01	8.63	0.01	0.000
41.01	2.13	104.85	1.50	157.78	35	2760	0.18	0.022	0.01	8.63	0.01	0.000
41.18	2.13	109.00	1.51	164.50	36	2888	0.18	0.020	0.01	8.63	0.01	0.000
41.34	2.15	107.86	1.54	166.41	37	2944	0.18	0.020	0.01	8.63	0.01	0.000
41.50	2.17	101.70	1.60	162.60	36	2903	0.18	0.020	0.01	8.63	0.01	0.000
41.67	2.20	93.97	1.66	156.19	35	2810	0.18	0.021	0.01	8.63	0.01	0.000
41.83	2.24	84.83	1.76	149.07	34	2702	0.18	0.022	0.01	8.63	0.01	0.000
42.00	2.27	78.09	1.85	144.25	33	2627	0.18	0.023	0.01	8.63	0.01	0.000
42.16	2.29	74.47	1.91	142.29	33	2600	0.18	0.024	0.01	8.63	0.01	0.000
42.32	2.29	73.38	1.93	141.37	33	2591	0.18	0.024	0.01	8.63	0.01	0.000
42.49	2.30	72.23	1.95	140.96	33	2591	0.18	0.024	0.01	8.63	0.01	0.000
42.65	2.31	71.17	1.99	141.64	34	2610	0.18	0.024	0.01	8.63	0.01	0.000
42.82	2.32	72.54	2.01	145.78	35	2694	0.18	0.023	0.01	8.63	0.01	0.000
42.98	2.31	76.96	1.97	151.32	36	2806	0.18	0.022	0.01	8.63	0.01	0.000
43.15	2.28	81.76	1.90	155.40	36	2891	0.18	0.021	0.01	8.63	0.01	0.000
43.31	2.28	83.04	1.89	156.87	37	2926	0.17	0.021	0.01	8.63	0.01	0.000
43.47	2.31	81.18	1.98	160.51	38	3003	0.17	0.020	0.01	8.63	0.01	0.000
43.64	2.35	79.82	2.11	168.39	40	3154	0.17	0.019	0.01	8.63	0.01	0.000
43.80	2.36	82.64	2.16	178.85	43	3356	0.17	0.018	0.01	8.63	0.01	0.000
43.97	2.37	85.31	2.20	187.99	46	3536	0.17	0.017	0.01	8.63	0.00	0.000
44.13	2.41	81.26	2.36	191.56	47	3598	0.17	0.016	0.01	8.63	0.00	0.000
44.29	2.49	70.51	2.72	191.57	49	3565	0.17	0.017	0.01	8.63	0.00	0.000
44.46	2.60	57.02	3.30	188.18	51	3444	0.17	0.017	0.01	8.63	0.00	0.000
44.62	2.67	48.53	3.77	183.10	0	0	0.17	0.000	0.00	0.00	0.00	0.000
44.79	2.65	47.09	3.67	172.90	0	0	0.17	0.000	0.00	0.00	0.00	0.000
44.95	2.65	43.42	3.67	159.47	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.11	2.67	39.00	3.75	146.30	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.28	2.71	34.44	4.10	141.34	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.44	2.72	35.53	4.17	148.27	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.61	2.73	38.91	4.22	164.36	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.77	2.61	54.00	3.41	184.31	0	0	0.17	0.000	0.00	0.00	0.00	0.000
45.93	2.35	94.57	2.14	201.99	49	3942	0.17	0.015	0.01	8.63	0.00	0.000
46.10	2.17	135.81	1.61	218.05	49	4208	0.17	0.014	0.00	8.63	0.00	0.000
46.26	2.10	156.57	1.45	227.23	49	4287	0.17	0.014	0.00	8.63	0.00	0.000
46.43	2.12	147.45	1.49	219.26	48	4180	0.17	0.014	0.01	8.63	0.00	0.000
46.59	2.14	137.66	1.53	210.49	46	4053	0.17	0.015	0.01	8.63	0.00	0.000
46.75	2.14	129.13	1.52	196.55	43	3790	0.17	0.016	0.01	8.63	0.00	0.000
46.92	2.13	118.11	1.52	179.34	39	3465	0.17	0.018	0.01	8.63	0.01	0.000
47.08	2.14	107.79	1.54	165.54	36	3216	0.17	0.019	0.01	8.63	0.01	0.000
47.25	2.15	103.88	1.54	160.29	35	3125	0.17	0.020	0.01	8.63	0.01	0.000
47.41	2.15	105.28	1.56	164.58	36	3226	0.17	0.019	0.01	8.63	0.01	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
47.57	2.16	109.07	1.57	171.62	38	3377	0.17	0.018	0.01	8.63	0.01	0.000
47.74	2.16	112.28	1.56	175.68	39	3462	0.17	0.018	0.01	8.63	0.01	0.000
47.90	2.12	114.35	1.50	171.65	38	3356	0.17	0.019	0.01	8.63	0.01	0.000
48.07	2.09	114.66	1.43	164.05	35	3165	0.17	0.020	0.01	8.63	0.01	0.000
48.23	2.09	113.15	1.45	163.55	35	3174	0.17	0.020	0.01	8.63	0.01	0.000
48.39	2.22	83.16	1.73	143.80	33	3930	0.17	0.016	0.01	8.63	0.01	0.000
48.56	2.26	87.52	1.82	159.31	37	4329	0.17	0.014	0.01	8.63	0.01	0.000
48.72	2.28	90.05	1.89	169.86	40	4598	0.17	0.013	0.01	8.63	0.00	0.000
48.89	2.30	90.36	1.94	175.66	41	4741	0.17	0.013	0.01	8.63	0.00	0.000
49.05	2.32	89.27	2.03	181.14	43	4855	0.17	0.012	0.00	8.63	0.00	0.000
49.22	2.34	89.16	2.10	186.85	45	4986	0.17	0.012	0.00	8.63	0.00	0.000
49.38	2.35	87.59	2.13	186.99	45	4983	0.17	0.012	0.00	8.63	0.00	0.000
49.54	2.36	85.87	2.14	183.76	44	4911	0.17	0.012	0.00	8.63	0.00	0.000
49.71	2.40	75.70	2.29	173.63	43	4570	0.17	0.013	0.01	8.63	0.00	0.000
49.87	2.50	58.48	2.78	162.81	42	4060	0.17	0.015	0.01	8.63	0.00	0.000

Total estimated settlement: 0.13

Abbreviations

Q_{tn}: Equivalent clean sand normalized cone resistance
K_c: Fines correction factor
$Q_{tn,cs}$: Post-liquefaction volumentric strain
G_{max}: Small strain shear modulus
CSR: Soil cyclic stress ratio
γ: Cyclic shear strain
$e_{vol(15)}$: Volumetric strain after 15 cycles
N_c: Equivalent number of cycles
e_v: Volumetric strain
Settle.: Calculated settlement

:: Post-earthquake settlement due to soil liquefaction ::

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
50.04	147.17	2.00	0.00	1.00	0.00	50.20	134.67	2.00	0.00	1.00	0.00

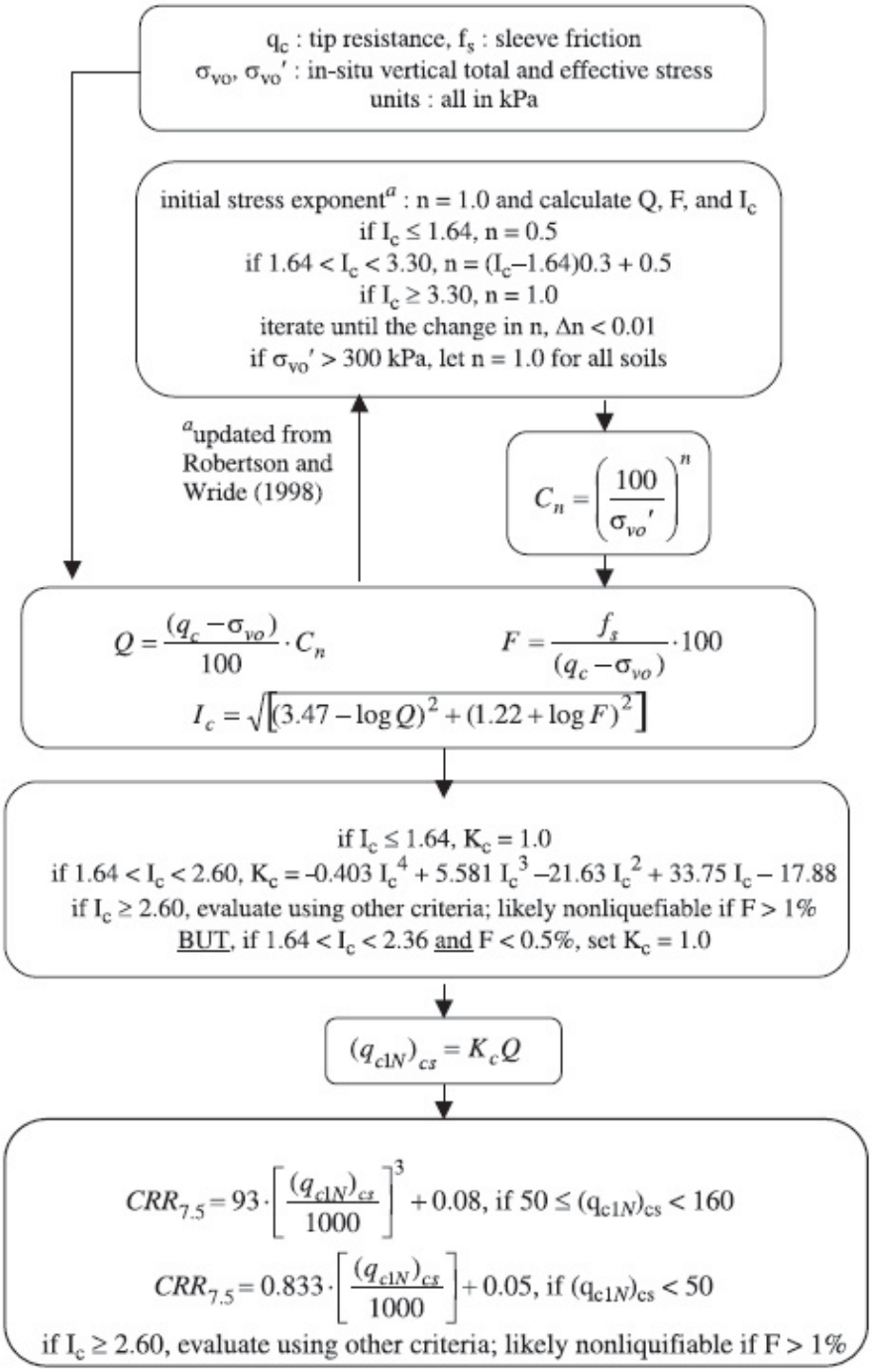
Total estimated settlement: 0.00

Abbreviations

$Q_{tn,cs}$: Equivalent clean sand normalized cone resistance
FS: Factor of safety against liquefaction
e_v (%): Post-liquefaction volumentric strain
DF: e_v depth weighting factor
Settlement: Calculated settlement

Procedure for the evaluation of soil liquefaction resistance, NCEER (1998)

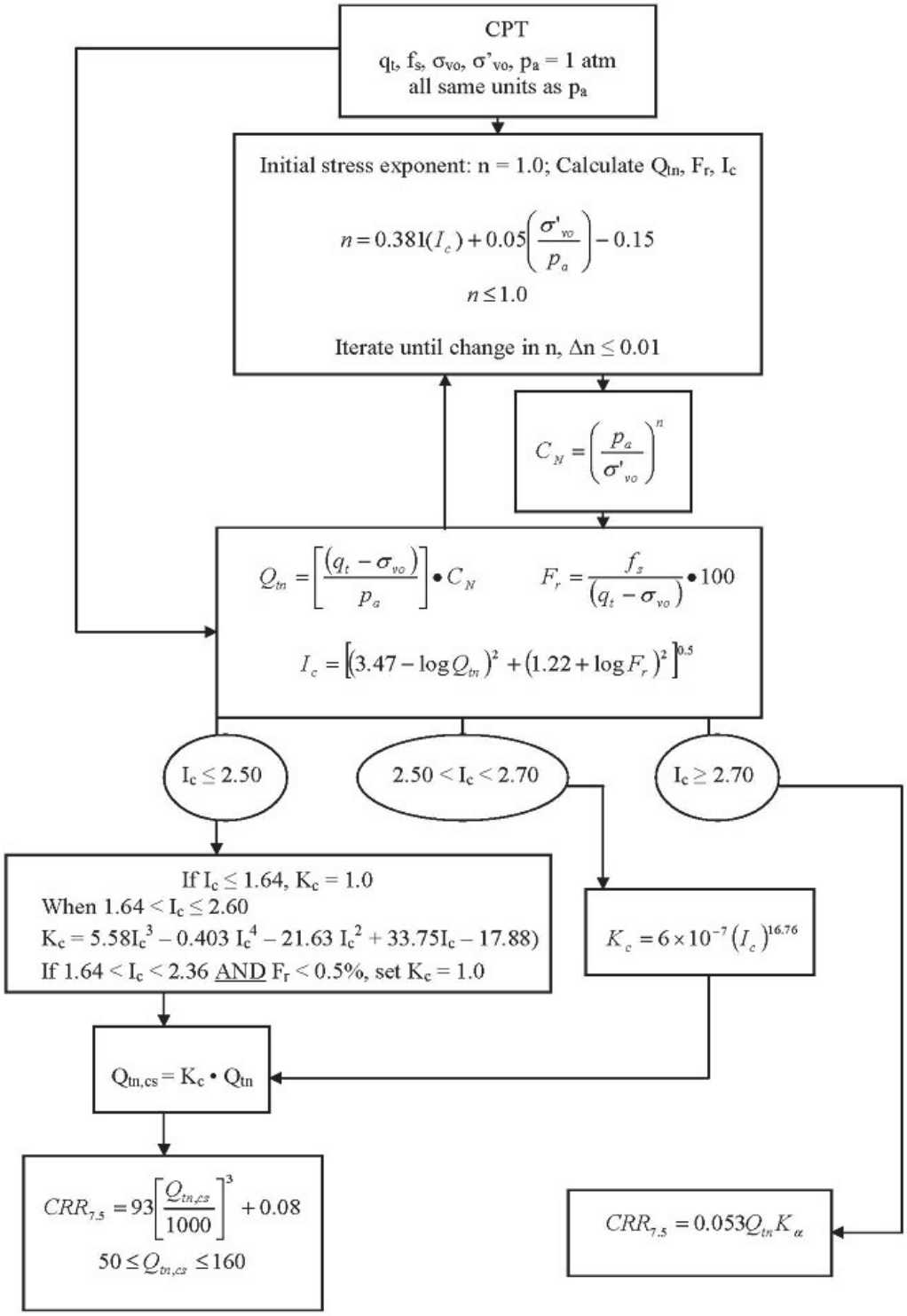
Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. The procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). The revised procedure is presented below in the form of a flowchart[1]:



[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

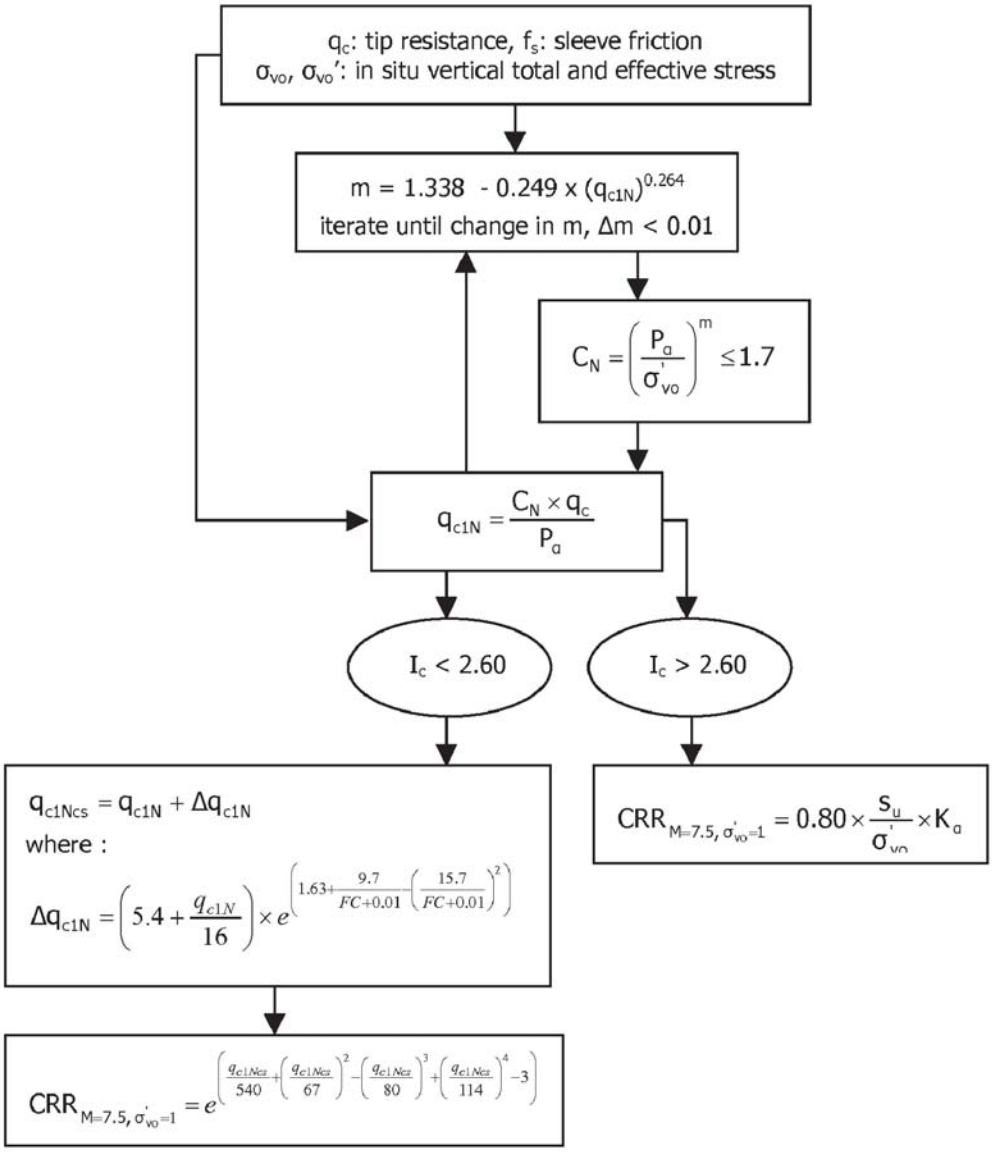
Procedure for the evaluation of soil liquefaction resistance (all soils), Robertson (2010)

Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. This procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). The revised procedure is presented below in the form of a flowchart[1]:

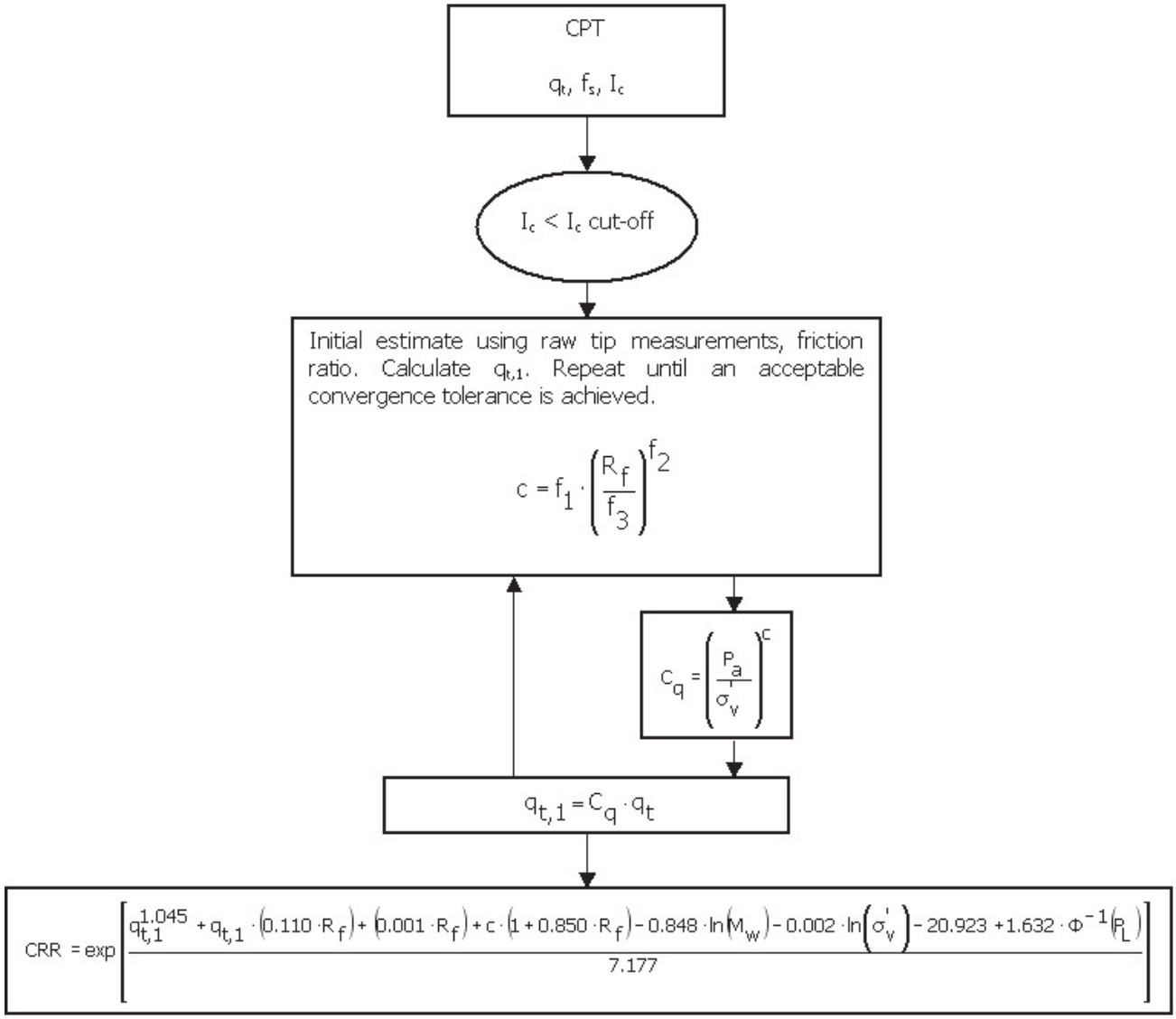


[1] P.K. Robertson, 2009. "Performance based earthquake design using the CPT", Keynote Lecture, International Conference on Performance-based Design in Earthquake Geotechnical Engineering – from case history to practice, IS-Tokyo, June 2009

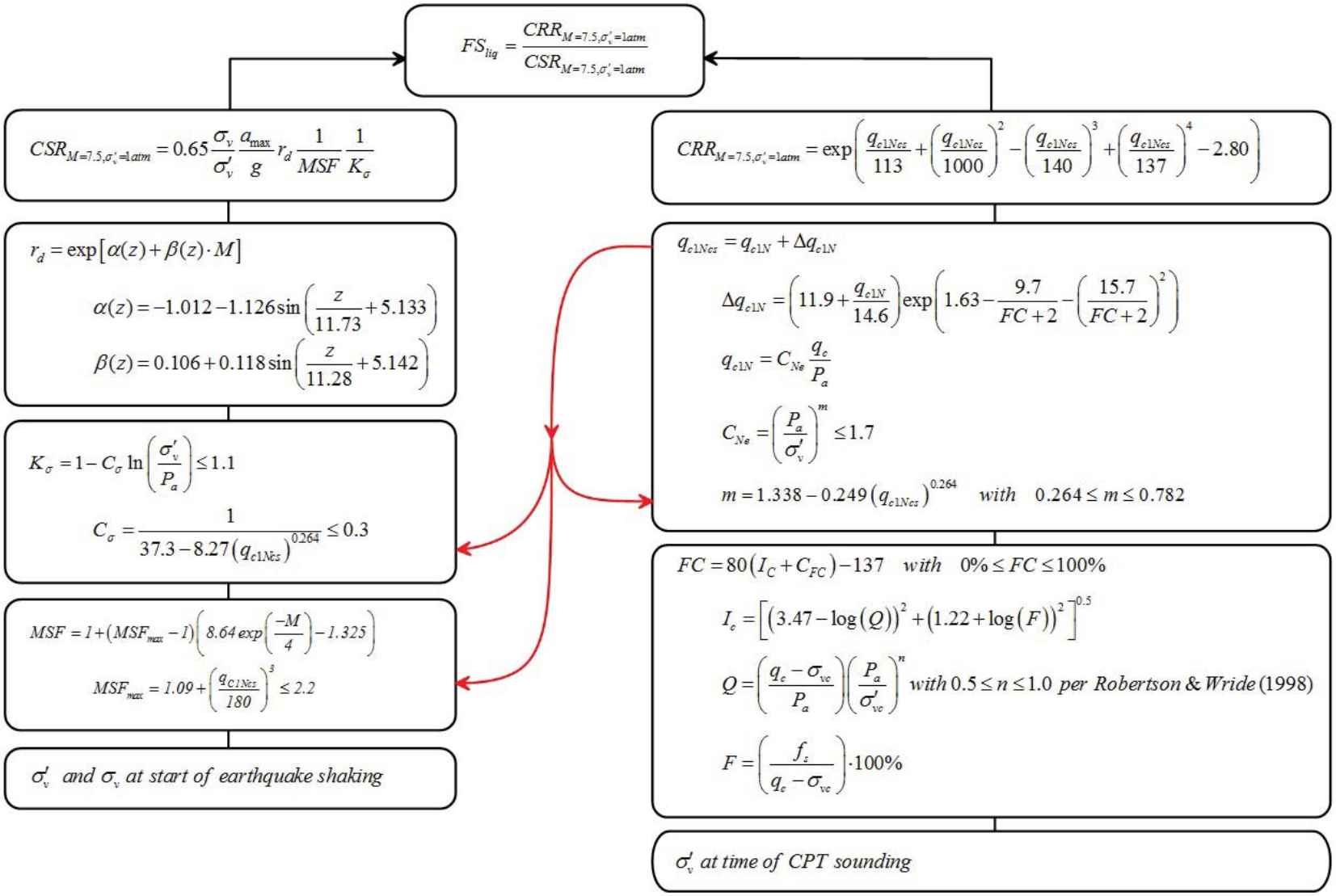
Procedure for the evaluation of soil liquefaction resistance, Idriss & Boulanger (2008)



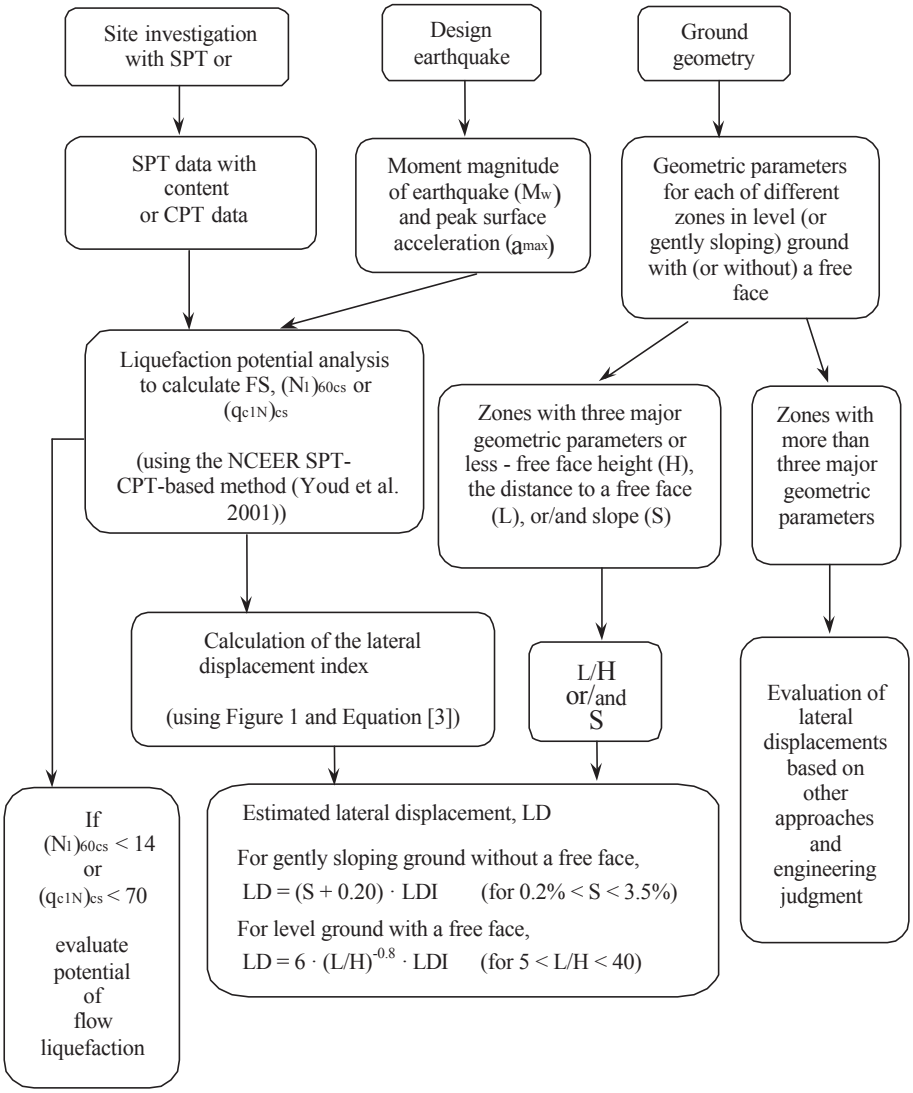
Procedure for the evaluation of soil liquefaction resistance (sandy soils), Moss et al. (2006)



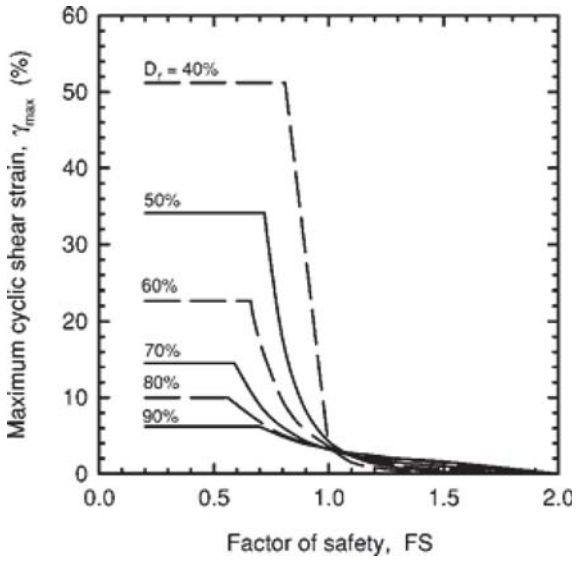
Procedure for the evaluation of soil liquefaction resistance, Boulanger & Idriss(2014)



Procedure for the evaluation of liquefaction-induced lateral spreading displacements



[1] Flow chart illustrating major steps in estimating liquefaction-induced lateral spreading displacements using the proposed approach



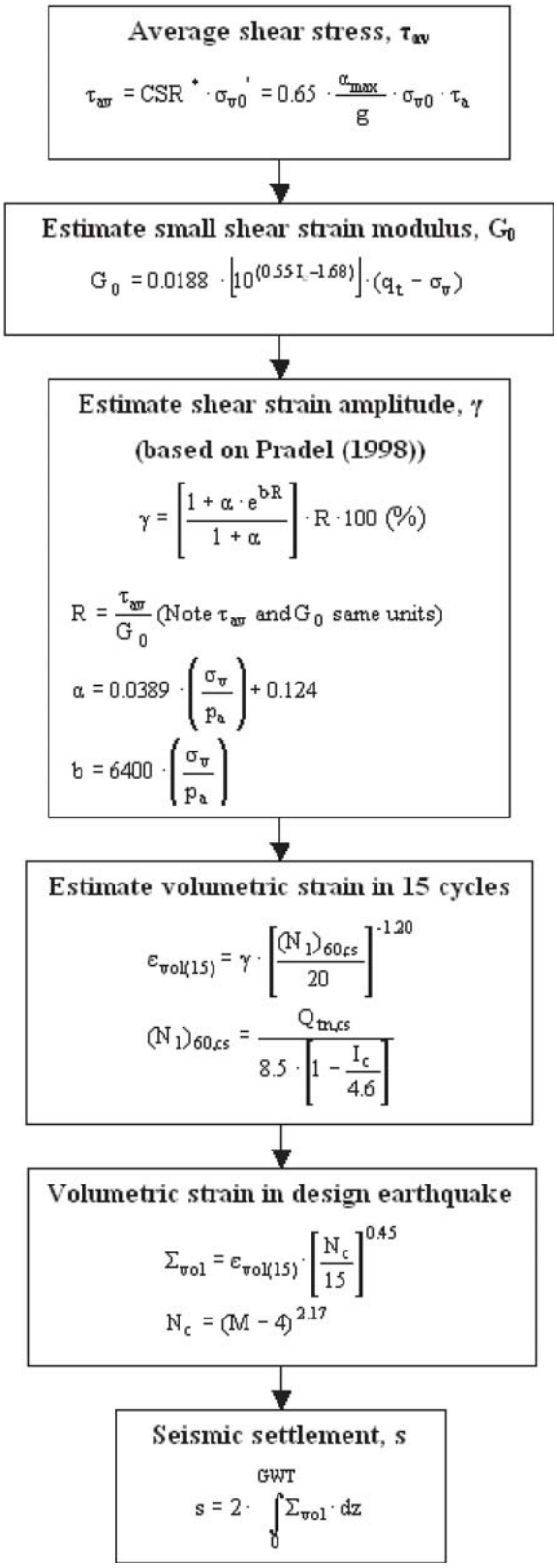
[1] **Figure 1**

$$LDI = \int_0^{z_{max}} \gamma_{max} dz$$

[1] **Equation [3]**

[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

Procedure for the estimation of seismic induced settlements in dry sands



Robertson, P.K. and Lisheng, S., 2010, "Estimation of seismic compression in dry soils using the CPT" FIFTH INTERNATIONAL CONFERENCE ON RECENT ADVANCES IN GEOTECHNICAL EARTHQUAKE ENGINEERING AND SOIL DYNAMICS, Symposium in honor of professor I. M. Idriss, San Diego, CA

Liquefaction Potential Index (LPI) calculation procedure

Calculation of the Liquefaction Potential Index (LPI) is used to interpret the liquefaction assessment calculations in terms of severity over depth. The calculation procedure is based on the methology developed by Iwasaki (1982) and is adopted by AFPS.

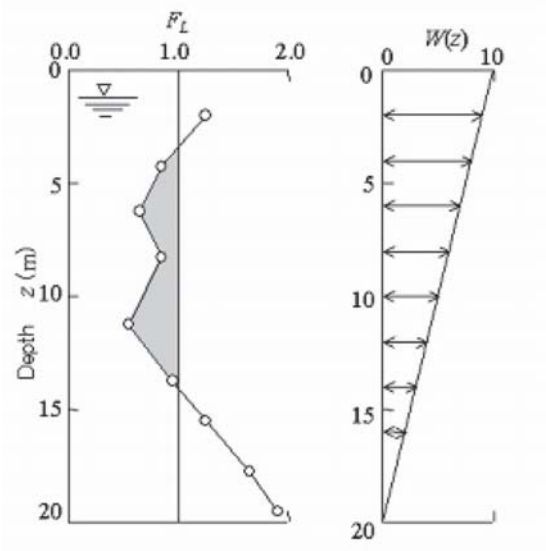
To estimate the severity of liquefaction extent at a given site, LPI is calculated based on the following equation:

$$\text{LPI} = \int_0^{20} (10 - 0{,}5z) \times F_L \times dz$$

where:
F_L = 1 - F.S. when F.S. less than 1
F_L = 0 when F.S. greater than 1
z depth of measurment in meters

Values of LPI range between zero (0) when no test point is characterized as liquefiable and 100 when all points are characterized as susceptible to liquefaction. Iwasaki proposed four (4) discrete categories based on the numeric value of LPI:

- LPI = 0 : Liquefaction risk is very low
- 0 < LPI <= 5 : Liquefaction risk is low
- 5 < LPI <= 15 : Liquefaction risk is high
- LPI > 15 : Liquefaction risk is very high



Graphical presentation of the LPI calculation procedure

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APPENDIX D

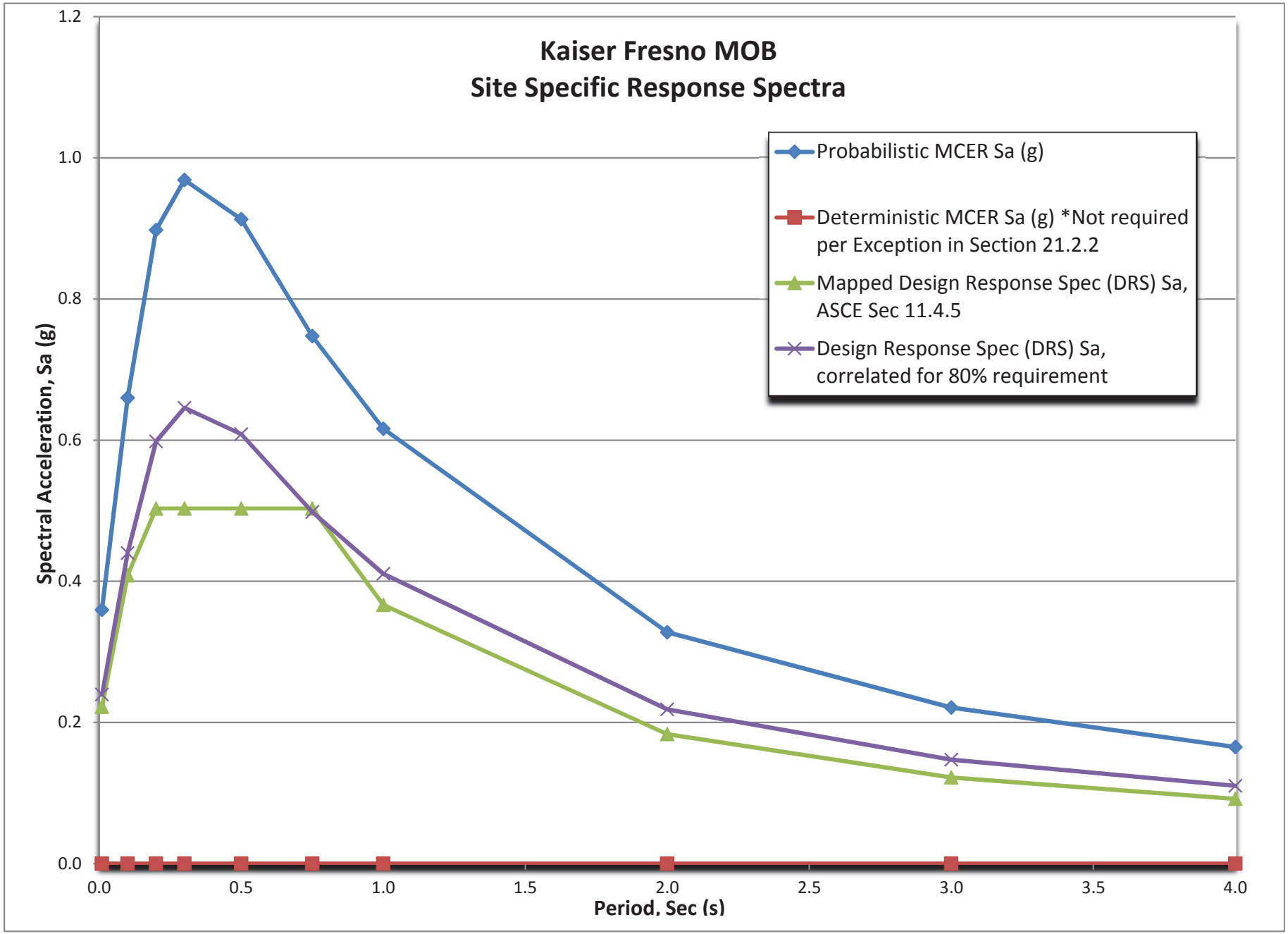
SITE SPECIFIC GROUND MOTION ANALYSIS RESULTS

Kaiser Fresno MOB: Site Specific Seismic Ground Motion Analysis Summary Table

Period (s)	Probabilistic MCER Sa (g)	Deterministic MCER Sa (g) *Not required per Exception in Section 21.2.2	Site Specific MCER Sa (g)	Site Specific Design Response Spec (DRS) Sa, ASCE Sec 21.3	Mapped Design Response Spec (DRS) Sa, ASCE Sec 11.4.5	% DRS ASCE Sec 21.3 vs 11.4.5	80% of Mapped DRS (ASCE 11.4.5)	Design Response Spec (DRS) Sa, correlated for 80% requirement	per 21.4
0.010	0.360	0.000	0.360	0.240	0.222	108%	0.178	0.240	
0.100	0.660	0.000	0.660	0.440	0.408	108%	0.327	0.440	
0.200	0.898	0.000	0.898	0.598	0.503	119%	0.403	**0.598**	S_{DS}, 90% of max from 0.2 to 5s
0.300	0.969	0.000	0.969	0.646	0.503	128%	0.403	0.646	
0.500	0.913	0.000	0.913	0.609	0.503	121%	0.403	0.609	
0.750	0.747	0.000	0.747	0.498	0.503	99%	0.403	0.498	
1.000	0.616	0.000	0.616	0.411	0.367	112%	0.293	**0.411**	S_{D1}, max value of Tsa from1 to 5s for $v_{s,30} \leq$ 365.76 m/s
2.000	0.328	0.000	0.328	0.219	0.183	119%	0.147	0.219	
3.000	0.221	0.000	0.221	0.147	0.122	121%	0.098	0.147	
4.000	0.165	0.000	0.165	0.110	0.092	120%	0.073	0.110	
5.000	0.134	0.000	0.134	0.089	0.073	121%	0.059	0.089	
PGA	0.345	-	**0.345**						

Parameters	Value from Site Specific	Value from Mapped ASCE, Sec 11.4	% Ratio of Site Specific Vs. ASCE
S_{MS}	0.872	0.755	116
S_{M1}	0.668	0.550	121
S_{DS}	0.581	0.503	116
S_{D1}	0.445	0.367	121
T_0	0.153	0.146	**Fig 11.4-1**
T_S	0.766	0.729	**Fig 11.4-1**
T_L	-	12	**Fig 22-12**

F_a	1.355	**Table 11.4-1**
F_V	2.5	**Section 21.3**
S_S	0.557	**Fig 22-1**
S_1	0.22	**Fig 22-2**
C_{RS}	0.929	**Fig 22-17**
C_{R1}	0.946	**Fig 22-18**


Kaiser Fresno MOB
Site Specific Response Spectra
Probabilistic MCER Sa (g)
Deterministic MCER Sa (g) *Not required per Exception in Section 21.2.2
Mapped Design Response Spec (DRS) Sa, ASCE Sec 11.4.5
Design Response Spec (DRS) Sa, correlated for 80% requirement
Spectral Acceleration, Sa (g)
Period, Sec (s)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0

November 30, 2022

Kaiser Permanente
National Facilities Services
NCAL Major Project Delivery MOPD COE
501 J Street
Sacramento, California 95814

Attention: Ms. Allison L. Hedberg | Senior Manager

Subject: **Supplemental Geotechnical Recommendations**
Kaiser Fresno Medical Office Building and Parking Structure
East Locust Avenue and North Orchard Street, Fresno, California 93720
Atlas Project No. 91-04768-B

Reference: *1) "Geotechnical Engineering Study, Kaiser Fresno Medical Office Building and Parking Structure, East Locust Avenue and North Orchard Street, Fresno, California 93720,"* prepared by Atlas Technical Consultants LLC, dated October 7, 2022.

Dear Ms. Hedberg:

Per your request, **Atlas Technical Consultants LLC (Atlas)** has developed supplemental geotechnical recommendations for the design of retaining walls for Kaiser Fresno Medical Office Building and Parking Structure project to be constructed in Fresno, California. Based on the information provided, we understand the retaining walls and/or below grade walls will also be designed and constructed as part of this project. Atlas previously prepared a geotechnical engineering study for the project (Reference 1).

Retaining Walls

Lateral Earth Pressure

Retaining walls should be designed to resist loading resulting from lateral earth pressures (static, and seismic as appropriate) and any additional lateral loads caused by surcharge loads on the adjoining ground surface.

The following recommended lateral earth design pressures are based on the assumption that approved on-site soils or structural fill will be used as wall backfill. For a level backfill condition, unrestrained walls (i.e., walls that are free to deflect or rotate) should be designed to resist an equivalent fluid pressure of 30 pounds per cubic foot. Restrained walls for a level backfill condition should be designed to resist an equivalent fluid pressure of 30 pounds per cubic foot, plus an additional uniform lateral pressure of 5H pounds per square foot, where H = height of backfill above the top of the wall footing, in feet. If required for seismic design (generally for walls with 6 feet or more in retained height), unrestrained walls and restrained walls with level backfill should

be designed to resist an additional uniform load equal to 7H psf, where H equals the height of soil retained by the wall in feet. The seismic load should be added to the *unrestrained* condition in both cases.

Walls with inclined backfill should be designed for an additional equivalent fluid pressure of 1 pound per cubic foot for every 2 degrees of slope inclination from horizontal. Walls subjected to surcharge loads should be designed for an additional uniform lateral pressure equal to 0.33 times the anticipated surcharge load for unrestrained walls, and 0.50 times the anticipated surcharge load for restrained walls.

The lateral earth pressures herein do not include any factor-of-safety and are not applicable for submerged soils/hydrostatic loading. Additional recommendations may be necessary if submerged conditions are to be included in the design.

Wall Foundations

Wall foundations may consist of spread footings designed in accordance with the *Foundations* sections (6.6.1 and 6.6.2) of the original report. These sections also include recommended passive lateral pressures for providing resistance against wall footing foundations.

Wall Drainage

The recommended lateral pressures assume that retaining walls are fully back drained to prevent the build-up of hydrostatic pressures. We note that the onsite near-surface soils are primarily granular and if used for wall backfill, should be relatively permeable, although to an undetermined extent. A retaining wall drainage system, if used, should consist of a minimum 12-inch width of free-draining granular soils containing less than 5 percent fines (by weight) passing a No. 200 sieve placed adjacent to the wall. The free-draining granular material should be of a gradation sufficient to prevent the intrusion of fines (e.g., a Caltrans Class 2 permeable material) or otherwise encapsulated in a suitable filter fabric.

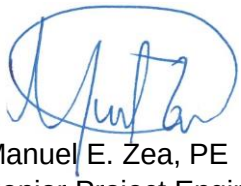
A drainage system consisting of either weep holes or perforated drain lines (placed near the base of the wall) should be used to intercept and discharge water, which would tend to saturate the backfill. Where used, drain lines should be embedded in a uniformly graded filter material and provided with adequate clean-outs for periodic maintenance if desired. An impervious soil should be used in the upper layer of backfill to reduce the potential for water infiltration. As an alternative, a prefabricated drainage element such as a geocomposite drain (e.g., MiraDRAIN 6000) may be used as a substitute for the granular backfill adjacent to the wall. Collector pipes for wall drainage should be sloped to discharge by gravity to an adjacent storm drain system or other appropriate facility.

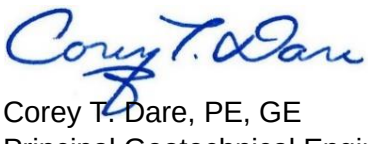
Retraining Wall Backfill

Structural backfill placed behind retaining walls should meet the requirements presented in the *Engineered Fill Materials and Placement Requirements* presented in the original report. Special care (such as the use of lightweight equipment) should be taken during wall backfill compaction to reduce the potential for overstressing of the walls.

We trust this letter provides the additional information you have requested. Should you or members of the design team have questions or need additional information, please contact the undersigned at corey.dare@oneatlas.com. We greatly appreciate the opportunity to be of continuing service to the project team.

Sincerely,
ATLAS TECHNICAL CONSULTANTS LLC







Manuel E. Zea, PE
Senior Project Engineer

Corey T. Dare, PE, GE
Principal Geotechnical Engineer

Distribution: PDF to Addressee: Allison.L.Hedberg@kp.org

MEZ/CTD:pmf

Appendix E

Phase 1 Environmental Site Assessment

Phase I Environmental Site Assessment

Proposed Kaiser Facility

APNs 303-20-117 and 303-20-111

Fresno, Fresno County, California

May 16, 2018

Terracon Project No. NB187057



Prepared for:
Kaiser Permanente
Oakland, California

Prepared by:
Terracon Consultants, Inc.
Sacramento, California

May 16, 2018

Kaiser Permanente
1950 Franklin Street, 12th Floor
Oakland, CA 94612

Attn:
Mr. Joseph Crist
P: (510) 987-2374
E: Joseph.Crist@kp.org

Re: Phase I Environmental Site Assessment
Proposed Kaiser Facility
APNs 303-20-117 and 303-20-111
Fresno, Fresno County, California
Terracon Project No. NB187057

Dear Mr. Crist:

Terracon Consultants, Inc. (Terracon) is pleased to submit the enclosed Phase I Environmental Site Assessment (ESA) report for the above-referenced site. This assessment was performed in accordance with our Master Services Agreement dated June 3, 2016, and Work Authorization No. CAP014673-34-02, dated April 4, 2018.

We appreciate the opportunity to be of service to you on this project. In addition to Phase I services, our professionals provide geotechnical, environmental, construction materials, and facilities services on a wide variety of projects locally, regionally and nationally. For more detailed information on all of Terracon's services please visit our website at www.terracon.com. If there are any questions regarding this report or if we may be of further assistance, please do not hesitate to contact us.

Sincerely,
Terracon Consultants, Inc.

Megan M. Davey
Field Scientist

Kristin Stout
Senior Scientist

Michael P. Harris
Senior National Account Manager

Attachments

TABLE OF CONTENTS

Page No.

EXECUTIVE SUMMARY ..... **i**
Findings and Opinions i
Significant Data Gaps vi
Conclusions vi
Recommendations vi
1.0 INTRODUCTION **1**
1.1 Site Description 1
1.2 Scope of Services 1
1.3 Standard of Care 2
1.4 Additional Scope Limitations, ASTM Deviations and Data Gaps 2
1.5 Reliance 3
1.6 Client Provided Information 4
2.0 PHYSICAL SETTING **5**
3.0 HISTORICAL USE INFORMATION **6**
3.1 Historical Topographic Maps, Aerial Photographs, Sanborn Maps 6
3.2 Historical City Directories 7
3.3 Site Ownership 8
3.4 Title Search 8
3.5 Environmental Liens and Activity and Use Limitations 8
3.6 Interviews Regarding Current and Historical Site Uses 8
3.7 Prior Report Review 8
4.0 RECORDS REVIEW **9**
4.1 Federal and State/Tribal Databases 9
4.2 Local Agency Inquiries 11
5.0 SITE RECONNAISSANCE **12**
5.1 General Site Information 12
5.2 Overview of Current Site Occupants 12
5.3 Overview of Current Site Operations 12
5.4 Site Observations 12
6.0 ADJOINING PROPERTY RECONNAISSANCE **15**
7.0 ADDITIONAL SERVICES **15**
7.1 Risk Assessment for Currently Tracked Materials 16
7.2 Asbestos-Containing Building Materials 16
7.3 Radon 16
7.4 Lead-Based Paint 16
7.5 Lead in Drinking Water 17
7.6 Wetlands 17
7.7 Regulatory Compliance 17
7.8 Cultural and Historic Resources 17
7.9 Industrial Hygiene 17
7.10 Health and Safety 17
7.11 Ecological Resources 18
7.12 Endangered Species 18
7.13 Indoor Air Quality 19
7.14 Biological Agents 19
7.15 Mold/Water Intrusion 19

7.16 Limited Vapor Intrusion Assessment 19
7.17 Limited Sea Level Rise Assessment 20
7.18 FEMA Flood Map Review 20
7.19 Limited Phase II Environmental Site Assessment 20
8.0 DECLARATION 24

APPENDICES

APPENDIX A Exhibit 1 - Topographic Map, Exhibit 2 - Site Diagram, Exhibit 3 - Soil Boring Locations

APPENDIX B Site Photographs

APPENDIX C Historical Documentation and User Questionnaire

APPENDIX D Environmental Database Information

APPENDIX E Credentials

APPENDIX F Description of Terms and Acronyms

EXECUTIVE SUMMARY

This Phase I Environmental Site Assessment (ESA) was performed in accordance with our Master Services Agreement dated June 3, 2016, and was conducted consistent with the procedures included in ASTM E1527-13, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*. The ESA was conducted under the supervision or responsible charge of Kristin Stout, Environmental Professional. Megan M. Davey performed the site reconnaissance on April 12, 2018.

Findings and Opinions

A summary of findings is provided below. It should be recognized that details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein.

Site Description and Use

The site is located northeast of the intersection of East Locust Avenue and Orchard Street (Assessor's Parcel Numbers [APNs] 303-20-117 and 303-20-111) in Fresno, Fresno County, California. The site consists of an approximately 7.01-acres tract of vacant land with no current improvements or structures. During the site reconnaissance, the site was unoccupied.

Historical Information

Based on a review of the historical information, the site has consisted primarily of agricultural land from the late 1930s through the early 1970's and vacant land from at least 1979 through the present. Additionally, soil stockpiles are present on the southern portion of the site from at least 2014 to present.

Historically, the site was used for agricultural purposes from at least the late 1930s through the early 1970's. The agricultural land use typically includes the use of pesticides and herbicides. These constituent's application over time could persist in the on-site shallow soils. Based on the historical agricultural use of the site, there is a potential that agricultural chemicals, such as pesticides and herbicides to be present in the shallow soils at the site, which represents a recognized environmental condition (REC). Additionally, the sudden and unknown origin of the soil stockpiles from at least 2014 to present also represents a REC.

The surrounding properties consisted of primarily vacant and cultivated agricultural land and associated residential properties from the early 1920s through the early 1970s, when commercial and residential development began and continued through 2010s.

Records Review

Selected federal and state environmental regulatory databases as well as responses from state and local regulatory agencies were reviewed. The site was not identified in the environmental regulatory databases. The facilities listed in the database report do not appear to represent RECs to the site at this time, based upon regulatory status, apparent topographic gradient, and/or distance from the site.

Site Reconnaissance

The site was observed as vacant land covered with native vegetation or long grass. No improvements or structures were observed during the time of the site visit. During the site reconnaissance, municipal litter, old disposed sod, soil stockpiles, and demolition debris were observed throughout the site. Based on site observations, indications of RECs were observed during the site reconnaissance in association with the site.

Adjoining Properties

The property to the adjoining north of the site consists of a multi-tenant commercial complex that includes Forward Advantage Development (7255 N First St. #101 and #106), Physician Network Advantage (7255 N First St. #103), HQ (7259 N First St. #101), First Carbon Solutions (7265 N First St. #101), HQ (7265 N First St. #102), Concentra Urgent Care (7265 N First St. #105), Artashes Avakian DDS (7269 N First St. #101), PNA Marketing (7269 N First St. #102), Cosmopolitan Finance (7275 N First St. #103), HQ Break (7275 N First St. #105), Drysdale Physical Therapy (7275 N First St. #106), and Intercare (7275 N First St. #112). The properties to the adjoining west of the site consist of a multi-tenant commercial complex that includes University Orthopedic Associates (7235 N. First St #103), Byron L. Reintjes, DD. (7235 N First St. #101), The WCPA Group (7225 N. First St. # 101), Sam I. Kodama, DDS and Clayton T. Kodama, DDS, JD (7225 N. First St. #107), Tamer Michael, DDS (7215 N. First St. #107), Bryan C. Fung, DDS (7215 N. First St. #103), and Aloha Family Optometric Group: Mukai Gary OD (7215 N. First St. #101), and vacant land. The properties to the adjoining south of the site consist of California Teaching Fellows Foundation - Santa Maria Building (575 E. Locust Avenue #302), and a multi-tenant commercial complex that includes California's Valued Trust (520 Herndon Ave), Frederick J. Kruger, D.P.M. Inc. (530 Herndon Ave #104), Quinox (530 Herndon Ave #105), R.A. Ballecer, MD, ENT (540 Herndon Ave #105), Tsing T. Kowk, MD, Inc., Internal Medicine (540 Herndon Ave #102), Gary Critser DO, Family Practice (540 Herndon Ave #106), BK Pharmacy Corp. (540 Herndon Ave #103), DaVita Herndon Dialysis Center (560 Herndon Avenue #101), and Keisho Plaza (568 Herndon Ave). The properties to the adjoining west of the site consist of a large freshwater pond and a baseball complex.

Additional Services

As requested by the client, Terracon performed a risk assessment for currently tracked materials, assessed cultural and historic resources, endangered species, vapor intrusion assessment, and sea level rise. Findings for the additional services are as follows:

- Based on information obtained from iPAC website and EDR, threatened species (Flowering Plants) were identified in the site area; therefore, there is an environmental risk associated with Ecological Resources.
- Based on the vacant and undeveloped nature of the site, there is a potential to support presence of threatened and endangered species.
- The site is located outside the estimated sea level rise of 0-2 feet above mean sea level and is considered to have a low risk impact from sea level rise.
- The site is located outside the 100-year and 500-year chance flood hazard areas of Fresno County. Based on this information, the site is considered to have a low risk impact from flooding.

Limited Phase II Environmental Site Assessment

Based upon the initial findings of the Phase I ESA, Terracon conducted a concurrent Limited Phase II ESA at the site to assess the historical agricultural land use and unknown origin of the soil stockpiles. On April 18, 2018, Terracon advanced 20 soil borings (B1 through B20) to a depth of 2 feet bgs for soil sampling at depths from surface to 0.5-feet bgs and 1.5- to 2-feet bgs. Four deeper soil borings (B21 through B24) were advanced to sample at a depth of 5- to 5.5-feet bgs. Terracon collected six (6) soil samples from the soil stockpiles from a depth of 1- to 2-feet within the surface of the soil stockpiles. Soil boring locations are depicted on Exhibit 3.

Individual shallow soil samples were composited for analysis. The composite samples were prepared as follows:

- Composite 1: B1, B2, B3, and B4 – samples from surface to 0.5-feet bgs
- Composite 2: B5, B6, B7, and B8 – samples from surface to 0.5-feet bgs
- Composite 3: B9, B10, B11, and B12 – samples from surface to 0.5-feet bgs
- Composite 4: B13 and B14 – samples from surface to 0.5-feet bgs

The following tests methods were performed by the laboratory:

- Organochlorine Pesticides (OCPs) by EPA Method 8081A;
- Total petroleum hydrocarbons (TPH) as gasoline range organics (GRO), diesel range organics (DRO), and oil range organics (ORO) by EPA Method 8015M;
- California Administrative Manual (CAM) 17 Metals by EPA Method 6020 and 7471;
- Volatile organic compounds (VOCs) by EPA Method 8260B;
- Polychlorinated biphenyl (PCBs) by EPA Method 8082; and,
- Semi-volatile organic compounds (SVOCs) by EPA Method 8270C or by EPA Method 8270C with selective ion monitoring (SIM).

Composited samples and stockpile samples (B15 through B20) from discrete intervals at 1- to 2-feet bgs and composite samples were analyzed for OCPs.

Select samples and duplicates samples from B1, B9, B13 through B24 were analyzed for TPH, Metals, VOCs, PCBs, and SVOCs.

Soil sample laboratory analytical results indicate that OCPs concentrations were not detected above their respective laboratory reporting limits in the four (4) composite soil samples and six (6) stockpile samples analyzed with the exception of 4,4'-DDE, 4,4'-DDT, and Toxaphene. The maximum detected concentrations for 4,4'-DDE and 4,4'-DDT were 0.00907 (COMP-3) and 0.00490 (COMP-1) milligrams per kilogram (mg/Kg), respectively. Toxaphene was detected in soil sample COMP-2, at a concentration of 0.0712 mg/kg.

The detected OCPs concentrations for 4,4'-DDE, 4,4'-DDT, and Toxaphene were compared to the Environmental Screening Levels (ESLs) established by the California Regional Water Quality Control Board, dated February 2016. The comparison reveals that the detected 4,4'-DDE, 4,4'-DDT concentrations are below their respective screening levels.

The laboratory reporting limits for toxaphene are higher that the generic site conceptual model (Tier 1) ESLs (for leaching); therefore, most of the sample results were not comparable to the most conservative Tier 1 screening level. The laboratory reported a detection of Toxaphene in sample COMP-2 at 0.0712 (j) mg/Kg that exceeds the Tier 1 ESL, but is less than the Residential Land Use ESL of 0.51 mg/Kg.

A summary of the soil sample analytical results for OCPs is presented in Table 1 of Appendix B, and the complete laboratory analytical report is included in Appendix C.

The laboratory reported detection of Toxaphene in sample COMP-2 at 0.0712 (j) mg/Kg, led Terracon to analyze the COMP-2 component aliquots (i.e. B5-0-0.5, B6-0-0.5, B7-0-0.5, and B8-0-0.5) separately using EPA Method 8081A. The following results were reported by the laboratory:

Detected Analyte	**Screening Criteria (mg/Kg)**		**Sample Identification (mg/Kg)**			
	Tier 1 ESL[1]	Direct Exposure Human Health Risk Levels (Table S-1) Residential Shallow Soil Exposure[1]	B5-0-0.5	B6-0-0.5	B7-0-0.5	B8-0-0.5
4,4-DDE	1.9	1.9	0.00121 J	0.0929	0.00116 J	0.0689
4,4-DDT	1.9	1.9	0.000980 J P	0.0187 J	0.000750 J P	0.00982 J
Toxaphene	0.00042	0.51	< 0.0373	**0.363 J**	< 0.0396	**0.232 J**

Notes:
[1] – California Regional Water Quality Control Board Environmental Screening Levels
J - The identification of the analyte is acceptable; the reported value is an estimate.
P - Relative Percent Difference (RPD) between the primary and confirmatory analysis exceeded 40%.
Bold – estimated value exceeds Tier 1 Environmental Screening Levels

Metals were detected in the soil samples below the ESLs, with the exception of arsenic which was detected at concentrations ranging from 2.7 mg/Kg to 3.5 mg/Kg. These concentrations were determined to be well within background concentrations.

The sample analytical results for the soil stockpile samples indicated concentrations of TPH-GRO, TPH-DRO, TPH-ORO, acetone, and 2-Butanone (MEK) detected above their respective laboratory reporting limits. However, none of the concentrations exceeded their respective ESLs. PCBs were not detected above the laboratory reporting limits in any of the stockpile soil samples.

The sample analytical results indicate that several SVOCs were detected above their respective laboratory reporting limits. These include anthracene, acenaphthene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene. Comparison of the detected concentrations to the screening levels reveals that the benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene concentrations detected in soil sample B-18 (1 to 2 feet) exceed the Tier 1 Soil ESL, and that the detected benzo(a)pyrene also exceeds the residential and commercial shallow soil ESL.

The findings of the Limited Phase II ESA investigation are as follows:

- Toxaphene was detected in one composite sample (COMP-2) above the CRWQCB Tier 1 ESL (leaching), the most conservative screening level, but lower than the residential land use ESL. Based on the results of the composite sample, Terracon analyzed the discrete samples that made up the composite sample as explained in Section 4.1.1. Each of the component sample from composite samples COMP-2 were re-analyzed to assess if an area of relatively elevated Toxaphene was present. Results for the samples B6-0-0.5 and B8-0-0.5 contained Toxaphene above Tier 1 ESL screening levels, but lower than the residential land use ESL. The Toxaphene Tier 1 ESL is based upon leaching from soil to shallow groundwater used for drinking water on site. Groundwater is estimated to be at a depth over 100 feet bgs. As no shallow groundwater (≤ 10 feet bgs) is present, and groundwater is not expected to be used for residential drinking water at the site, then the Tier 1 ESLs do not apply. Further, as the residential land use ESL is not exceeded, Toxaphene is not a concern based upon the samples collected.
- Arsenic was detected in all samples analyzed at concentrations consistent with regional background concentrations reported by the USGS. Therefore, arsenic does not appear to be a concern based on the samples collected.
- Stockpile soil on site contain polynuclear aromatic hydrocarbons including benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene and indeno(1,2,3-cd)pyrene were detected above the Tier 1 ESL in soil sample B-18 at 1 to 2 feet. Benzo(a)pyrene also exceeded the commercial shallow soil ESL in sample B-18.

Significant Data Gaps

Significant data gaps were not identified.

Conclusions

We have performed a Phase I ESA consistent with the procedures included in ASTM Practice E 1527-13 at the Proposed Kaiser Facility located at Assessor's Parcel Numbers [APNs] 303-20-117 and 303-20-111, Fresno, Fresno County, California, the site. The following RECs were identified in connection with the site:

- **Soil stockpiles**: the unknown origin of the soil stockpiles represents a REC.

Recommendations

Based on the historical data and the results of the investigation conducted at the site on April 18, 2018, Terracon recommends the following:

- Remove and dispose of approximately 200 cubic yards of the 2,000 cubic yards of stockpiled soil associated with sample location B-18 that may contain polynuclear aromatic hydrocarbons including benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene and indeno(1,2,3-cd)pyrene detected above the Tier 1 ESLs.
- Terracon recommends conducting a threatened and endangered species assessment prior to development of the property.
- If soils are to be disturbed during future excavations, proper procedures should be followed with respect to worker health and safety, and any affected materials encountered should be properly handled and disposed in accordance with local and state regulations. Additionally, a Soil Management Plan is recommended for protection of construction worker and proper handling of soils during future development activities.

1.0 INTRODUCTION

1.1 Site Description

Site Name	Proposed Kaiser Facility
Site Location/Address	Assessor's Parcel Number [APN] 303-20-117 and 303-20-111, Fresno, Fresno County, California
Land Area	Approximately 7.01-acres.
Site Improvements	None
Anticipated Future Site Use	Medical office building.
Purpose of the ESA	Ground lease, with an option to purchase

The location of the site is depicted on Exhibit 1 of Appendix A, which was reproduced from a portion of the USGS 7.5-minute series topographic map. The site and adjoining properties are depicted on the Site Diagram, which is included as Exhibit 2 of Appendix A. Acronyms and terms used in this report are described in Appendix F.

1.2 Scope of Services

This Phase I ESA was performed in accordance with our Master Services Agreement dated March 25, 2018, and was conducted consistent with the procedures included in ASTM E1527-13, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*. The purpose of this ESA was to assist the client in developing information to identify RECs in connection with the site as reflected by the scope of this report. This purpose was undertaken through user-provided information, a regulatory database review, historical and physical records review, interviews, including local government inquiries, as applicable, and a visual noninvasive reconnaissance of the site and adjoining properties. Limitations, ASTM deviations, and significant data gaps (if identified) are noted in the applicable sections of the report.

ASTM E1527-13 contains a new definition of "migrate/migration," which refers to "the movement of hazardous substances or petroleum products in any form, including, for example, solid and liquid at the surface or subsurface, and vapor in the subsurface." By including this explicit reference to migration in ASTM E1527-13, the Standard clarifies that the potential for vapor migration should be addressed as part of a Phase I ESA. This Phase I ESA has considered vapor migration in evaluation of RECs associated with the site.

As requested by the client, the following additional services were performed:

- Visual Observations for Suspect Asbestos

- Limited Asbestos Sampling
- Visual Observations for Mold
- Radon Records Review
- Short-Term Radon Testing
- Limited Lead-Based Paint Sampling
- Visual Observations of Suspect Lead-Based Paint
- Lead in Drinking Water Records Review
- Limited Lead in Drinking Water Sampling
- Wetland Records Review
- Threatened/Endangered Species Records Review
- Historic Properties/Archaeological Resources Review
- ASTM E 2600-15 Vapor Encroachment Screening

1.3 Standard of Care

This ESA was performed in accordance with generally accepted practices of this profession, undertaken in similar studies at the same time and in the same geographical area. We have endeavored to meet this standard of care, but may be limited by conditions encountered during performance, a client-driven scope of work, or inability to review information not received by the report date. Where appropriate, these limitations are discussed in the text of the report, and an evaluation of their significance with respect to our findings has been conducted.

Phase I ESAs, such as the one performed at this site, are of limited scope, are noninvasive, and cannot eliminate the potential that hazardous, toxic, or petroleum substances are present or have been released at the site beyond what is identified by the limited scope of this ESA. In conducting the limited scope of services described herein, certain sources of information and public records were not reviewed. It should be recognized that environmental concerns may be documented in public records that were not reviewed. No ESA can wholly eliminate uncertainty regarding the potential for RECs in connection with a property. Performance of this practice is intended to reduce, but not eliminate, uncertainty regarding the potential for RECs. No warranties, express or implied, are intended or made. The limitations herein must be considered when the user of this report formulates opinions as to risks associated with the site or otherwise uses the report for any other purpose. These risks may be further evaluated – but not eliminated – through additional research or assessment. We will, upon request, advise you of additional research or assessment options that may be available and associated costs.

1.4 Additional Scope Limitations, ASTM Deviations and Data Gaps

Based upon the agreed-on scope of services, this ESA did not include subsurface or other invasive assessments, vapor intrusion assessments or indoor air quality assessments (i.e. evaluation of the presence of vapors within a building structure), business environmental risk evaluations, or other services not particularly identified and discussed herein. Credentials of the company (Statement of Qualifications) have not been included in this report but are available upon request. Pertinent documents are referred to in the text of this report, and a separate

reference section has not been included. Reasonable attempts were made to obtain information within the scope and time constraints set forth by the client; however, in some instances, information requested is not, or was not, received by the issuance date of the report. Information obtained for this ESA was received from several sources that we believe to be reliable; nonetheless, the authenticity or reliability of these sources cannot and is not warranted hereunder. This ESA was further limited by the following:

- At the issuance of this report, the user questionnaire was not provided to Terracon by a Kaiser Permanente representative. Based on the reviewed historical information, the absence of the user questionnaire does not appear to represent a significant data gap.
- Ownership contact information was not provided to Terracon from the client and an interview regarding the site has not been performed. Based on the historical and environmental regulatory database reviews, the absence of an interview with the current site owner does not appear to represent a significant data gap.

An evaluation of the significance of limitations and missing information with respect to our findings has been conducted, and where appropriate, significant data gaps are identified and discussed in the text of the report. However, it should be recognized that an evaluation of significant data gaps is based on the information available at the time of report issuance, and an evaluation of information received after the report issuance date may result in an alteration of our conclusions, recommendations, or opinions. We have no obligation to provide information obtained or discovered by us after the issuance date of the report, or to perform any additional services, regardless of whether the information would affect any conclusions, recommendations, or opinions in the report. This disclaimer specifically applies to any information that has not been provided by the client.

This report represents our service to you as of the report date and constitutes our final document; its text may not be altered after final issuance. Findings in this report are based upon the site's current utilization, information derived from the most recent reconnaissance and from other activities described herein; such information is subject to change. Certain indicators of the presence of hazardous substances or petroleum products may have been latent, inaccessible, unobservable, or not present during the most recent reconnaissance and may subsequently become observable (such as after site renovation or development). Further, these services are not to be construed as legal interpretation or advice.

1.5 Reliance

This ESA report is prepared for the exclusive use and reliance of Kaiser Permanente. Use or reliance by any other party is prohibited without the written authorization of Kaiser Permanente and Terracon Consultants, Inc. (Terracon).

Reliance on the ESA by the client and all authorized parties will be subject to the terms, conditions and limitations stated in the proposal, ESA report, and Terracon's Agreement. The limitation of

liability defined in the Agreement is the aggregate limit of Terracon's liability to the client and all relying parties.

Continued viability of this report is subject to ASTM E1527-13 Sections 4.6 and 4.8. If the ESA will be used by a different user (third party) than the user for whom the ESA was originally prepared, the third party must also satisfy the user's responsibilities in Section 6 of ASTM E1527-13.

1.6 Client Provided Information

Prior to the site visit, Mr. Matthew Harrison, client's representative, was asked to provide the following user questionnaire information as described in ASTM E1527-13 Section 6.

Client Questionnaire Responses

Client Questionnaire Item	Client Did Not Respond	Client's Response	
		Yes	No
Specialized Knowledge or Experience that is material to a REC in connection with the site.	X		
Actual Knowledge of Environmental Liens or Activity Use Limitations (AULs) that may encumber the site.	X		
Actual Knowledge of a Lower Purchase Price because contamination is known or believed to be present at the site.	X		
Commonly Known or Reasonably Ascertainable Information that is material to a REC in connection with the site.	X		
Obvious Indicators of Contamination at the site.	X		

The client did not provide the requested User's information as of the issuance date of the report, which represents a data gap. Based on the reviewed historical information, the absence of the user questionnaire does not appear to represent a significant data gap.

2.0 PHYSICAL SETTING

Physical Setting Information		Source
Topography		
Site Elevation	Approximately 340 feet above sea level.	USGS Topographic Map, Fresno North Quadrangle, California, 1981 (Appendix A)
Topographic Gradient	Relatively flat area with general gradient towards the south-southwest.	
Closest Surface Water	A recreational pond, located approximately 60 feet to the west of the site.	
Soil Characteristics		
Soil Type and Description	San Joaquin loam (100%) Located throughout the entire site, these soils are moderately well drained with 0 to 3 percent slopes. Parent materials consist of alluvium derived from granite. Typical soil profile consists of loam down to 16 inches below ground surface (bgs), followed by sandy clay loam to 28 inches bgs, clay to 29 inches bgs, cemented to 36 inches, and coarse sandy loam to a total depth of 5 feet bgs.	Eastern Fresno Area, California USDA-NRCS Web Soil Survey, issued October 4, 2017
Geology/Hydrogeology		
Formation	Quaternary (Qoa)	California Department of Conservation, Geologic Map of California, 2010
Description	Older alluvium, lake, playa, and terrace deposits.	
Estimated Depth to First Occurrence of Groundwater	According to the contour map, groundwater is anticipated at a depth of approximately 130 to 140 feet bgs.	California Department of Water Resource Groundwater Information Center Interactive Map, issued June 2017
*Hydrogeologic Gradient	According to the contour map, groundwater flows to the southwest.	

* The groundwater flow direction and the depth to shallow, unconfined groundwater, if present, would likely vary depending upon seasonal variations in rainfall and other hydrogeological features. Without the benefit of on-site groundwater monitoring wells surveyed to a datum, groundwater depth and flow direction beneath the site cannot be directly ascertained.

3.0 HISTORICAL USE INFORMATION

Terracon reviewed the following historical sources to develop a history of the previous uses of the site and surrounding area, in order to help identify RECs associated with past uses. Copies of selected historical documents are included in Appendix C.

3.1 Historical Topographic Maps, Aerial Photographs, Sanborn Maps

Readily available historical USGS topographic maps, selected historical aerial photographs (at approximately 10 to 15 year intervals) and historical fire insurance maps produced by the Sanborn Map Company were reviewed to evaluate land development and obtain information concerning the history of development on and near the site. Reviewed historical topographic maps, aerial photographs and Sanborn maps are summarized below.

Historical fire insurance maps produced by the Sanborn Map Company were requested from EDR to evaluate past uses and relevant characteristics of the site and surrounding properties. Based upon inquiries to the above-listed Sanborn provider, Sanborn maps were not available for the site.

- Topographic map:
  - Bullard, California, published in **1921**, **1923** (1:24,000)
  - Clovis, California, published in **1923**, **1946**, **1947**, **1964**, **1972**, **1981**, **2012** (1:24,000)
  - Fresno North, California, published in **1946**, **1947**, **1965**, **1972**, **1981**, **2012** (1:24,000)
  - Herndon, California, published in **1965** (1:62,5000)
- Aerial photograph:
  - USGS, **1937**, **1942**, **1946**, **1962**, 1”=500’
  - USGS/DOQQ, **1998**, 1”=500’
  - USDA, **1950**, **1957**, **1967**, **1973**, **1979**, **1984**, **1987**, 1”=500’
  - USDA/NAIP, **2006**, **2010**, **2014**, 1”=500’

Historical Maps and Aerial Photographs

Direction	Description
Site	Cultivated *agricultural land* (1921-1973); vacant land with a large trench visible in the southern portion of site (1979); vacant land with ditch removed (1984-2010); vacant land with soil stockpiles on southern portion of site (2014).
North	Cultivated agricultural land (1921-1973); vacant land (1979-1988); developed with commercial properties (2006-2014).
East	Cultivated agricultural land (1921-1973); vacant land (1979-1998); road followed by vacant land and commercial properties in the northern portion (2006-2014).

Direction	Description
South	Cultivated agricultural land (1921-1950); agricultural land, followed by several small rectangular unknown buildings (1957-1973); vacant land and a ditch (1979); vacant land (1984); paved road followed by vacant land (1987); paved road followed by commercial building (1998-2006); additional commercial complex constructed (2010-2014).
West	Cultivated agricultural land (1921-1973); vacant land with medium pond (1984-1987); vacant land with developing sports complex (1998); developed with large freshwater pond and sports complex (2006-2014).

Historically, the site was used for agricultural purposes from at least the late 1930s through the early 1970's. The agricultural land use typically includes the use of pesticides and herbicides. These constituent's application over time could persist in the on-site shallow soils. Based on the historical agricultural use of the site, there is a potential that agricultural chemicals, such as pesticides and herbicides to be present in the shallow soils at the site, which represents a recognized environmental condition (REC).

3.2 Historical City Directories

The R.L. Pole & Co Publishers and EDR Digital Archive city directories used in this study were made available through EDR (selected years reviewed: 1922 through 2014) and were reviewed at approximate five-year intervals, if readily available. Street listings were not available prior to 1970. The current street addresses for APNs 303-20-117 and 303-20-111 were not identified.

Historical City Directories

Direction	Description
Site	None – vacant land.
North	**7255 North First Street:** No listing (1970-1996); Premier Valley Foods Inc. (2002); Forward Advantage Inc. (2005); multi-tenant commercial listing with no suspect uses (2010); Forward Advantage Inc. (2014). **7259 North First Street:** No listing (1970-1996); Wathen Castanos (2002); multi-tenant commercial listing with no suspect uses (2005-2014). **7265 North First Street:** No listing (1970-1996); Concentra Medical Center (2002-2005); multi-tenant commercial listing with no suspect uses (2010-2014). **7269 North First Street:** No listing (1970-2002); Professional Dental Care (2005-2014). **7275 North First Street:** No listing (1970-2002); multi-tenant commercial listing with no suspect uses (2005-2014). **7301 North First Street:** No listing (1970-2014).

Direction	Description
East	**576 East Locust Avenue:** No listing (1970-2014). **7215 North First Street:** No listing (1970-2005); multi-tenant commercial listing with no suspect uses (2010-2014). **7225 North First Street:** No listing (1970-2002); multi-tenant commercial listing with no suspect uses (2005-2014). **7235 North First Street:** No listing (1970-2005); Byron Reintjes DDS (2010-2014).
South	**575 East Locust Avenue:** No listing (1970-2002); multi-tenant commercial listing with no suspect uses (2005-2014).
West	None – large pond and sports complex.

3.3 Site Ownership

Based on a review of information obtained from the Fresno County Assessor's records, the current site owner of Assessor Parcel Number (APN) 303-20-117 is Wathen Legacy LP. In addition, the previous owner was Richard G. Wathen. The site was granted ownership on December 31, 2012. The current and previous owner of APN 303-20-111 was not reported.

3.4 Title Search

At the direction of the client, a title search was/was not included as part of the scope of services. Based on the reviewed historical information, the absence of the title search does not appear to represent a significant data gap.

3.5 Environmental Liens and Activity and Use Limitations

The EDR regulatory database report included a review of both Federal and State Engineering Control (EC) and Institutional Control (IC) databases. Based on a review of the database report, the site was not listed on the EC or IC databases. Please note that in addition to these federal and state listings, AULs can be recorded at the county and municipal level that may not be listed in the regulatory database report. Environmental lien and activity and use limitation records recorded against the site were not provided by the client. At the direction of the client, performance of a review of these records was not included as part of the scope of services..

3.6 Interviews Regarding Current and Historical Site Uses

Terracon requested owner contact information from the client; however, at the issuance of this report, the contact information has not been received.

3.7 Prior Report Review

Terracon requested the client provide any previous environmental reports they are aware of for the site. Previous reports were not provided by the client to Terracon for review. Based on the

undeveloped nature of the site, the absence of prior reports does not appear to represent a significant data gap.

4.0 RECORDS REVIEW

Regulatory database information was provided by EDR, a contract information services company. The purpose of the records review was to identify RECs in connection with the site. Information in this section is subject to the accuracy of the data provided by the information services company and the date at which the information is updated. The scope herein did not include confirmation of facilities listed as "unmappable" by regulatory databases.

In some of the following subsections, the words up-gradient, cross-gradient and down-gradient refer to the topographic gradient in relation to the site. As stated previously, the groundwater flow direction and the depth to shallow groundwater, if present, would likely vary depending upon seasonal variations in rainfall and the depth to the soil/bedrock interface. Without the benefit of on-site groundwater monitoring wells surveyed to a datum, groundwater depth and flow direction beneath the site cannot be directly ascertained.

4.1 Federal and State/Tribal Databases

Listed below are the facility listings identified on federal and state/tribal databases within the ASTM-required search distances from the approximate site boundaries. Database definition, descriptions, and the database search report are included in Appendix D.

Federal Databases

Database	Description	Distance (miles)	Listings
CERCLIS	Comprehensive Environmental Response, Compensation, & Liability Information System	0.5	0
CERCLIS / NFRAP	Comprehensive Environmental Response, Compensation, & Liability Information System/No Further Remedial Action Planned	0.5	0
ERNS	Emergency Response Notification System	Site	0
IC / EC	Institutional Control/Engineering Control	Site	0
NPL	National Priorities List	1.0	0
NPL (Delisted)	National Priorities Delisted List	0.5	0
RCRA CORRACTS/ TSD	RCRA Corrective Action Activity	1.0	0
RCRA Generators	Resource Conservation and Recovery Act	Site and adjoining properties	2

Database	Description	Distance (miles)	Listings
RCRA Non-CORRACTS/ TSD	RCRA Non-Corrective Action Activity	0.5	0

State/Tribal Databases

Database	Description	Distance (miles)	Listings
CALSITES	CalSites Database	1.0	1
CALSITES (AWP)	Active Annual Workplan Sites	1.0	0
LUST	Leaking Underground Storage Tanks	0.5	0
SWF/LF	Solid Waste Facilities/Landfills	0.5	0
UST	Underground Storage Tank Facilities	Site and adjoining properties	0
VCP	Voluntary Cleanup Program	0.5	0
RESPONSE	State Response Sites	1.0	1
ENVIROSTOR	EnviroStor Database	1.0	2
Cortese	"Cortese" Hazardous Waste & Substances Sites List	0.5	1
CUPA Listings	CUPA Listings	0.25	4
Drycleaners	Cleaner Facilities	0.25	2
HIST CORTESE	Hazardous Waste & Substance Site List	0.5	2

In addition to the above ASTM-required listings, Terracon reviewed other federal, state, local, and proprietary databases provided by the database firm. A list of the additional reviewed databases is included in the regulatory database report included in Appendix D.

The following table summarizes the site-specific information provided by the database and/or gathered by this office for identified facilities. Facilities are listed in order of proximity to the site. Additional discussion for selected facilities follows the summary table.

Listed Facilities

Facility Name And Location	Estimated Distance / Direction/Gradient	Database Listings	Is a REC, CREC, or HREC to the Site
Concentra-Fresno North 7265 N. First Street #105	Adjoining North / Cross to Up-gradient	CUPA Listings	No, discussed below
Fresno Vascular Access Center 586 E. Herndon Avenue #103	Adjoining Southwest / Down-gradient	CUPA Listings	No, discussed below

Concentra-Fresno North (7265 N. First Street #105)
The above listed facility, identified to the adjoining northwest and hydrogeologically cross to up-gradient relative to the site, is listed on the CUPA Listings database. Based on a review of the facility's listing, the Concentra-Fresno North facility generated hazardous waste in quantities below CUPA reporting limits and was not required to register on a hazardous materials database. Based on the facility's CUPA reporting limits and anticipated regional depth to groundwater, the facility does not represent a REC to the site.

Fresno Vascular Access Center (586 E. Herndon Avenue #103)
The above listed facility, identified to the adjoining northwest and hydrogeologically cross to up-gradient relative to the site, is listed on the CUPA Listings database. Based on a review of the facility's listing, the Fresno Vascular Access Center facility generated hazardous waste in quantities below CUPA reporting limits and was not required to register on a hazardous materials database. Based on the facility's hydrogeologic gradient relative to the site and anticipated regional depth to groundwater, the facility does not represent a REC to the site.

The remaining facilities listed in the database report do not appear to represent RECs to the site at this time based upon regulatory status, apparent topographic gradient, and/or distance from the site.

Unmapped facilities are those that do not contain sufficient address or location information to evaluate the facility listing locations relative to the site. The report listed seventy-five facilities in the unmapped section. Determining the location of unmapped facilities is beyond the scope of this assessment; however, none of these facilities were identified as the site or adjacent properties. These facilities are listed in the database report in Appendix D.

4.2 Local Agency Inquiries

Agency Contacted/ Contact Method	Response
Fresno County Department of Public Health, Environmental Health Division / Email: FresnoCUPA@co.fresno.ca.us	On April 9, 2018, Terracon received a response from the agency indicating no records were found for the site.
Central Valley Regional Water Quality Control Board / Email: R5S-PRA@waterboards.ca.gov	On April 9, 2018, Terracon received a response from the agency indicating no records were found for the site.
Department of Toxic Substances Control / Email: PubReqAct@dtsc.ca.gov	On April 4, 2018, Terracon received a response from the agency indicating no records were found for the site.
San Joaquin County Air Pollution Control District / Email: Public.RecordsCoordinator@valleyair.com	On April 12, 2018, Terracon received a response from the agency indicating no records were found for the site.
City of Fresno Fire Department / online: https://www.fresno.gov/fire/contact-fire/	On April 26, 2018, Terracon received a response from the agency indicating no records were found for the site.

Agency Contacted/ Contact Method	Response
City of Fresno – City Clerk / Fax: (559) 621-7650	On April 26, 2018, Terracon received a response from the agency indicating no records were found for the site.

5.0 SITE RECONNAISSANCE

5.1 General Site Information

Information contained in this section is based on a visual reconnaissance conducted while walking through the site and the accessible interior areas of structures, if any, located on the site. The site and adjoining properties are depicted on the Site Diagram, which is included in Exhibit 2 of Appendix A. Photo documentation of the site at the time of the visual reconnaissance is provided in Appendix B. Credentials of the individuals planning and conducting the site visit are included in Appendix E.

General Site Information

Site Reconnaissance	
Field Personnel	Megan M. Davey
Reconnaissance Date	April 12, 2018
Weather Conditions	Sunny and strong wind, 65° F
Site Contact/Title	None.

5.2 Overview of Current Site Occupants

The site is located northeast of the intersection of East Locust Avenue and Orchard Street (APNs 303-20-117 and 303-20-111) in Fresno, Fresno County, California. The site consists of an approximately 7.01-acres tract of vacant land with no current improvements or structures. During the site reconnaissance, the site was unoccupied.

5.3 Overview of Current Site Operations

The site was unoccupied at the time of the site reconnaissance with no operations observed.

5.4 Site Observations

The following table summarizes site observations and interviews. Affirmative responses (designated by an “X”) are discussed in more detail following the table.

Site Characteristics

Category	Item or Feature	Observed or Identified
Site Operations, Processes, and Equipment	Emergency generators	
	Elevators	
	Air compressors	
	Hydraulic lifts	
	Dry cleaning	
	Photo processing	
	Ventilation hoods and/or incinerators	
	Waste treatment systems and/or water treatment systems	
	Heating and/or cooling systems	
	Paint booths	
	Sub-grade mechanic pits	
	Wash-down areas or carwashes	
	Pesticide/herbicide production or storage	
	Printing operations	
	Metal finishing (e.g., electroplating, chrome plating, galvanizing, etc.)	
	Salvage operations	
	Oil, gas or mineral production	
	Other processes or equipment	
Aboveground Chemical or Waste Storage	Aboveground storage tanks	
	Drums, barrels and/or containers ^{3} 5 gallons	
	MSDS or SDS	
Underground Chemical or Waste Storage, Drainage or Collection Systems	Underground storage tanks or ancillary UST equipment	
	Sumps, cisterns, French drains, catch basins and/or dry wells	
	Grease traps	
	Septic tanks and/or leach fields	
	Oil/water separators, clarifiers, sand traps, triple traps, interceptors	
	Pipeline markers	
	Interior floor drains	
Electrical Transformers/ PCBs	Transformers and/or capacitors	
	Other equipment	

Category	Item or Feature	Observed or Identified
Releases or Potential Releases	Stressed vegetation	
	Stained soil	
	Stained pavement or similar surface	
	Leachate and/or waste seeps	
	Trash, debris and/or other waste materials	X
	Dumping or disposal areas	
	Construction/demolition debris and/or dumped fill dirt	X
	Surface water discoloration, odor, sheen, and/or free floating product	
	Strong, pungent or noxious odors	
	Exterior pipe discharges and/or other effluent discharges	
Other Notable Site Features	Surface water bodies	
	Quarries or pits	
	Wastewater lagoons	
	Wells	

Releases or Potential Releases

Trash, debris and/or other waste materials

Based on visual observation, minor amounts of trash, consisting of typical municipal litter items such as plastic bags, blankets, clothing, bottles, and pieces of tarp, were observed on the southern and western portions of the site. Piles of old disposed sod, approximately 0.4 cubic feet in size each, were observed intermittently on the southern portion of the site. Leakage, spills or other releases from these materials were not observed during the visual reconnaissance. Based on site observations, the debris materials did not appear to be hazardous in nature and do not represent a REC. The debris should be removed and properly disposed of at an appropriate disposal facility.

Construction/demolition debris and/or dumped fill dirt

Soil stockpiles were observed on the southern portion of the site. The total amount of stockpile soil was approximately 2,000 cubic yards. Demolition debris consisting of a telephone pole was observed on the southwestern portion of the site north of the stockpiles. Staining or evidence of a release was not observed in connection with the stockpiles and debris. Based on visual observation, hazardous materials were not observed in the vicinity of the debris. Based on the unknown origin, the soil stockpiles are considered a REC to the site.

6.0 ADJOINING PROPERTY RECONNAISSANCE

Visual observations of adjoining properties (from site boundaries) are summarized below.

Adjoining Properties

Direction	Description
North	The property to the adjoining north of the site consists of a multi-tenant commercial complex that includes Forward Advantage Development (7255 N First St. #101 and #106), Physician Network Advantage (7255 N First St. #103), HQ (7259 N First St. #101), First Carbon Solutions (7265 N First St. #101), HQ (7265 N First St. #102), Concentra Urgent Care (7265 N First St. #105), Artashes Avakian DDS (7269 N First St. #101), PNA Marketing (7269 N First St. #102), Cosmopolitan Finance (7275 N First St. #103), HQ Break (7275 N First St. #105), Drysdale Physical Therapy (7275 N First St. #106), and Intercare (7275 N First St. #112).
East	The properties to the adjoining west of the site consist of a multi-tenant commercial complex that includes University Orthopedic Associates (7235 N. First St #103), Byron L. Reintjes, DDS (7235 N First St. #101), The WCPA Group (7225 N. First St. # 101), Sam I. Koadama, DDS and Clayton T. Kodama, DDS, JD (7225 N. First St. #107), Tamer Michael, DDS (7215 N. First St. #107), Bryan C. Fung, DDS (7215 N. First St. #103), and Aloha Family Optometric Group: Mukai Gary OD (7215 N. First St. #101), and vacant land.
South	The properties to the adjoining south of the site consist of California Teaching Fellows Foundation - Santa Maria Building (575 E. Locust Avenue #302), and a multi-tenant commercial complex that includes California's Valued Trust (520 Herndon Ave), Frederick J. Kruger, D.P.M. Inc. (530 Herndon Ave #104), Quinox (530 Herndon Ave #105), R.A. Ballecer, MD, ENT (540 Herndon Ave #105), Tsing T. Kowk, MD, Inc., Internal Medicine (540 Herndon Ave #102), Gary Critser DO, Family Practice (540 Herndon Ave #106), BK Pharmacy Corp. (540 Herndon Ave #103), DaVita Herndon Dialysis Center (560 Herndon Avenue #101), and Keisho Plaza (568 Herndon Ave).
West	The properties to the adjoining west of the site consist of a large freshwater pond and a baseball complex.

RECs or environmental risks were not observed with the adjoining properties.

7.0 ADDITIONAL SERVICES

Per the agreed scope of services specified in the proposal, the Terracon performed a limited risk assessment for currently tracked materials and a limited vapor intrusion assessment.

7.1 Risk Assessment for Currently Tracked Materials

Terracon visually observed the site for the following tracked materials:

Currently Tracked Materials	On-Site Risk	Comment
Asbestos	No	None reported or observed.
Chromium	No	None reported or observed.
Freon	No	None reported or observed.
Lead Paint	No	None reported or observed.
Lead Shielding	No	None reported or observed.
Mercury	No	None reported or observed.
PCB light ballasts	No	None reported or observed.
PCBs in Sealants	No	None reported or observed.
Soil remediation	Yes	Approximately 200 cubic yards of stockpiled soil is impacted with polynuclear aromatic hydrocarbons including benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene and indeno(1,2,3-cd)pyrene detected above the Tier 1 ESLs. Refer to Section 7.19 for additional information.
Underground storage tanks	No	None reported or observed.
Aboveground storage tanks	No	None reported or observed.

7.2 Asbestos-Containing Building Materials

At the time of the site reconnaissance, buildings were not reported or observed; therefore, ACMs are not a concern for occupancy of the site.

7.3 Radon

Terracon reviewed regional data published by the EPA (http://www.epa.gov/radon/zonemap.html) on average indoor radon concentrations in the vicinity of the site. The site is located in Zone 2 and is considered to have moderate potential for radon in concentrations of 2.0 to 4.0 picoCuries per liter (pCi/L). To determine property-specific radon levels a radon survey would have to be conducted. However, because the site is not planned for residential use, further investigation of indoor radon issues does not appear to be warranted at this time. There is a moderate potential for environmental risks associated with indoor radon concentrations.

7.4 Lead-Based Paint

Based on review of historical documents, buildings were not observed on this site; therefore, LBP is not likely a concern for occupancy of the site.

7.5 Lead in Drinking Water

Based on a review of the 2016 Water Quality Report for the City of Fresno, California, indicates the lead concentrations in 54 of 54 samples were below action levels of 15 parts per billion collected from wells, the distribution system, and the residential taps. Based on this information, there does not appear to be environmental risk associated with lead in drinking water. A copy of the Water Quality Report in included in Appendix C.

7.6 Wetlands

Based on review of the US Fish and Wildlife Service National Wetland Inventory maps (https://www.fws.gov/wetlands/Data/Mapper.html) and the field observations, wetlands do not appear to be present at the site. The closest mapped wetland is a freshwater pond located approximately 60 feet to the west of the site. There does not appear to be environmental risks associated with wetlands.

7.7 Regulatory Compliance

The site was not identified in the environmental regulatory database. Additionally, the Fresno County Department of Public Health, Environmental Health Division (FCDPH), the Department of Toxic Substances Control (DTSC), and the Central Valley Regional Water Quality Control Board (CVRWQCB) reportedly did not have records for the site. Based on this information, the site appears to be operating in compliance with local and state regulations.

7.8 Cultural and Historic Resources

Based on a review of the EDR Database Report and the National Register of Historic Places website, cultural and historical resources are not a concern for occupancy of the site. There does not appear to be environmental risks associated with Cultural and Historical Resources.

7.9 Industrial Hygiene

Based on the observations during the site visit, there were no industrial hygiene issues such as dust or noxious odors noted. There does not appear to be environmental risks associated with Industrial Hygiene issues.

7.10 Health and Safety

No issues regarding Health and Safety were noted during the site inspection. There does not appear to be environmental risks associated with Health and Safety issues.

7.11 Ecological Resources

Based on a review of the EDR Database Report and the US First & Wildlife Service Information for Planning and Consultation (IPaC) database, the following table of Threatened Species are a concern for development of the site.

Species Type	Name	Status
Flowering Plants	Fleshy Owl's-clover	Threatened
	San Joaquin Orcutt Grass	Threatened

Based on this information, there is a potential for environmental risks associated with Ecological Resources.

7.12 Endangered Species

Based on a review of the EDR Database Report and the US First & Wildlife Service Information for Planning and Consultation (IPaC) database, the following table of Endangered and Threatened Species are a concern for occupancy of the site.

Species Type	Name	Status
Mammal	Fresno Kangaroo Rat	Endangered
	San Joaquin Kit Fox	Endangered
Reptiles	Blunt-nosed Leopard Lizard	Endangered
	Giant Garter Snake	Threatened
Amphibians	California Red-legged Frog	Threatened
	California Tiger Salamander	Threatened
Fishes	Delta Smelt	Threatened
Crustaceans	Vernal Pool Fairy Shrimp	Threatened
Ecological	Fleshy Owl's-clover	Threatened
	San Joaquin Orcutt Grass	Threatened
Bird	Allen's Hummingbird	Bird of Conservation Concern (BCC)
	Bald Eagle	Attention due to Eagle Act
	Black Swift	BCC
	Black-chinned Sparrow	BCC
	Burrowing Owl	BCC
	California Thrasher	BCC
	Clark's Grebe	BCC
	Costa's Hummingbird	BCC
	Golden Eagle	Attention due to Eagle Act
	Lawrence's Goldfinch	BCC

Species Type	Name	Status
	Lewis's Woodpecker	BCC
	Long-billed Curlew	BCC
	Marbled Godwit	BCC
	Mountain Plover	BCC
	Nuttall's Woodpecker	BCC
	Oak Titmouse	BCC
	Rufous Hummingbird	BCC
	Short-billed Dowitcher	BCC
	Tricolored Blackbird	BCC
	Whimbrel	BCC
	White Headed Woodpecker	BCC
	Willet	BCC
	Wrentit	BCC
	Yellow-billed Magpie	BCC

Based on this information, there is a potential for environmental risks associated with Endangered Species.

7.13 Indoor Air Quality

No buildings were reported or observed during the site inspection. Based on this information, there does not appear to be an environmental risk associated with indoor air quality.

7.14 Biological Agents

At the time of the site reconnaissance, the site consisted of vacant land with no buildings reported or observed. Based on this information, there is a low potential for environmental risks associated with Biological Agents.

7.15 Mold/Water Intrusion

At the time of the site reconnaissance, the site consisted of vacant land with no buildings reported or observed. Based on this information, there is a low potential for environmental risks associated with Mold/Water Intrusion issues.

7.16 Limited Vapor Intrusion Assessment

Pursuant to the client's request, and in conjunction with the ESA, Terracon conducted a limited Tier I Vapor Intrusion Assessment. This assessment was conducted in accordance with ASTM E 2600 15. This assessment was based on information collected in conjunction with the ESA, including existing/planned use of the site, type of structures located on the site, surrounding

property description, user information, historical and physical records review, regulatory database review, manmade or natural conduits, as applicable, and a visual noninvasive reconnaissance of the site and adjoining properties, and did not include regulatory file reviews or subsurface investigations to evaluate soil, soil gas, or groundwater quality.

Based on the historical review, the site consisted of vacant land from as early as 1921 through present. Based on the historical and EDR Database Report, the potential for vapor intrusion to exist at the site is low.

7.17 Limited Sea Level Rise Assessment

Based on a review of the Office for Coastal Management's Sea Level Rise and Coastal Flooding Impacts Map (https://coast.noaa.gov/slr/), the site is located outside the highest estimated sea level rise of 2 feet above mean sea level. Based on this information, the site is considered to have a low risk impact from sea level rise.

7.18 FEMA Flood Map Review

Terracon reviewed the FEMA Flood Map website regarding potential flooding issues at the site. Based on a review of map **06019C1560H** and the **EDR Report,** the site is located outside the 100-year and 500-year chance flood hazard areas of Fresno County. Based on this information, the site is considered to have a low risk impact from flooding.

7.19 Limited Phase II Environmental Site Assessment

Based upon the initial findings of the Phase I ESA, Terracon conducted a concurrent Limited Phase II ESA at the site to assess the historical agricultural land use and unknown origin of the soil stockpiles. On April 18, 2018, Terracon advanced 20 soil borings (B1 through B20) to a depth of 2 feet bgs for soil sampling at depths from surface to 0.5-feet bgs and 1.5- to 2-feet bgs. Four deeper soil borings (B21 through B24) were advanced to sample at a depth of 5- to 5.5-feet bgs. Terracon collected six (6) soil samples from the soil stockpiles from a depth of 1- to 2-feet within the surface of the soil stockpiles. Soil boring locations are depicted on Exhibit 3.

Individual shallow soil samples were composited for analysis. The composite samples were prepared as follows:

- Composite 1: B1, B2, B3, and B4 – samples from surface to 0.5-feet bgs
- Composite 2: B5, B6, B7, and B8 – samples from surface to 0.5-feet bgs
- Composite 3: B9, B10, B11, and B12 – samples from surface to 0.5-feet bgs
- Composite 4: B13 and B14 – samples from surface to 0.5-feet bgs

The following tests methods were performed by the laboratory:

- Organochlorine Pesticides (OCPs) by EPA Method 8081A;

- Total petroleum hydrocarbons (TPH) as gasoline range organics (GRO), diesel range organics (DRO), and oil range organics (ORO) by EPA Method 8015M;
- California Administrative Manual (CAM) 17 Metals by EPA Method 6020 and 7471;
- Volatile organic compounds (VOCs) by EPA Method 8260B;
- Polychlorinated biphenyl (PCBs) by EPA Method 8082; and,
- Semi-volatile organic compounds (SVOCs) by EPA Method 8270C or by EPA Method 8270C with selective ion monitoring (SIM).

Composited samples and stockpile samples (B15 through B20) from discrete intervals at 1- to 2-feet bgs and composite samples were analyzed for OCPs.

Select samples and duplicates samples from B1, B9, B13 through B24 were analyzed for TPH, Metals, VOCs, PCBs, and SVOCs.

Soil sample laboratory analytical results indicate that OCPs concentrations were not detected above their respective laboratory reporting limits in the four (4) composite soil samples and six (6) stockpile samples analyzed with the exception of 4,4'-DDE, 4,4'-DDT, and Toxaphene. The maximum detected concentrations for 4,4'-DDE and 4,4'-DDT were 0.00907 (COMP-3) and 0.00490 (COMP-1) milligrams per kilogram (mg/Kg), respectively. Toxaphene was detected in soil sample COMP-2, at a concentration of 0.0712 mg/kg.

The detected OCPs concentrations for 4,4'-DDE, 4,4'-DDT, and Toxaphene were compared to the Environmental Screening Levels (ESLs) established by the California Regional Water Quality Control Board, dated February 2016. The comparison reveals that the detected 4,4'-DDE, 4,4'-DDT concentrations are below their respective screening levels.

The laboratory reporting limits for Toxaphene are higher that the generic site conceptual model (Tier 1) ESLs (for leaching); therefore, most of the sample results were not comparable to the most conservative Tier 1 screening level. The laboratory reported a detection of Toxaphene in sample COMP-2 at 0.0712 (j) mg/Kg that exceeds the Tier 1 ESL, but is less than the Residential Land Use ESL of 0.51 mg/Kg.

A summary of the soil sample analytical results for OCPs is presented in Table 1 of Appendix B, and the complete laboratory analytical report is included in Appendix C.

The laboratory reported detection of Toxaphene in sample COMP-2 at 0.0712 (j) mg/Kg, led Terracon to analyze the COMP-2 component aliquots (i.e. B5-0-0.5, B6-0-0.5, B7-0-0.5, and B8-0-0.5) separately using EPA Method 8081A. The following results were reported by the laboratory:

Detected Analyte	Screening Criteria (mg/Kg)		Sample Identification (mg/Kg)			
	Tier 1 ESL[1]	Direct Exposure Human Health Risk Levels (Table S-1) Residential Shallow Soil Exposure[1]	B5-0-0.5	B6-0-0.5	B7-0-0.5	B8-0-0.5
4,4-DDE	1.9	1.9	0.00121 J	0.0929	0.00116 J	0.0689
4,4-DDT	1.9	1.9	0.000980 J P	0.0187 J	0.000750 J P	0.00982 J
Toxaphene	0.00042	0.51	< 0.0373	**0.363 J**	< 0.0396	**0.232 J**

Notes:
[1] – California Regional Water Quality Control Board Environmental Screening Levels
J - The identification of the analyte is acceptable; the reported value is an estimate.
P - Relative Percent Difference (RPD) between the primary and confirmatory analysis exceeded 40%.
Bold – estimated value exceeds Tier 1 Environmental Screening Levels

Comparison of the detected metals concentrations to the ESLs reveals that arsenic was detected above the ESL Soil Tier 1, and Tier 2 residential and commercial (shallow soil), and construction worker screening levels. No other metals were detected above any of their respective ESLs. Arsenic was also analyzed, and detected above the ESLs, in the four (4) discrete shallow samples and four (4) deep (5-foot) samples. A summary of the soil sample metals analytical results is presented in Table 2 of Appendix B and the complete laboratory analytical report is included in Appendix C.

According to the United States Geological Survey (USGS) on-line spatial data for mineral resources, the background arsenic concentrations in this area ranges from 2.7 to 3.5 mg/Kg. The arsenic levels detected in soils at the site are consistent with regional background arsenic concentrations.

Six (6) stockpile soil samples were also analyzed for the TPH, VOCs, SVOCs and PCBs. The sample analytical results for TPH and VOCs indicate that TPH-GRO, TPH-DRO, TPH-ORO, acetone, and 2-Butanone (MEK) concentrations were detected above their respective laboratory reporting limits. However, none of the concentrations exceeded their respective ESLs. PCBs were not detected above the laboratory reporting limits in any of the stockpile soil samples.

The sample analytical results indicate that several SVOCs were detected above their respective laboratory reporting limits. These include anthracene, acenaphthene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene. Comparison of the detected concentrations to the screening levels reveals that the benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene concentrations detected in soil sample B-18 (1 to 2 feet) exceed the Tier 1 Soil ESL, and that the detected benzo(a)pyrene also exceeds the residential and commercial shallow soil ESL.

The findings of this investigation are as follows:

- Toxaphene was detected in one composite sample (COMP-2) above the CRWQCB Tier 1 ESL (leaching), the most conservative screening level, but lower than the residential land use ESL. Based on the results of the composite sample, Terracon analyzed the discrete samples that made up the composite sample as explained in Section 4.1.1. Each of the component sample from composite samples COMP-2 were re-analyzed to assess if an area of relatively elevated Toxaphene was present. Results for the samples B6-0-0.5 and B8-0-0.5 contained Toxaphene above Tier 1 ESL screening levels, but lower than the residential land use ESL. The Toxaphene Tier 1 ESL is based upon leaching from soil to shallow groundwater used for drinking water on site. Groundwater is estimated to be at a depth over 100 feet bgs. As no shallow groundwater (≤ 10 feet bgs) is present, and groundwater is not expected to be used for residential drinking water at the site, then the Tier 1 ESLs do not apply. Further, as the residential land use ESL is not exceeded, Toxaphene is not a concern based upon the samples collected.
- Arsenic was detected in all samples analyzed at concentrations consistent with regional background concentrations reported by the USGS. Therefore, arsenic does not appear to be a concern based on the samples collected.
- Stockpile soil on site contain polynuclear aromatic hydrocarbons including benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene and indeno(1,2,3-cd)pyrene were detected above the Tier 1 ESL in soil sample B-18 at 1 to 2 feet. Benzo(a)pyrene also exceeded the commercial shallow soil ESL in sample B-18.

Based on the historical data and the results of the investigation conducted at the site on April 18, 2018, Terracon recommends the following:

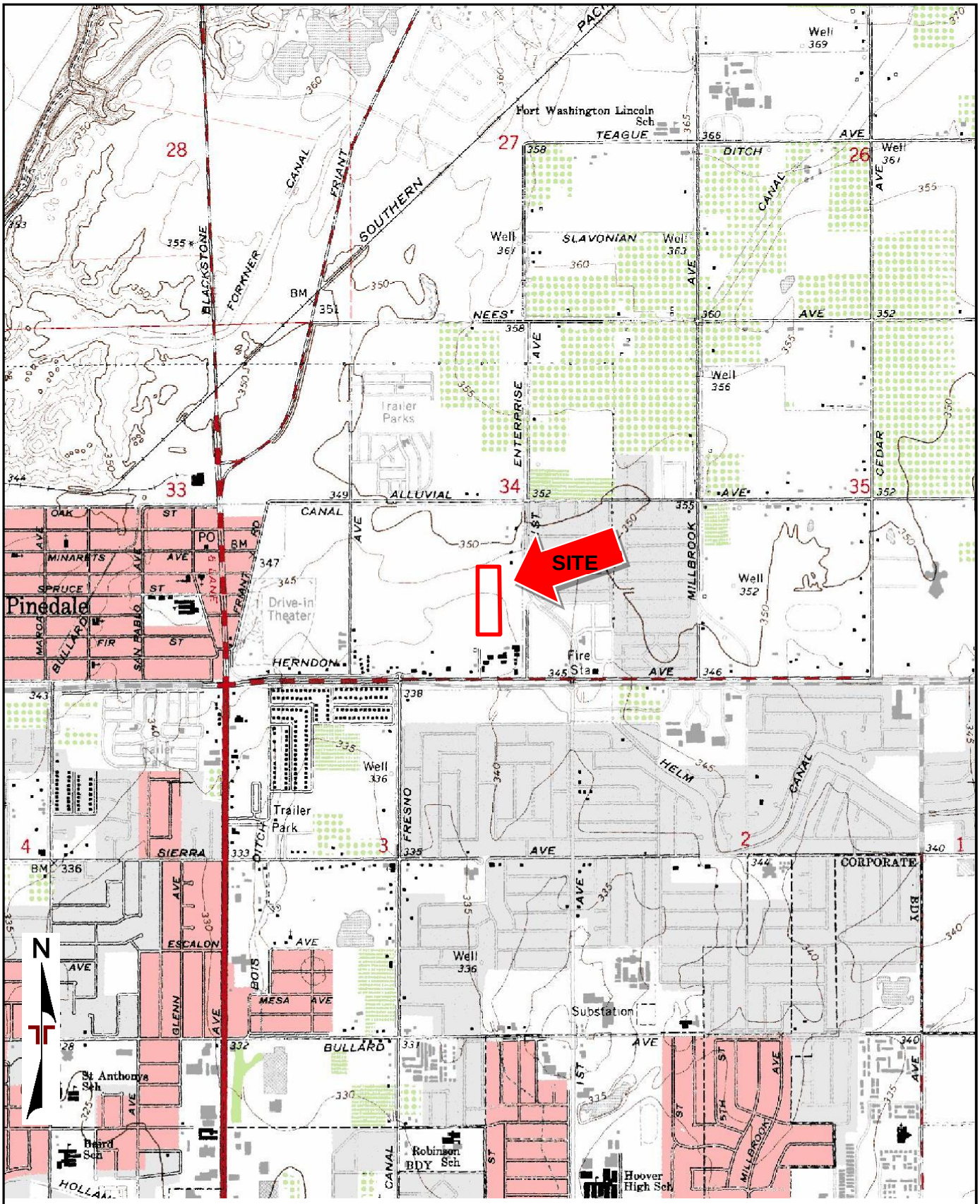
- Remove and dispose of approximately 200 cubic yards of the 2,000 cubic yards of stockpiled soil associated with sample location B-18 that may contain polynuclear aromatic hydrocarbons including benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene and indeno(1,2,3-cd)pyrene detected above the Tier 1 ESLs.
- If soils are to be disturbed during future excavations, proper procedures should be followed with respect to worker health and safety, and any affected materials encountered should be properly handled and disposed in accordance with local and state regulations. Additionally, a Soil Management Plan is recommended for protection of construction worker and proper handling of soils during future development activities.

8.0 DECLARATION

I, Kristin Stout, declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in Section 312.10 of 40 CFR 312; and I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the site. I have developed and performed the All Appropriate Inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

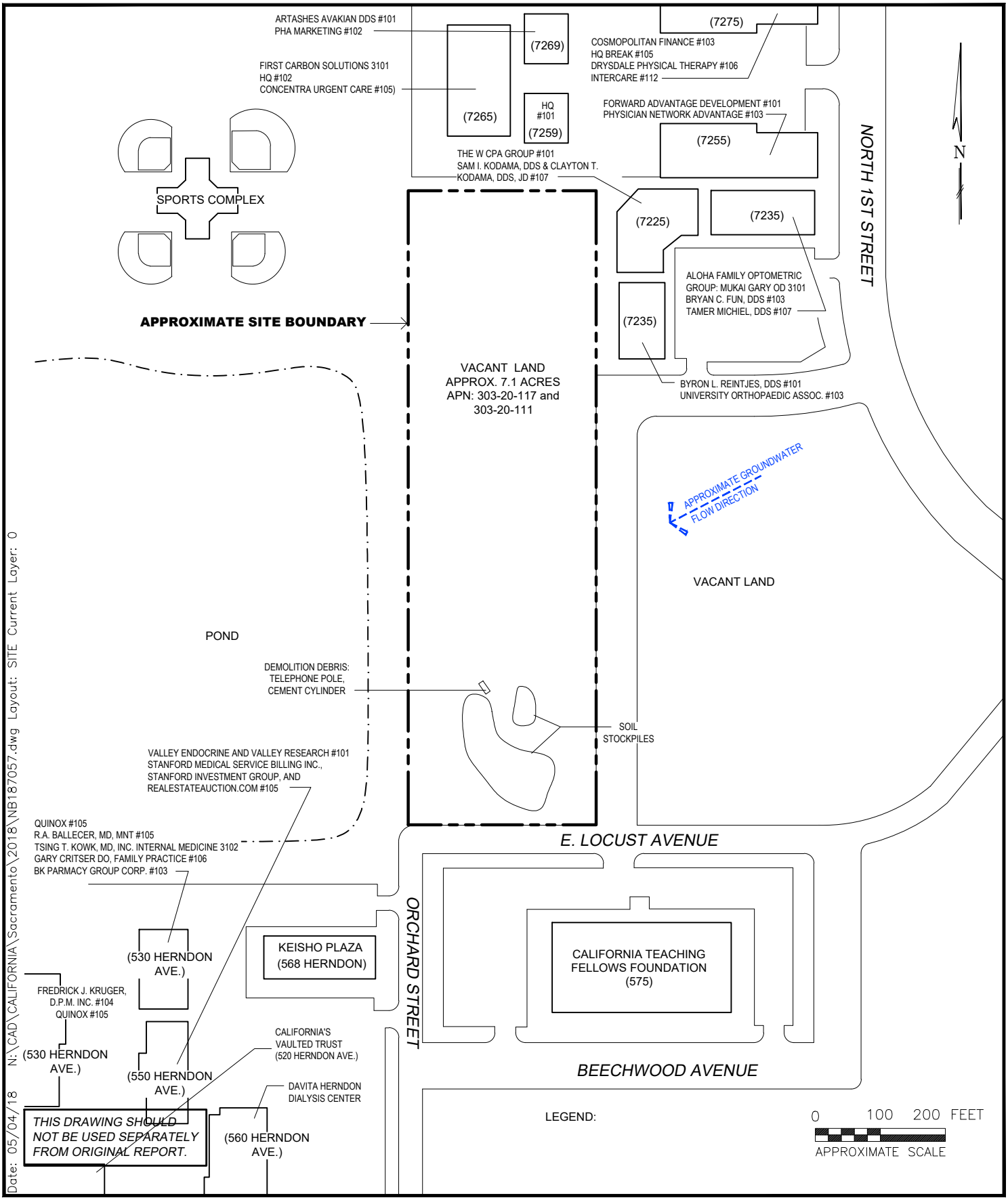
Kristin Stout
Senior Scientist

APPENDIX A
EXHIBIT 1 – TOPOGRAPHIC MAP
EXHIBIT 2 – SITE DIAGRAM
EXHIBIT 3 – SOIL BORING LOCATIONS



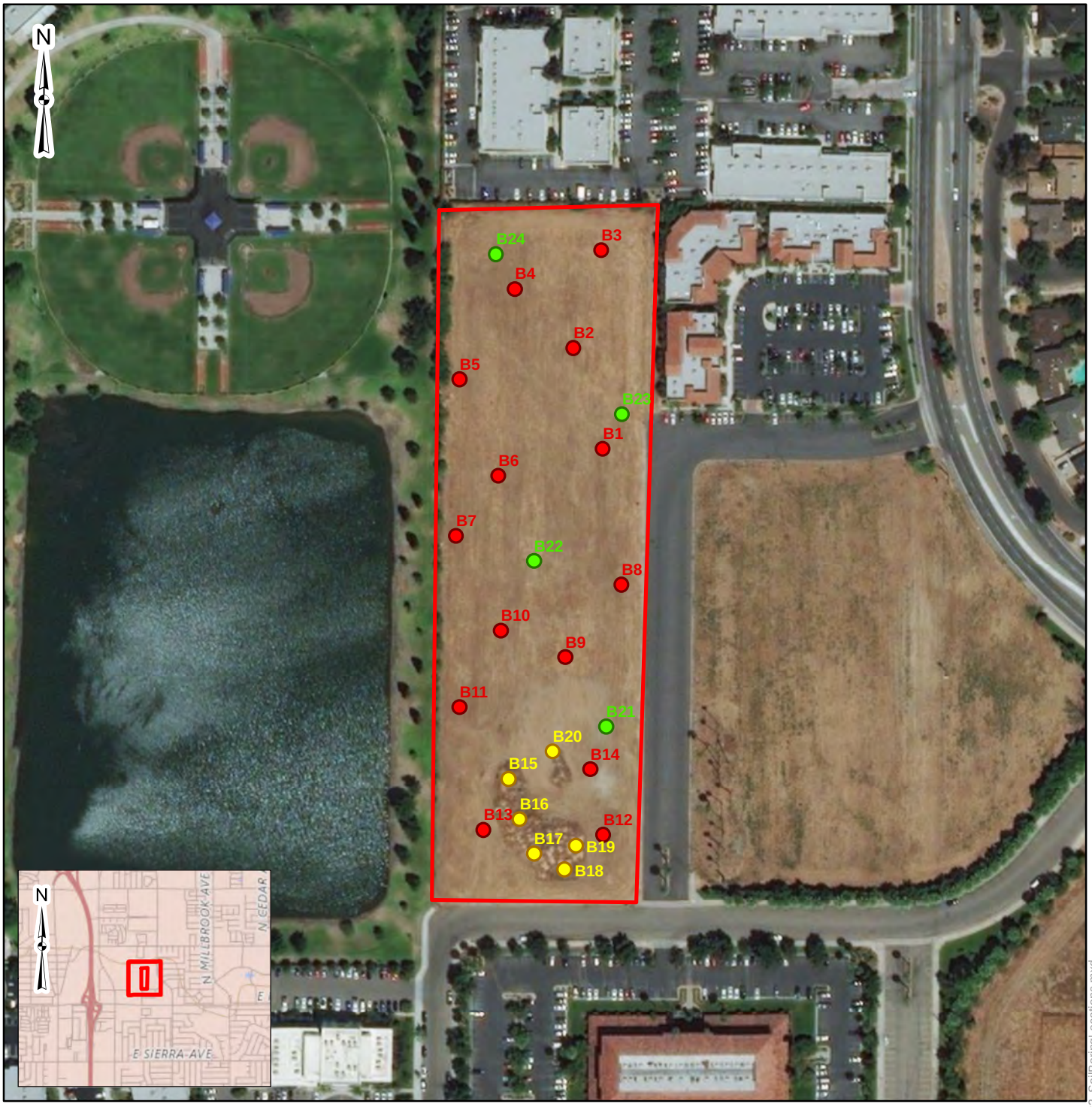
TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY
QUADRANGLES INCLUDE: FRESNO NORTH, CA (1/1/1981).

Project Manager: KS	Project No. NB187057	Terracon 50 Goldenland Ct Ste 100 Sacramento, CA 95834-2425	TOPOGRAPHIC MAP **PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA
Drawn by: MD	Scale: 1"=2,000'		
Checked by: KS	File Name: TOPO		
Approved by: CAP	Date: APRIL 2018		Exhibit 1



Project Mngr: KS	Project No. NB187057	Terracon Consulting Engineers and Scientists	**SITE DIAGRAM**
Drawn By: CDD	Scale: AS SHOWN	50 GOLDENLAND CT., SUITE 100 SACRAMENTO, CA 95834	PROPOSED KAISER FACILITY
Checked By: MD	Date: 05/04/18	PH. (916) 858-1579 FAX. (916) 858-8277	APNs 303-20-117 AND 303-20-111
Approved By: CAP			FRESNO, FRESNO COUNTY, CALIFORNIA

EXHIBIT 2



Approximate Site Boundary

Soil Boring Locations

- Deep soil boring for background arsenic soil boring (5.0-5.5 ft)
- Shallow soil boring for historical agricultural use soil boring (0.0-0.5 ft and 1.5-2.0 ft)
- Soil stockpile boring (1.0-2.0 ft)

0 100 200 400 Feet

DATA SOURCES:
ESRI WMS - World Aerial Imagery, USGS National Map Topography

Project No.:	NB187057
Date:	May 2018
Drawn By:	IMS
Reviewed By:	KAS

Terracon
50 Goldenland Court, Suite 100 Sacramento, CA
PH. (916) 246 5098 terracon.com

Soil Boring Locations

Proposed Kaiser Facility
APNs 303-20-117 and 303-20-111
Fresno, Fresno County, California

Exhibit

3

M:\GIS\NB187057_KaiserFresno\Maps\NB187057_KaiserFresno_Ex3_SoilBoringLocations.mxd

APPENDIX B
SITE PHOTOGRAPHS

Proposed Kaiser Facility
Project No: NB187057
Photo Date: April 12, 2018

Terracon
Consulting Engineers & Scientists



Photo #1 View of the northeastern side of the site, facing southwest.



Photo #2 View of the southeastern side of the site, facing northwest.



Photo #3 View of the southwestern side of the site, facing northeast.



Photo #4 View of the northwestern side of the site, facing southeast.



Photo #5 View of soil stockpiles, located on the southern portion of the site.



Photo #6 Overview of sandy fill soil and additional stockpiles, located on the southern portion of the site.



Photo #7 View of cement telephone pole demolition debris, located on the southern portion of the site.



Photo #8 View of one of three sod piles, located on the southern portion of the site.



Photo #9 View of municipal trash, located on the soil stockpiles.



Photo #10 View of municipal trash, located on the southern and western portions of the site.



Photo #11 View of multi-tenant commercial building (7265 North First Street), adjoining property to the north.



Photo #12 View of HQ (7265 North First Street), adjoining property to the north.



Photo #13 View of multi-tenant commercial building (7269 North First Street), adjoining property to the north.



Photo #14 View of multi-tenant commercial building (7255 North First Street), adjoining property to the north.



Photo #15 View of multi-tenant commercial building (7275 North First Street), adjoining property to the north.



Photo #16 Additional view of multi-tenant commercial building (7275 North First Street), adjoining property to the north.



Photo #17 View of multi-tenant commercial building (7235 North First Street), adjoining property to the east.



Photo #18 View of multi-tenant commercial building (7225 North First Street), adjoining property to the east.



Photo #19 View of multi-tenant commercial building (7215 North First Street), adjoining property to the east.



Photo #20 Another view of multi-tenant commercial building (7215 North First Street), adjoining property to the east.



Photo #21 View of vacant land, adjoining property to the east.



Photo #22 View of California Teaching Fellows Foundation (545 East Locust Avenue), adjoining property to the south.



Photo #23 View of multi-tenant commercial building (568 Herndon Avenue), adjoining property to the south.



Photo #24 View of DaVita Herndon Dialysis Center (560 Herndon Avenue, #101), adjoining property to the south.



Photo #25 View of California's Value Trust (520 Herndon Avenue), adjoining property to the south.



Photo #26 View of multi-tenant commercial building (530 Herndon Avenue), adjoining property to the south.



Photo #27 View of multi-tenant commercial building (540 Herndon Avenue), adjoining property to the south.



Photo #28 View of multi-tenant commercial building (550 Herndon Avenue), adjoining property to the south.



Photo #29 View of large fresh water pond, adjoining property to the west.



Photo #30 View of baseball complex, adjoining property to the west.

APPENDIX C
HISTORICAL DOCUMENTATION AND USER QUESTIONNAIRE

City of FRESNO WATER DIVISION

Water Quality
Annual Report 2016

Continuing To Supply An Ever-Increasing Demand

For over 80 years, the City of Fresno has operated and maintained a water system that provides safe, reliable drinking water at affordable rates to Fresno customers. In 2016, the City of Fresno Department of Public Utilities, supplied more than 500,000 customers with 36 billion gallons of water that met or exceeded drinking water standards set by the State Water Resources Control Board (SWRCB) and United States Environmental Protection Agency (EPA). To ensure a high-quality water supply, the Department of Public Utilities continuously monitors our surface water and groundwater sources, utilizes advanced water treatment processes, and rigorously samples and tests the water before delivering it to our customers.

Our H2O: The Origin Story

For Fresno customers, there are two sources of drinking water. One is derived from the Fresno Sole Source Aquifer, a large underground water system that supplies many communities in the San Joaquin Valley. The Water Division operates approximately 260 wells that draw from this aquifer. Unfortunately, pumping water from the aquifer can lower the water table. For this reason, Fresno has an aggressive recharge program that is continually finding new places and methods to conduct groundwater recharge. Water recharge operations can slow this decline, but with conservation, you can help make a greater impact.

The second source of water is surface water from the Sierra Nevada delivered via Fresno Irrigation District and Friant-Kern canals. This water is stored in both Millerton and Pine Flat lakes, located in the foothills east of Fresno. Surface water is treated to drinking water standards at either of Fresno's state-of-the-art treatment facilities: the 30 million gallons per day (MGD) Northeast Surface Water Treatment Facility in northeast Fresno or the 4 MGD T-3 Water Storage and Treatment Facility in southeast Fresno.

Moving Fresno Into The Future

During these times of increasing water quality standards, new groundwater regulations, and conservation mandates, the Department of Public Utilities is continuously working on projects to improve the water systems that capture, treat, and deliver water to Fresno customers. One such project is the 80 MGD Southeast Surface Water Treatment Facility (SESWTF), which commenced construction in January of 2016. The SESWTF is part of the Department of Public Utilities' capital investment plan that includes raw water pipelines to deliver surface water; the SESWTF that will prepare the water for use in the community; and finished water distribution facilities to deliver this water to Fresno's homes, businesses, churches, schools, parks, and restaurants. The capital investment totals $429 million over the five-year period spanning 2015-2019.

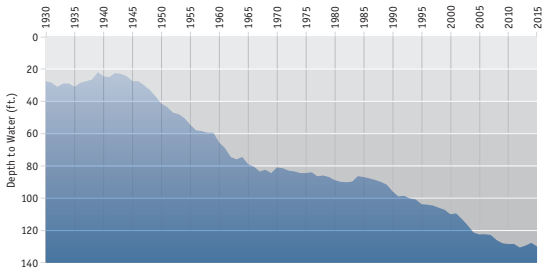
The capital investment plan includes the following categories of projects:

- **Intentional Groundwater Recharge Facilities = $6.4 million**
- **Raw Water Supply Facilities = $98.4 million**
- **Surface Water Treatment Facilities = $186.4 million**
- **Finished Water Distribution Facilities = $55.4 million**
- **Pipeline and Well Rehabilitation and Replacement = $82.5 million**

Conserving Is Our Best Defense

Of course, one of the most valuable water sources is water that is not actually used. In 2016, we got a slight reprieve from the record-setting drought conditions that had ravaged the state for several years, but when called upon to reduce water usage the past few years, Fresno's water users responded by drastically reducing water demand. Because conservation is the most economical and environmentally protective resource management tool, it's fortunate that we can depend on the people of Fresno to come through when called upon. With the current investment in our water system, new state-of-the-art treatment facilities, and continued conservation efforts by water users, we are working together to ensure a high-quality, reliable, and sustainable water supply for Fresno's present and future generations.

City of Fresno Historical Water Levels



Fresno's water table has dropped more than 100 feet in the past 70 years

City of FRESNO
Department of Public Utilities
1910 EAST UNIVERSITY | FRESNO, CA 93703-2988

A translation of this report in Spanish, Hmong, or Vietnamese can be requested by calling 621-5365.

Este informe contiene información muy importante sobre su agua potable. Tradúzcalo o hable con alguien que lo entienda bien.

Daimntawv tshaj tawm no muaj lus tseemceeb txog koj cov dej haus. Tshab txhais nws, los yog tham nrog tej tug neeg uas totaub txog nws.

Chi ti t này th t quan tr ng, xin nh ngu i d ch cho quý v.

What's in This Report?

This Annual Water Quality Report, prepared in cooperation with the California State Water Resources Control Board (State Board) - Division of Drinking Water, provides important information about Fresno's water supply, water quality, and water delivery system. Test results for Fresno's 2016 Water Quality Monitoring Program are summarized on the following pages. It is important to read the messages regarding various water quality issues from the U.S. Environmental Protection Agency (USEPA) and from your City of Fresno Water Division.

Unregulated contaminant monitoring helps USEPA and the State Water Resources Control Board to determine where certain contaminants occur and whether the contaminants need to be regulated.

Facts About Drinking Water Standards

Under the 1974 Safe Drinking Water Act, the United States Environmental Protection Agency and the California Department of Public Health were charged with the responsibility of setting and implementing safe drinking water standards. Congress reauthorized this act in 1996. There are 74 regulated contaminants and another 34 are subject to monitoring. Fortunately, only a small number have ever been detected in Fresno's water supply.

What happens in Fresno if a well exceeds USEPA or SWRBC standards?

If a well violates standards, it would be removed from service and an alternate water supply is provided. In the event a well exceeds standards but must stay in service, customers who receive water from that well would be directly notified by mail or by hand-delivered flyers.

Contaminants that may be present in source water include:

- Microbial contaminants, such as viruses and bacteria that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- Inorganic contaminants, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- Pesticides and herbicides that may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.
- Organic chemical contaminants, including synthetic and volatile organic chemicals that are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, agricultural application, and septic systems.
- Radioactive contaminants that can be naturally-occurring or be the result of oil and gas production and mining activities.

Notice of Violation

We are required to monitor your drinking water for specific contaminants on a regular basis. Results of regular monitoring are an indicator of whether or not our drinking water meets health standards. During 2016, we failed to collect a nitrate sample at Well 97 near Herndon and Brawley and therefore cannot be sure of the quality of the drinking water during that time.

Regulations require at least one nitrate sample from each operational source annually. If a well exceeds ½ the MCL, quarterly samples are then required. Well 97 only operated for a few months before it was removed from service for pump repairs and was offline the remainder of the year and we missed the opportunity to sample in 2016. Repairs were completed in March 2017 and the well resumed operations on March 13th.

Well 97 was sampled on March 17, 2017 with a result of 0.65 mg/L. Historically, the well has never exceeded ½ the MCL and the average for this well is about 2 to 3 mg/L, while the MCL is 10 mg/L.

Nitrate: Nitrate in drinking water at levels above 10 mg/L is a health risk for infants of less than six months of age. Such nitrate levels in drinking water can interfere with the capacity of the infant's blood to carry oxygen, resulting in a serious illness; symptoms include shortness of breath and blueness of the skin. Nitrate levels above 10 mg/L may also affect the ability of the blood to carry oxygen in other individuals, such as pregnant women and those with certain specific enzyme deficiencies. If you are caring for an infant, or you are pregnant, you should ask advice from your health care provider.

Arsenic: While your drinking water meets the federal and state standard for arsenic, it does contain low levels of arsenic. The arsenic standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. The U.S. Environmental Protection Agency continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

Lead: If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Fresno is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you do so, you may wish to collect the flushed water and reuse it for another beneficial purpose, such as watering plants. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/lead.

www.fresno.gov/water

We're here to help!

You can contact the City of Fresno Water Division by phone, mail or e-mail.

PHONE

Water Division	621-5300
Water Quality	621-5365
Water Conservation	621-5480

MAIL

City of Fresno Water Division
1910 E. University Ave.
Fresno, CA 93703-2988

E-MAIL

information@water.fresno.gov

OPPORTUNITIES FOR PUBLIC DISCUSSION

The public is invited to discuss water quality and other water issues during monthly meetings held at the Water Division. For more information, contact us at 621-5305.

SPEAKER'S BUREAU & TOURS

Need a speaker for your community group, or service club about water issues? Call 621-1610. Tours are also available. Call us at 621-8635.

Report Water Waste 621-5480

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the USEPA's Safe Drinking Water Hotline (1-800-426-4791). Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/ Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

The following tables list all the drinking water contaminants that were tested for during the 2016 calendar year. The presence of these contaminants in the water does not necessarily indicate that the water poses a health risk. Unless otherwise noted, the data presented in this table is from testing done January 1 through December 31, 2016. The State requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data contained in this report, though representative of the water quality, is more than one year old.

California Drinking Water Source Assessment and Protection Program

The City of Fresno Water Division and the State Water Resources Control Board, formally the California Department of Public Health, CaDPH, has completed the California Drinking Water Source Assessment and Protection (DWSAP) Program for water wells operated by the Fresno Water Division. The complete report prepared in 2003 is available for viewing at the Water Division or the State Water Resources Control Board office. Please contact the Water Division at 621-5300 or State Water Resources Control Board at 447-3300 if you are interested in more information regarding this report. The City operates approximately 260 wells throughout Fresno's 115 sq. mile service area. Given the size and complexity of our system, the DWSAP report is a very large document and even a brief summary would be difficult to include in this Consumer Confidence report. However, two summary data tables are available on the City's website at www.fresno.gov. In the search box type Water Quality Report and you will automatically be routed to the linking page containing the reports. The multipurpose goal of the DWSAP is to identify ways communities can protect the water supplies, manage their water resources, improve drinking water quality, inform their citizens of known contaminants, and identify known activities and locations that can threaten their supply, and meet regulatory requirements. As an example, the following paragraph lists the contaminating activities and sources which can affect Fresno's drinking water. Airports-Maintenance/ fueling areas, Apartments and condominiums, Automobile-Body Shops, Automobile-Gas stations, Automobile-Repair Shops, Boat services/repair/ refinishing, Chemical/petroleum processing/ storage, Crops, irrigated, Dry Cleaners, Electrical/ electronic manufacturing, Fertilizer, Pesticide/ Herbicide Application, Golf courses, Historic gas stations, Historic waste dumps/landfills, Home manufacturing, Hospitals, Housing-high density, Junk/scrap/salvage yards, Known Contaminant Plumes, Landfills/dumps, Machine shops, Metal plating/finishing/fabricating, Medical/dental offices/clinics, Military installations, Motor pools, Office buildings/complexes, Parks, Pesticide/ fertilizer/petroleum storage & transfer areas, Photo processing/printing, Plastics/synthetics producers, Railroad yards/maintenance/fueling areas, Rental Yards, Schools, Septic systems-high density, Sewer collection systems, Transportation corridors-Railroads, Underground storage tanks-Confirmed leaking tanks, Utility Stations-maintenance areas, Veterinary offices/clinics, Wastewater treatment plants, Wells-Agriculture/Irrigation, Wells-Water supply.

More information is included in the summary which identifies the affected well(s) and associated activities.

Terms and Abbreviations

n/a: not applicable

NTU: Nephelometric Turbidity Unit (a measure of light)

nd: not detectable at reporting limits.

ng/L: nanograms per liter or parts per trillion.

ug/L: micrograms per liter or parts per billion

mg/L: milligrams per liter or parts per million

pCi/L: picocuries per liter (a measure of radiation)

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.



Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs are set to protect the odor, taste, and appearance of drinking water.

Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.

Public Health Goal (PHG): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

Primary Drinking Water Standard (PDWS): MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

Maximum Residual Disinfectant Level (MRDL): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfectant Level Goal (MRDLG): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

Regulatory Action Level: The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

Treatment Technique: A required process intended to reduce the level of a contaminant in drinking water.

Table 1: PRIMARY STANDARDS AND UNREGULATED CONTAMINANTS							
Chemical Table	**MCL**	**PHG (MCLG)**	**Fresno Average**	**Range of Detection's**	**MCL Violation**	**Last Sampled**	**Typical Source of Contaminant**
Volatile Organic Contaminants							
cis-1,2-Dichloroethylene (ug/L) (1)	**6**	**100**	**0.42**	**0 - 6.0**	**NO**	**2016**	**Discharge from industrial chemical factories; major biodegradation byproduct of TCE and PCE groundwater contamination**
Tetrachloroethylene (PCE) (ug/L)	5	0.06	0.48	0 - 4.5	NO	2016	Discharge from factories, drycleaners, and auto shops (metal degreaser)
Trichloroethylene (TCE) (ug/L)	5	1.7	0.27	0 - 3.8	NO	2016	Discharge from metal degreasing sites and other factories
Synthetic Organic Contaminants							
Dibromochloropropane (DBCP) (ng/L) (2)	**200**	**1.7**	**80.0**	**0 - 210**	**NO**	**2016**	**Banned nematocide that may still be present in soils due to runoff/leaching from former use on soybeans, cotton, vineyards, tomatoes, and tree fruit**
Inorganic Contaminants							
Aluminum (AL) (mg/L)	1	0.6	0.02	nd - 0.15	NO	2016	Erosion of natural deposits; residue from some surface water treatment plants
Arsenic (As) (ug/L)	10	0.004	1.2	nd - 4.1	NO	2016	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes
Barium (Ba) (mg/L)	1	2	0.060	nd- 0.15	NO	2016	Discharges of oil drilling wastes and from metal refineries; erosion of natural deposits
Chromium (Total) (ug/L)	50	(100)	0.769	nd - 10	NO	2016	Discharge from steel and pulp mills and chrome plating; erosion of natural deposits
Hexavalent Chromium (ug/L) (3)	**10**	**0.02**	**3.517**	**nd - 5.1**	**NO**	**2016**	**Discharge from electroplating factories, leather tanneries, wood preservation, chemical systhesis, refactory production, and textile manufacturing facilities; erosion of natural deposits**
Fluoride (ug/L)	2	1	0.073	nd - 0.15	NO	2016	Erosion of natural deposits; water additive that promotes strong teeth; discharge from fertilizer and aluminum factories
Nitrate (N) (mg/L)	10	10	5	0 - 9.8	NO	2016	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
Perchlorate (ug/L)	**6**	**6**	**0.013**	**nd - 3.1**	**NO**	**2014**	Historic aerospace or industrial operations associated with rocket propellant, fireworks, explosives, flares, matches and a varity of industries.
Radionuclides (4)							
Gross Alpha (pCi/L) (5)	**15**	**n/a**	**7.80**	**nd - 21.1**	**NO**	**2016**	**Erosion of natural deposits**
Radium 226 (pCi/L)	3	n/a	0.72	-0.12 - 3.84	NO	2007	Erosion of natural deposits
Radium 228 (pCi/L)	5	0.019	1.30	nd - 2.1	NO	2016	Erosion of natural deposits
Uranium (pCi/L)	20	0.5	5.89	nd - 16	NO	2016	Erosion of natural deposits
Unregulated Contaminants (ICR, UCMR & Misc)							
1,4-Dioxane	n/a		13	nd - 210	n/a	2015	We are required by regulations to monitor for certain unregulated contaminants. This is helpful to the USEPA and DDW for tracking the location of contaminants and whether there is a need for stricter regulations. Several contaminants indicate detected values with a "<" symbol meaning less than. There are two possible reasons for this. First, the Detection Limit for Reporting, the DLR, has not been established by EPA or DDW. Second, for various reasons, the analytical equipment is unable to quantify the value below the stated "less than" value but analysis indicates the contaminant is present. For either reason, the concentration cannot be quantified and the City must assume that a "Fresno Average" is not applicable for this report.
Dichlorodifluoromethane (Freon 12)	n/a		0.721	nd - 16	n/a	2016	
Hexavalent Chromium (ug/L) (6)	**n/a**		**2.248**	**nd - 13**	**n/a**	**2016**	
Trichloropropane (1,2,3-TCP) (7)	**0.0007 ug/L (PHG)**		**0.005**	**nd - 0.080**	**n/a**	**2016**	
Tert-Butly Alcohol (TBA)	n/a		0.609	nd - 37	n/a	2016	
Vanadium (total)	n/a		11	nd - 71	n/a	2014	
Bromochloromethane	n/a		0.001	nd - 0.79	n/a	2014	
Chlorate	n/a		204	nd - 970	n/a	2014	
Chlorodifluoromethane	n/a		0.085	nd - 3.8	n/a	2014	
Molybdenum (total)	n/a		0.9	nd - 7.1	n/a	2014	
Strontium (total)	n/a		97	nd - 510	n/a	2014	
Disinfection Byproducts, Disinfectant Residuals, and Disinfection Byproduct Precursors							
Total Trihalomethanes (TTHM) (ug/L)	80	n/a	1.7	nd - 7.8	NO	2016	Byproduct of drinking water chlorination
Haloacetic Acids (HAA5) (ug/L)	60	n/a	6.1	nd - 29	NO	2016	Byproduct of drinking water chlorination
Chlorine (NAOCL) (mg/L)	4	4	0.78	nd - 2.1	NO	2016	Drinking water disinfectant added for treatment

1) cis-1,2-Dichloroethylene: PS 251 located near Blackstone and Ashlan is being monitored monthly for VOC's. For 2016, the annual average concentration is 4.44 ug/L and is below the MCL of 6 ug/L. However, there was one result at the MCL of 6 ug/L from a sample collected in September 2016. Determination as to whether a well exceeds an MCL for non-acute contaminants such as cis-1,2-Dichloroethylene is based on a running average for a prescribed period of time, typically six months. Therefore a well may have several results above the MCL yet still meet drinking water standards. Some people who use water containing cis-1,2-Dichloroethylene in excess of the MCL over many years may experience liver problems.

(2) Dibromochloropropane (DBCP): PS 184 and 205 are both located in SE Fresno and are active DBCP treatment sites using GAC contact vessels. Influent samples are collected monthly but Effluent samples are collected more frequently as detections increase over time. In both cases, there were single effluent results reported at 0.21 ug/L. and were technically at the MCL when rounding is factored in. They did not exceed the MCL. The wells were removed form service at this point and scheduled for GAC change out. Some people who use water containing DBCP in excess of the MCL over many years may experience reproductive problems and may have an increased risk of getting cancer.

(3 & 6) Hexavalent Chromium is a regulated contaminant in the State of California but is not regulated at the federal level. The test results for State compliance did not exceed the MCL of 10 ug/L, however, there were two results from the UCMR events in previous years that were greater than the State MCL. The sample locations and testing methods differ between the two requirements and are not an equal comparison. Both sets of test results are included in this report. Some people who drink water containing hexavalent chromium in excess of the MCL over many years may have an increased risk of getting cancer.

(4 & 5) RADIONUCLIDES, including Gross Alpha, Uranium, Radium 226 and Radium 228 are sampled on various schedules depending upon the results for previous samples. The well may be sampled as often as every three years but no longer than nine years. Two wells, PS 79 and 146 are being closely monitored for gross alpha and uranium and some individual results exceeded the limit in 2016, however, compliance is based on the average of four quarters and no MCL's have been exceeded. Some people who drink water containing these constituents over many years may have an increased risk of getting cancer.

(7) Trichloropropane (1,2,3-TCP): In 2016, 1,2,3-TCP was detected in 61 wells in Fresno. The State Water Resources Control Board is currently creating an MCL to regulate the amount of 1,2,3-TCP that would be allowable in potable water. This regulation is not yet final but a number of wells may be impacted in the near future. Some people who use water containing 1,2,3-Trichloropropane in excess of the notification level over many years may have an increased risk of getting cancer, based on studies in laboratory animals.

Table 2: MICRO BIOLOGICAL CONTAMINANTS

Over 220 bacteriological samples are collected every month in Fresno's distribution system. In addition, over 300 bacteriological samples are collected from wells and treatment sites.

Contaminant	Highest No. of Detection's	No. of Months in Violation	MCL	MCLG	Typical Source of Bacteria
Total Coliform Bacteria	2 of 240 or .83%	0	5%	(0)	Naturally present in the environment
E.coli	0	0	A routine sample is positive for E.coli and a repeat sample is positive for total, fecal or E.coli bacteria	(0)	Human or animal fecal waste

Table 3: LEAD AND COPPER

Lead and Copper samples are collected from wells, the distribution system and from inside residences.

Contaminant	No. of Samples Collected	90th Percentile Level Detected	No. of Sites Exceeding Action Level	Action Level	MCLG	Typical Source of Contaminant
Lead (ug/L) (Sampled in 2015)	54	0	0	15	0.2	Internal corrosion of household water plumbing systems; discharges from industrial manufacturers; erosion of natural deposits
Copper mg/L) (Sampled in 2015)	54	0.26	0	1.3	0.3	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives

Table 4: SECONDARY STANDARDS CONTAMINANTS LIST

Secondary standards are based on aesthetic factors (taste, appearance and odor, etc.) and are not health related.

Inorganic Contaminants	MCL	Fresno Average	Range of Detection's	SMCL Violation	Last Sampled	Typical Source of Contaminant
Aluminum (ug/L)	200	16.6	nd - 150	NO	2016	Erosion of natural deposits; residual from some surface water treatment processes
Apparent Color (Unfiltered)	15	0.6	nd - 5	NO	2016	Naturally-occurring organic materials
Iron (Fe) (ug/L) (8)	**300**	**130**	**nd - 880**	**NO**	**2016**	**Leaching from natural deposits; industrial wastes**
Manganese (Mn) (ug/L) (9)	**50**	**17**	**nd - 380**	**NO**	**2016**	**Leaching from natural deposits**
Odor Threshold	3 units	0.182	nd - 1	NO	2016	Naturally-occurring organic materials
Sodium (Na) (mg/L)	n/a	20	2.9 - 57	NO	2016	
Specific Conductance (E.C.) (umho/cm+)	1600	262	44 - 570	NO	2016	Substances that form ions when in water; seawater influence
Sulfate (SO4) (mg/L)	500	8.28	1.7 - 15	NO	2016	Runoff/leaching from natural deposits; industrial wastes
Total Dissolved Solids (TDS) (mg/L)	1000	173	36 - 380	NO	2016	Runoff/leaching from natural deposits
Total Hardness (as CaCO3) (mg/L)	n/a	97	31 - 180	NO	2016	
Turbidity (Lab) (units)	5	0.660	nd - 3.9	NO	2016	Soil runoff
Zinc (Zn) (mg/L)	5	0.001	nd - 0.17	NO	2014	Runoff/leaching from natural deposits; industrial wastes

(8) Iron: One well, 58A-2, a new well with no operational runtime had a result that exceeded the Secondary MCL for Iron. Most likely, the iron is related to developing corrosion on the column pipe and well casing, something that is normal for new wells. Iron in water may cause discoloration and staining of appliances, fixtures and clothing.

(9) Manganese: Two wells, PS 329 and 347 in southeast Fresno had detections above the Secondary MCL for Manganese while monitoring for SMCL compliance. Both wells have confirmed above the SMCL and have been removed from service pending possible installation of treatment equipment. Manganese in water may cause discoloration and staining of appliances, fixtures and clothing.

Table 5: TURBIDITY IN NORTH EAST FRESNO RELATED TO SURFACE WATER TREATMENT PLANT OPERATIONS

	MCL	MCLG	Level Found	Range	Sample Date	Violation	Typical Source
Turbidity (NTU)	TT = 1 NTU	n/a	0.253	n/a	3-Feb-16	n/a	Soil runoff
	TT = 95% of samples <0.3 NTU		100%		Continuous	n/a	

Turbidity is a measurement of the cloudiness of the water determined by the ratio of the intensity of light scattered by the sample to the intensity of incident light. We monitor it because it is a good indicator of the effectiveness of our filtration system.

Table 5: TURBIDITY IN SOUTH EAST FRESNO RELATED TO SURFACE WATER TREATMENT PLANT OPERATIONS

	MCL	MCLG	Level Found	Range	Sample Date	Violation	Typical Source
Turbidity (NTU)	TT = 1 NTU	n/a	0.198	n/a	14-JUL-16	n/a	Soil runoff
	TT = 95% of samples <0.3 NTU		100%		Continuous	n/a	

Turbidity is a measurement of the cloudiness of the water determined by the ratio of the intensity of light scattered by the sample to the intensity of incident light. We monitor it because it is a good indicator of the effectiveness of our filtration system.

WATER CONSERVATION

After several years of drought, the Golden State finally received an above-average year of rain. But getting a normal amount of rain one year is not going to cure all that ails our dry state. We need to work harder than ever to stay on the cutting-edge of water conservation – because we never know what the future holds, but we do know that if we each save a little, we'll all save a lot.

Retain Your Resources With Rebates

Save water and money when you take advantage of one or more rebate opportunities!

State of California Turf Replacement - up to $2 per square foot
www.SaveOurWaterRebates.com

City of Fresno Rebates:

Residential

Clothes Washer – $50
Evaporative Cooler – $100
Lawn to Garden Conversion – $.50 per square foot
Micro Irrigation Conversion – $.25 per square foot
Rain Sensor – $50
Rainwater Harvesting – $50
Recirculating Hot Water Pump – $100
Smart Irrigation Controller – $50
Soil Moisture Sensor – $50
Sprinkler Nozzles – up to $4 per nozzle
Swimming Pool Cover – $50
Toilets – $50
Commercial Only
Toilets – $50 ($150 June through August 2017)
Urinal – $100

Find rebate forms online by clicking on the Water Drop at www.fresno.gov and then Rebates & Coupons.

Water Conservation Services

Water-wise landscape consultation
Learn about local water wise plant choices, turf removal and design for your home. A City of Fresno landscape specialist can provide a free water-wise landscape consultation for customers.

Irrigation efficiency audit
Make sure your irrigation water is being effective. Call for a free irrigation efficiency audit of your property by a City of Fresno landscape specialist.

Help setting irrigation controllers
A City of Fresno representative will come to your home and show you how to adjust your automatic water timer for free.

Interior/exterior water leak surveys
Think you have a water leak? City of Fresno specialists can conduct a free water leak survey on your property.

Meter use information
City of Fresno water customers can view numbers and graphs of their total monthly water consumption, as well as their average daily metered water usage, by clicking the "pay utilities bill" tab at www.fresno.gov and logging into their utilities account. For details contact Utility Billing & Collection at 621-6888.

Water Conservation Hotline 621-5480
Call to report water waste.

You can also email waterconservation@fresno.gov or click on the FresGO app.

Know Your Watering Schedule*

The watering schedule changes as the seasons change. Be aware of the days and times you're allowed to water by checking the schedule:

CITY OF FRESNO
THREE-DAY WATERING SCHEDULE
June 1 - August 31, 2017

ODD Numbered Addresses:
(Ending in 1, 3, 5, 7, 9)
Tuesdays, Thursdays and/or Saturdays

EVEN Numbered Addresses:
(Ending in 0, 2, 4, 6, 8)
Wednesdays, Fridays and/or Sundays

NO WATERING MONDAYS OR BETWEEN 9AM AND 6PM

*Watering schedules are subject to change at any time.

Other Things You Should Know

- Customers may not use potable (fresh, drinking) water to wash sidewalks, walkways, driveways, parking lots, open ground, or other hard surface areas except where necessary for public health or safety.
- Car washing is allowed only with a bucket and a hose equipped with a shut off nozzle for a quick rinse.
- Irrigating outdoor landscapes with potable water during and following 48 hours of a measurable rainfall is prohibited.
- A permit is required to drain a swimming pool (Fresno Municipal Code-Sect 6-520 C (5). A free permit may be requested by calling 621-5480 or completing the online form by clicking on $Rebates$; Permits at www.fresno.gov/publicutilities/water-conservation-landscaping/conservation/.
- A permit is required if additional watering days are needed to install new lawn and plants for current customers. The City does not require a permit to re-seed lawns, however no extra water days are provided.
- Power outages can cause timers to reset schedules. Please check to make sure your timer is set correctly and install a fresh battery if needed.

62573 / 06.22 / 2.5M

576 East Locust Avenue

576 East Locust Avenue

Fresno, CA 93720

Inquiry Number: 5203814.4

February 28, 2018

EDR Historical Topo Map Report

with QuadMatch™

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Historical Topo Map Report

02/28/18

Site Name:	Client Name:
576 East Locust Avenue	Terracon
576 East Locust Avenue	50 Goldenland Ct., #100
Fresno, CA 93720	Sacramento, CA 95834
EDR Inquiry # 5203814.4	Contact: Megan Davey

EDR Topographic Map Library has been searched by EDR and maps covering the target property location as provided by Terracon were identified for the years listed below. EDR's Historical Topo Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topo Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the late 1800s.

Search Results:		*Coordinates:*	
P.O.#	NA	**Latitude:**	36.839889 36° 50' 24" North
Project:	NB187030	**Longitude:**	-119.77414 -119° 46' 27" West
		UTM Zone:	Zone 11 North
		UTM X Meters:	252623.95
		UTM Y Meters:	4080703.31
		Elevation:	344.71' above sea level

Maps Provided:

2012	1921
1981	
1972	
1965	
1964, 1965	
1947	
1946	
1923	

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Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

2012 Source Sheets



Fresno North
2012
7.5-minute, 24000



Clovis
2012
7.5-minute, 24000

1981 Source Sheets

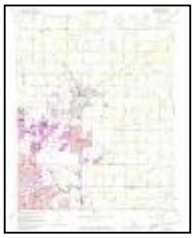


Clovis
1981
7.5-minute, 24000
Aerial Photo Revised 1978



Fresno North
1981
7.5-minute, 24000
Aerial Photo Revised 1978

1972 Source Sheets



Clovis
1972
7.5-minute, 24000
Aerial Photo Revised 1972



Fresno North
1972
7.5-minute, 24000
Aerial Photo Revised 1972

1965 Source Sheets

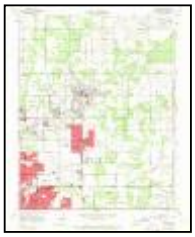


Herndon
1965
15-minute, 62500

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

1964, 1965 Source Sheets



Clovis
1964
7.5-minute, 24000
Aerial Photo Revised 1962



Fresno North
1965
7.5-minute, 24000
Aerial Photo Revised 1962

1947 Source Sheets



Clovis
1947
7.5-minute, 24000



Fresno North
1947
7.5-minute, 24000

1946 Source Sheets



Fresno North
1946
7.5-minute, 24000



Clovis
1946
7.5-minute, 24000

1923 Source Sheets



Clovis
1923
7.5-minute, 31680

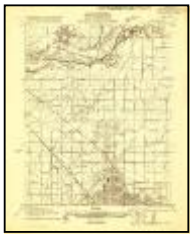


Bullard
1923
7.5-minute, 31680

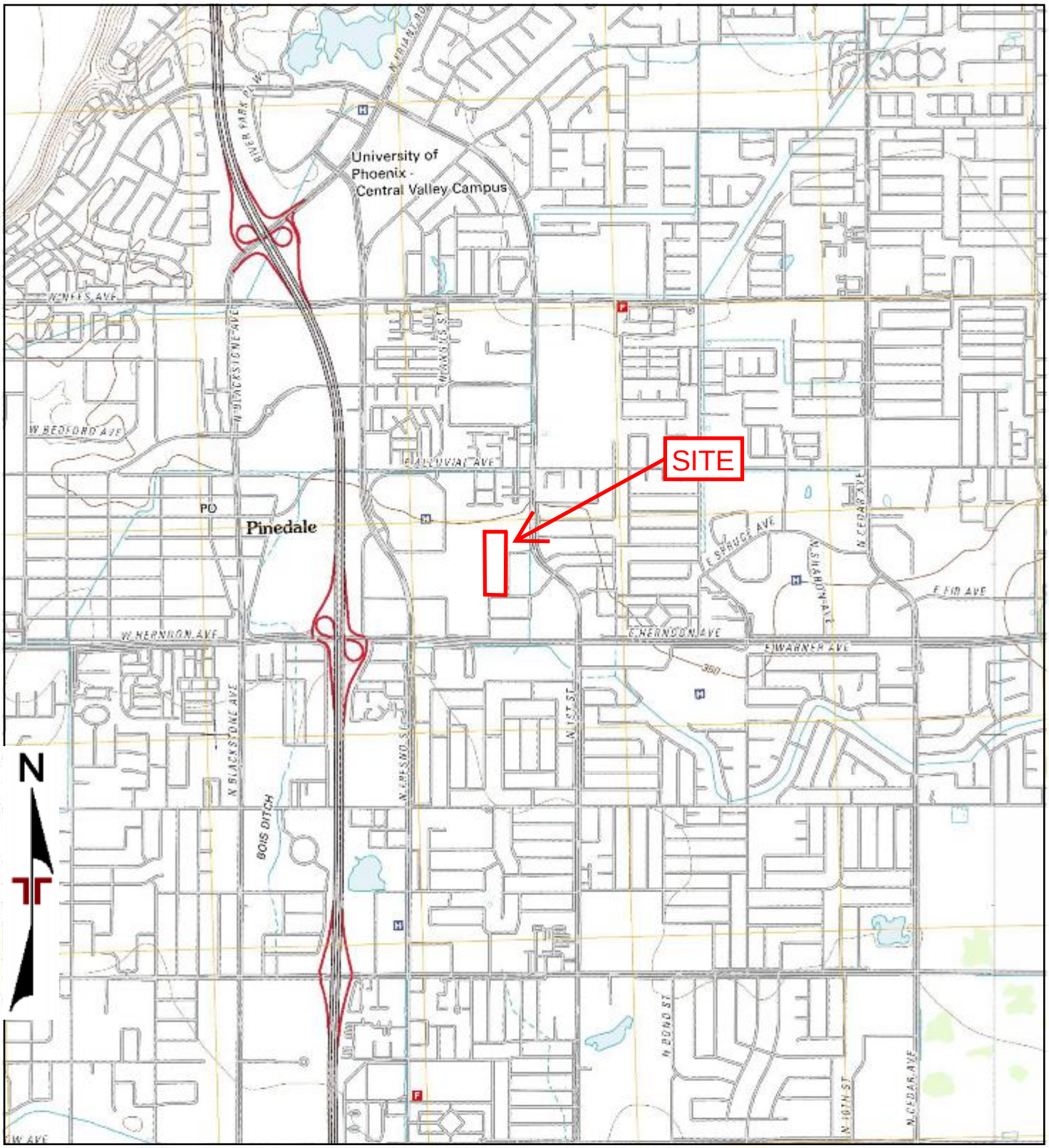
Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

1921 Source Sheets



Bullard
1921
7.5-minute, 31680

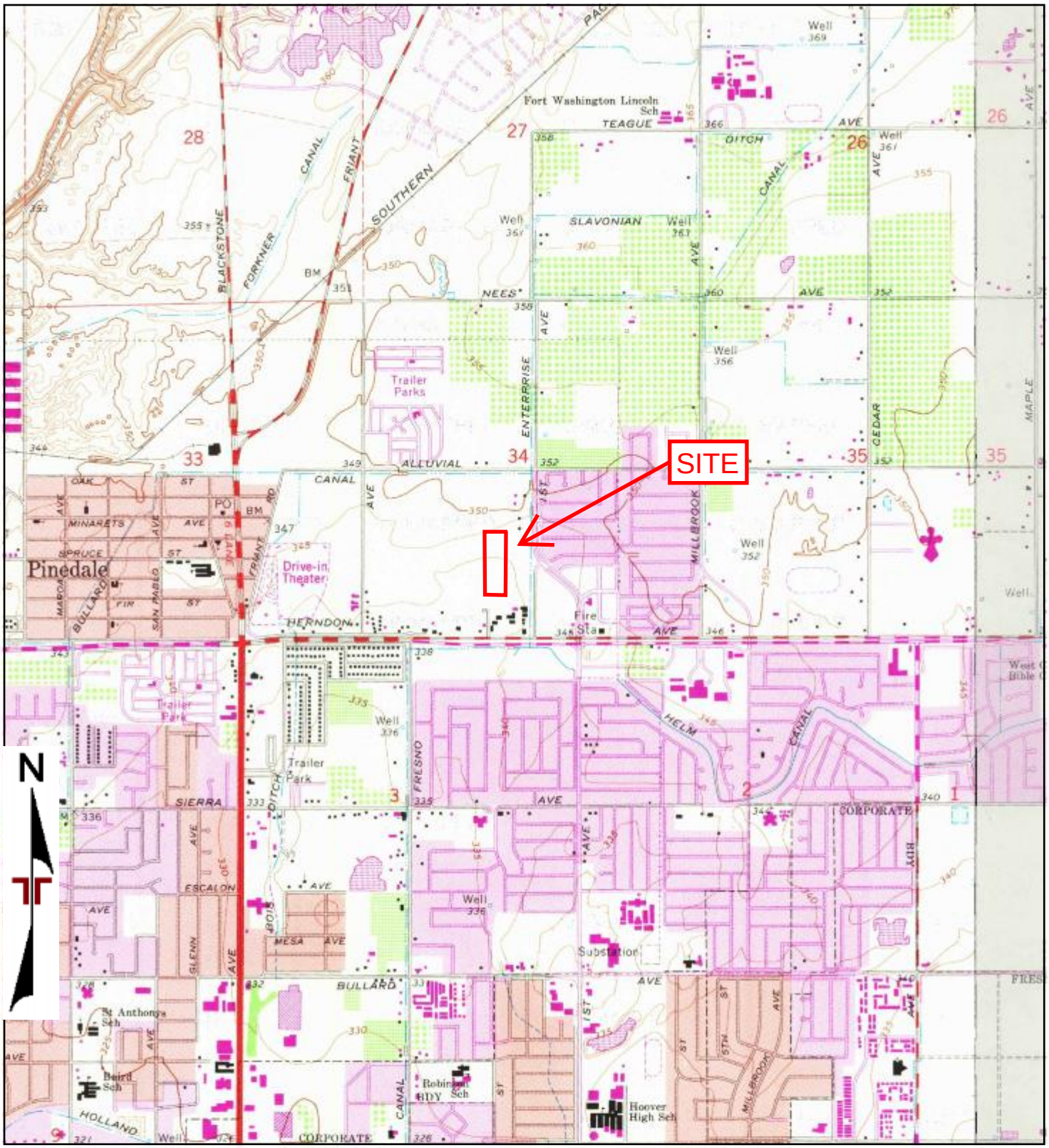


TP, Fresno North, 2012, 7.5-minute
E, Clovis, 2012, 7.5-minute

0 Miles 0.25 0.5 1 1.5

Project Manager:	Project No. NB187030	Terracon 50 Goldenland Ct., #100 Sacramento, CA 95834	2012 TOPOGRAPHIC MAP **PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA
Drawn by:	Scale: As Shown		
Checked by:	File Name:		
Approved by:	Date: 2012		

Appendix C

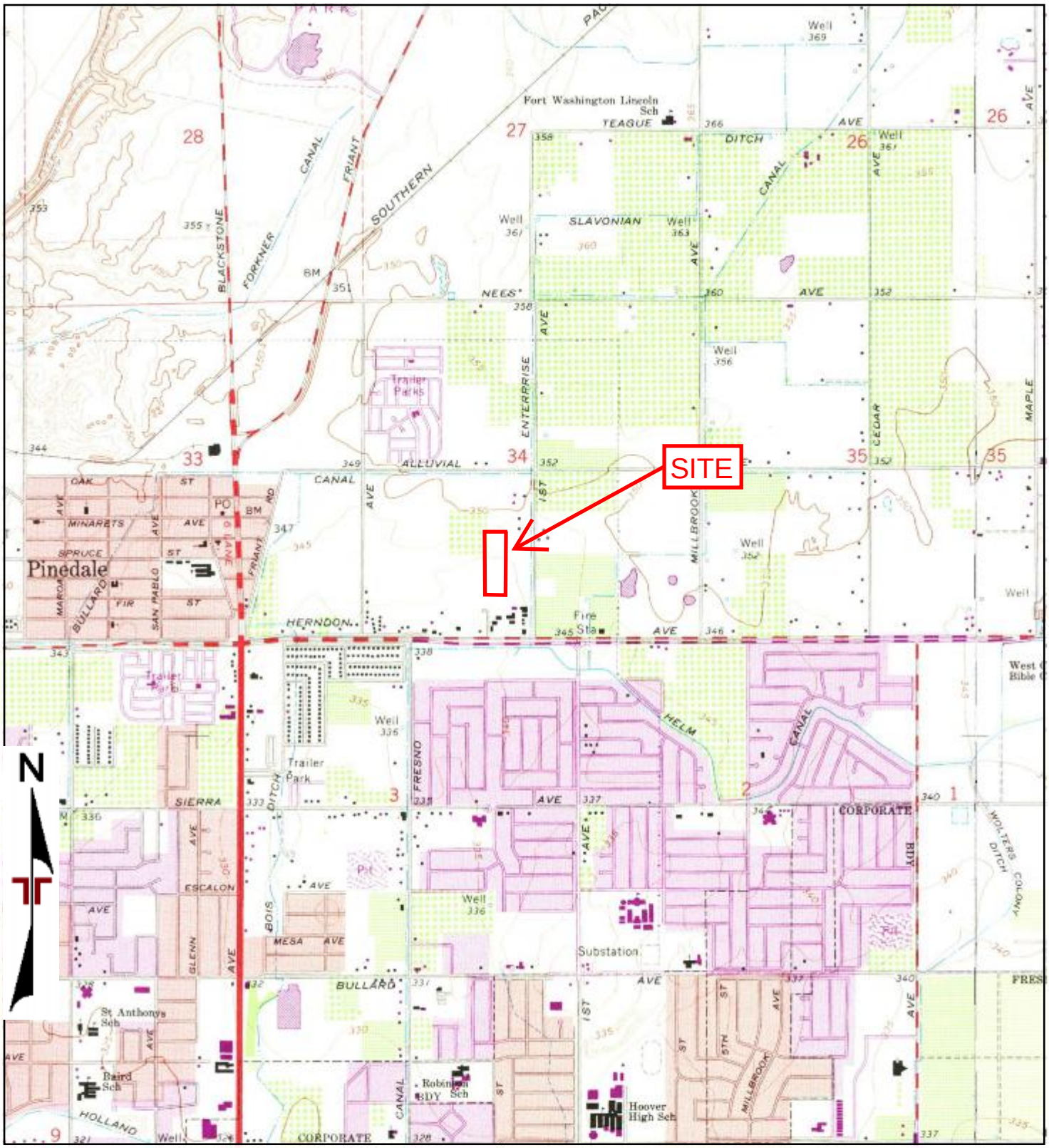


TP, Fresno North, 1981, 7.5-minute
E, Clovis, 1981, 7.5-minute

0 Miles 0.25 0.5 1 1.5

Project Manager:	Project No. NB187030	Terracon 50 Goldenland Ct., #100 Sacramento, CA 95834	1981 TOPOGRAPHIC MAP **PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA
Drawn by:	Scale: As Shown		
Checked by:	File Name:		
Approved by:	Date: 1981		

Appendix C

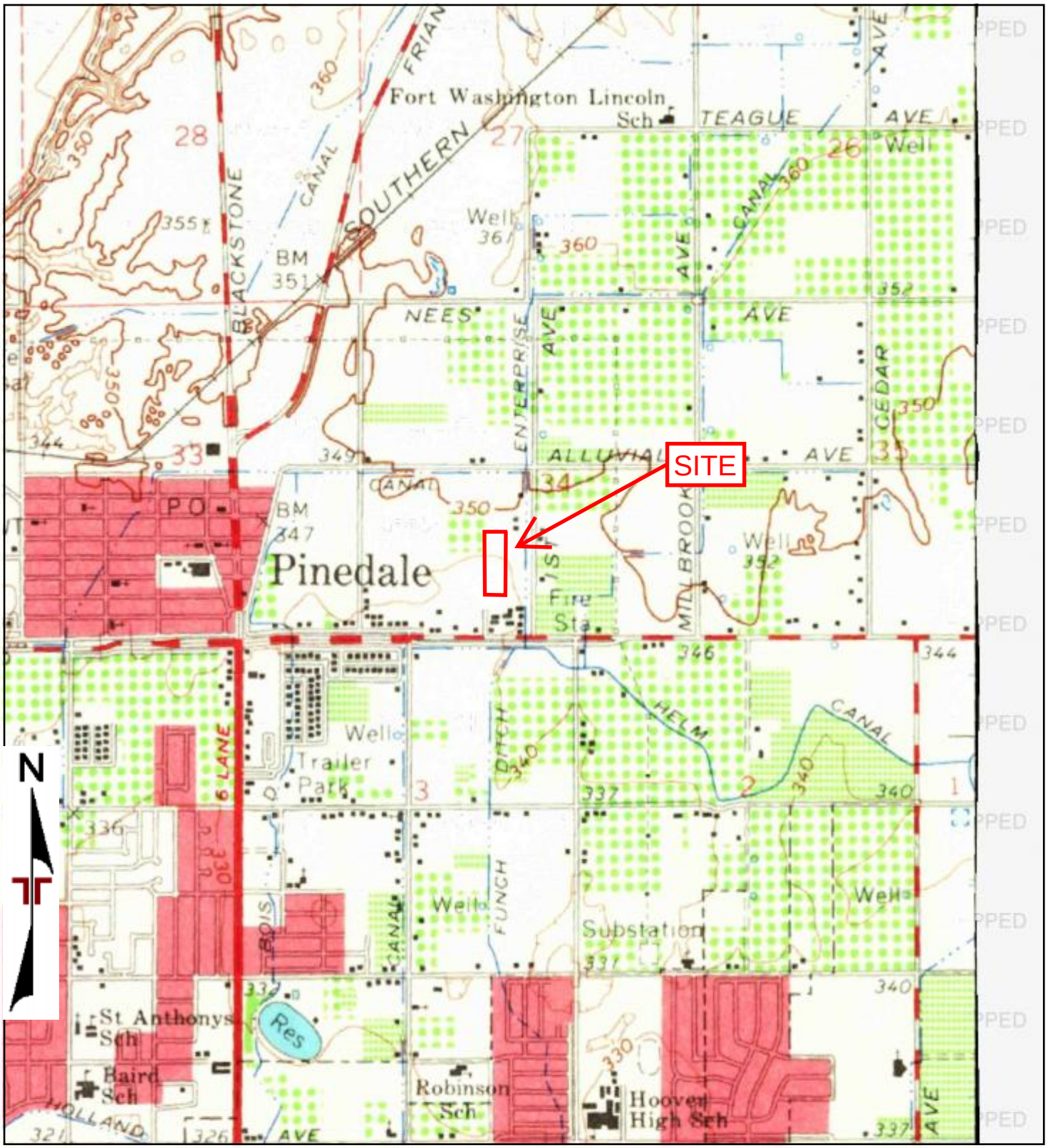


TP, Fresno North, 1972, 7.5-minute
E, Clovis, 1972, 7.5-minute

0 Miles 0.25 0.5 1 1.5

Project Manager:	Project No. NB187030	Terracon 50 Goldenland Ct., #100 Sacramento, CA 95834	1972 TOPOGRAPHIC MAP **PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA
Drawn by:	Scale: As Shown		
Checked by:	File Name:		
Approved by:	Date: 1972		

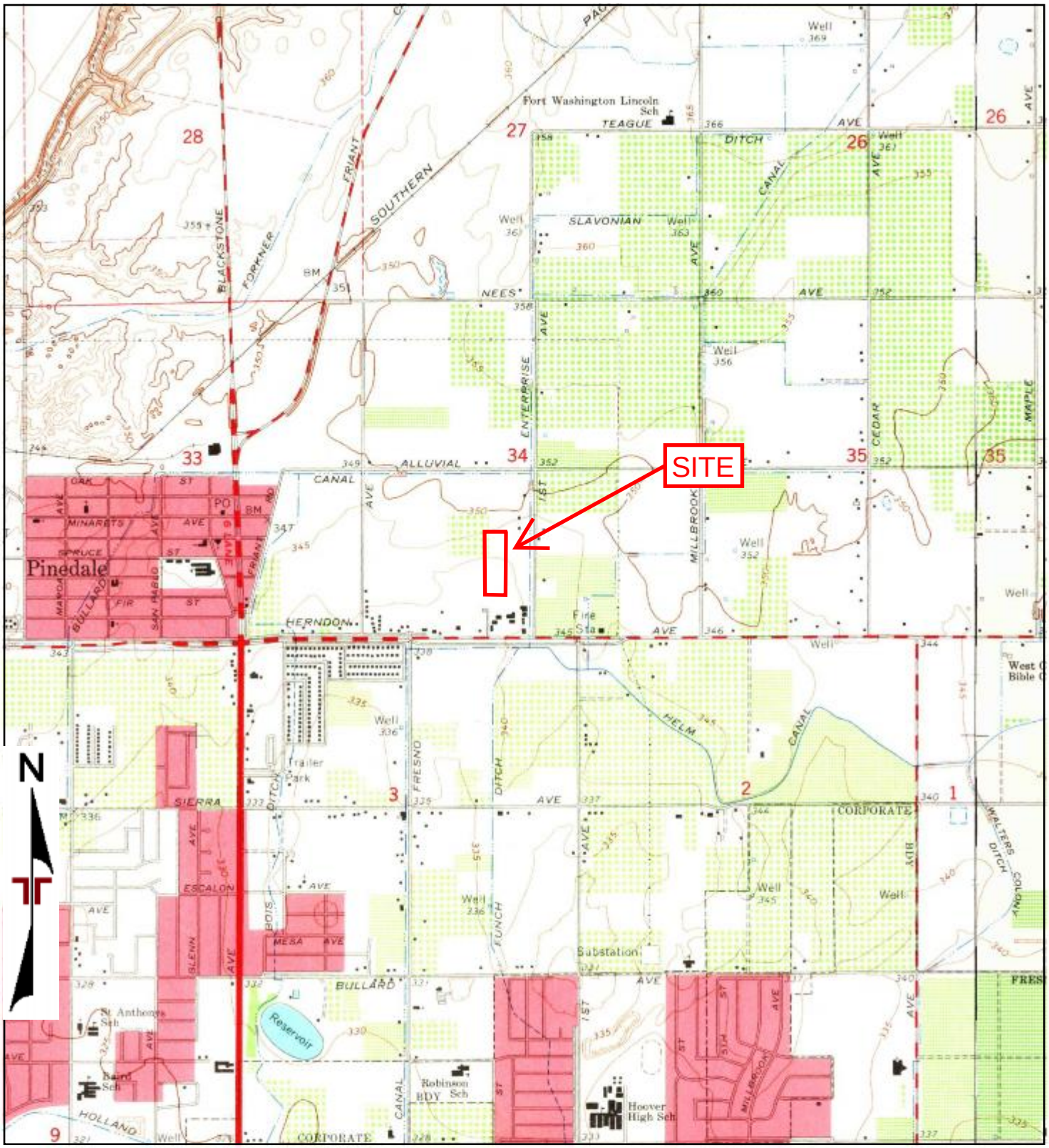
Appendix C



TP, Herndon, 1965, 15-minute

0 Miles 0.25 0.5 1 1.5

Project Manager:	Project No. NB187030	Terracon 50 Goldenland Ct., #100 Sacramento, CA 95834	1965 TOPOGRAPHIC MAP **PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA
Drawn by:	Scale: As Shown		
Checked by:	File Name:		
Approved by:	Date: 1965		Appendix C

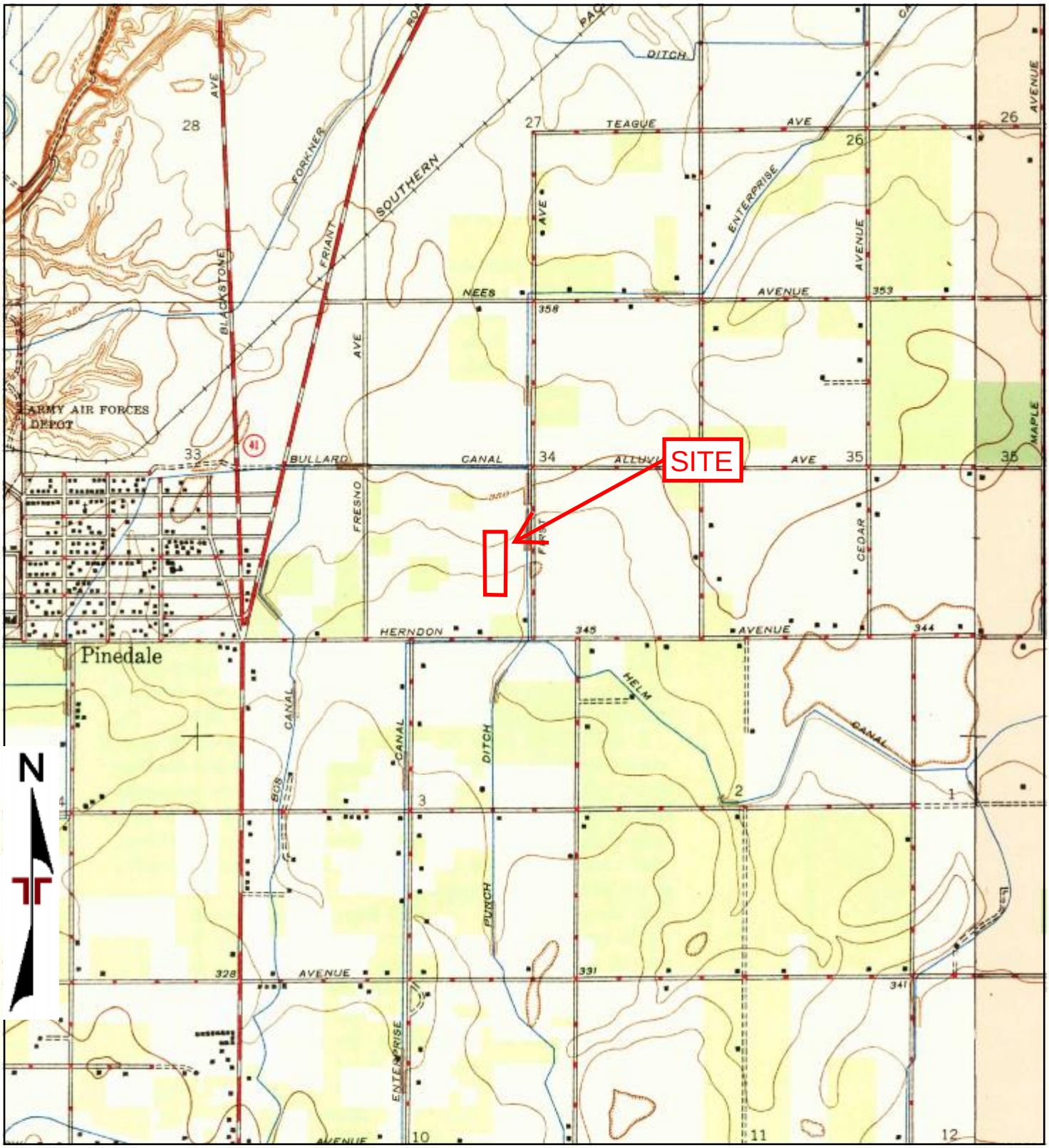


TP, Fresno North, 1965, 7.5-minute
E, Clovis, 1964, 7.5-minute

0 Miles 0.25 0.5 1 1.5

Project Manager:	Project No. NB187030	Terracon 50 Goldenland Ct., #100 Sacramento, CA 95834	1964, 1965 TOPOGRAPHIC MAP **PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA
Drawn by:	Scale: As Shown		
Checked by:	File Name:		
Approved by:	Date: 1964, 1965		

Appendix C

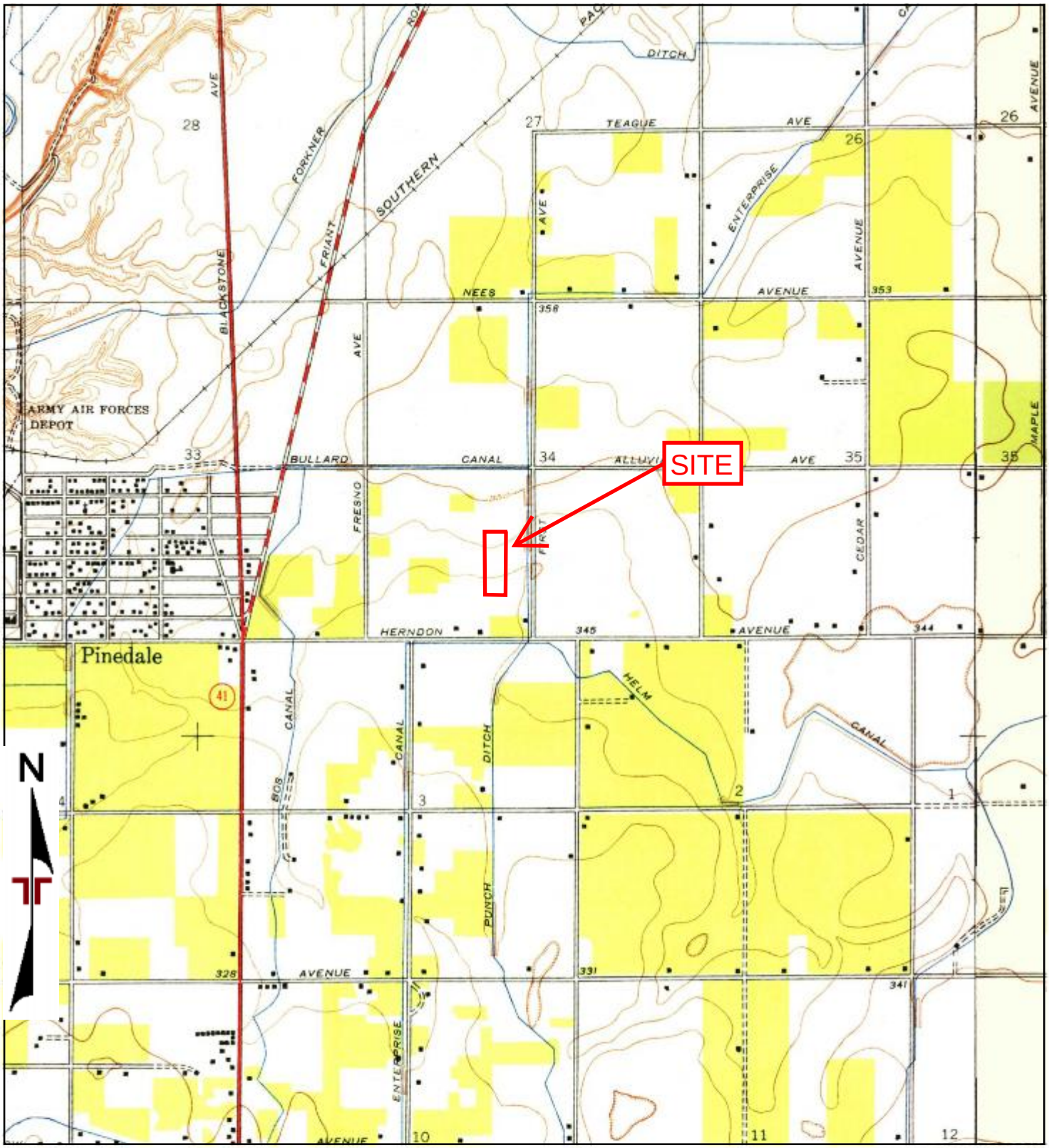


TP, Fresno North, 1947, 7.5-minute
E, Clovis, 1947, 7.5-minute

0 Miles 0.25 0.5 1 1.5

Project Manager:	Project No. NB187030	Terracon 50 Goldenland Ct., #100 Sacramento, CA 95834	1947 TOPOGRAPHIC MAP **PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA
Drawn by:	Scale: As Shown		
Checked by:	File Name:		
Approved by:	Date: 1947		

Appendix C

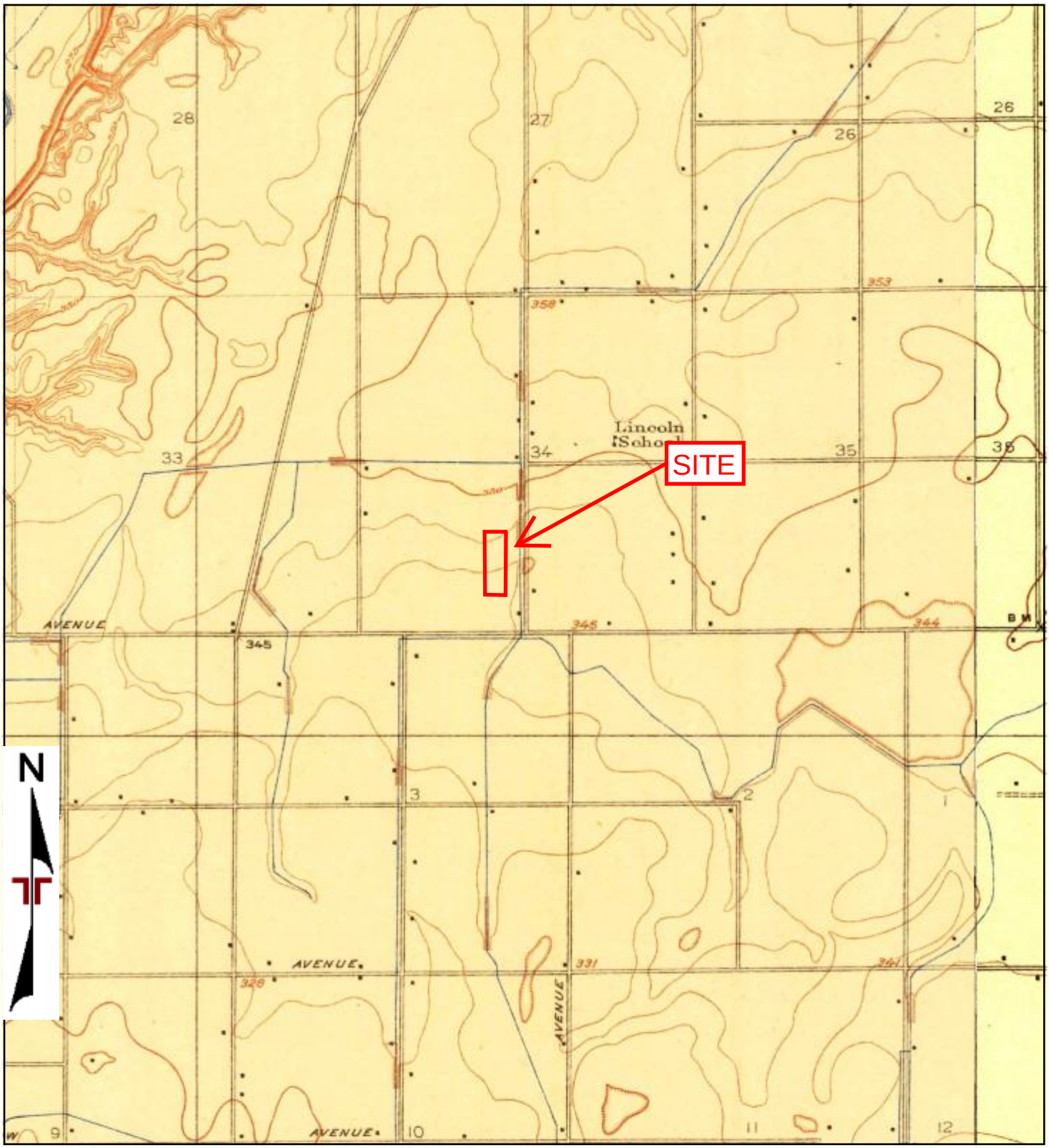


TP, Fresno North, 1946, 7.5-minute
E, Clovis, 1946, 7.5-minute

0 Miles 0.25 0.5 1 1.5

Project Manager:	Project No. NB187030	Terracon 50 Goldenland Ct., #100 Sacramento, CA 95834	1946 TOPOGRAPHIC MAP **PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA
Drawn by:	Scale: As Shown		
Checked by:	File Name:		
Approved by:	Date: 1946		

Appendix C

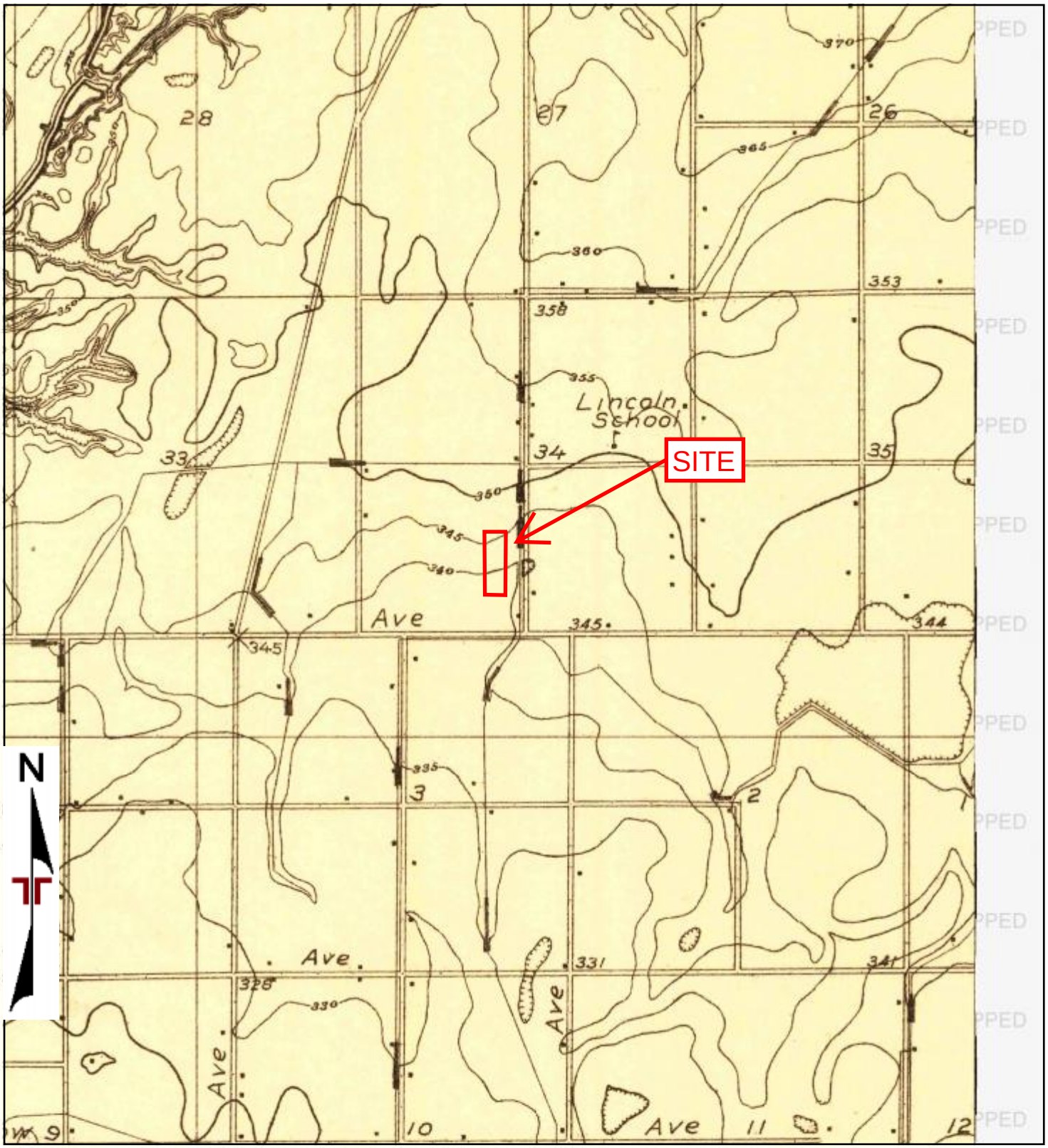


TP, Bullard, 1923, 7.5-minute
E, Clovis, 1923, 7.5-minute

0 Miles 0.25 0.5 1 1.5

Project Manager:	Project No. NB187030	Terracon 50 Goldenland Ct., #100 Sacramento, CA 95834	1923 TOPOGRAPHIC MAP **PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA
Drawn by:	Scale: As Shown		
Checked by:	File Name:		
Approved by:	Date: 1923		

Appendix C



TP, Bullard, 1921, 7.5-minute

0 Miles 0.25 0.5 1 1.5

Project Manager:	Project No. NB187030	Terracon 50 Goldenland Ct., #100 Sacramento, CA 95834	1921 TOPOGRAPHIC MAP **PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA
Drawn by:	Scale: As Shown		
Checked by:	File Name:		
Approved by:	Date: 1921		

Appendix C

576 East Locust Avenue

576 East Locust Avenue

Fresno, CA 93720

Inquiry Number: 5203814.9

February 28, 2018

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

02/28/18

Site Name:

576 East Locust Avenue
576 East Locust Avenue
Fresno, CA 93720
EDR Inquiry # 5203814.9

Client Name:

Terracon
50 Goldenland Ct., #100
Sacramento, CA 95834
Contact: Megan Davey

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

Search Results:

Year	Scale	Details	Source
2014	1"=500'	Flight Year: 2014	USDA/NAIP
2010	1"=500'	Flight Year: 2010	USDA/NAIP
2006	1"=500'	Flight Year: 2006	USDA/NAIP
1998	1"=500'	Acquisition Date: August 17, 1998	USGS/DOQQ
1987	1"=500'	Flight Date: June 17, 1987	USDA
1984	1"=500'	Flight Date: June 09, 1984	USDA
1979	1"=500'	Flight Date: September 04, 1979	USDA
1973	1"=500'	Flight Date: May 08, 1973	USDA
1967	1"=500'	Flight Date: May 03, 1967	USDA
1962	1"=500'	Flight Date: August 09, 1962	USGS
1957	1"=500'	Flight Date: August 09, 1957	USDA
1950	1"=500'	Flight Date: January 30, 1950	USDA
1946	1"=500'	Flight Date: April 23, 1946	USGS
1942	1"=500'	Flight Date: May 19, 1942	USGS
1937	1"=500'	Flight Date: October 05, 1937	USGS

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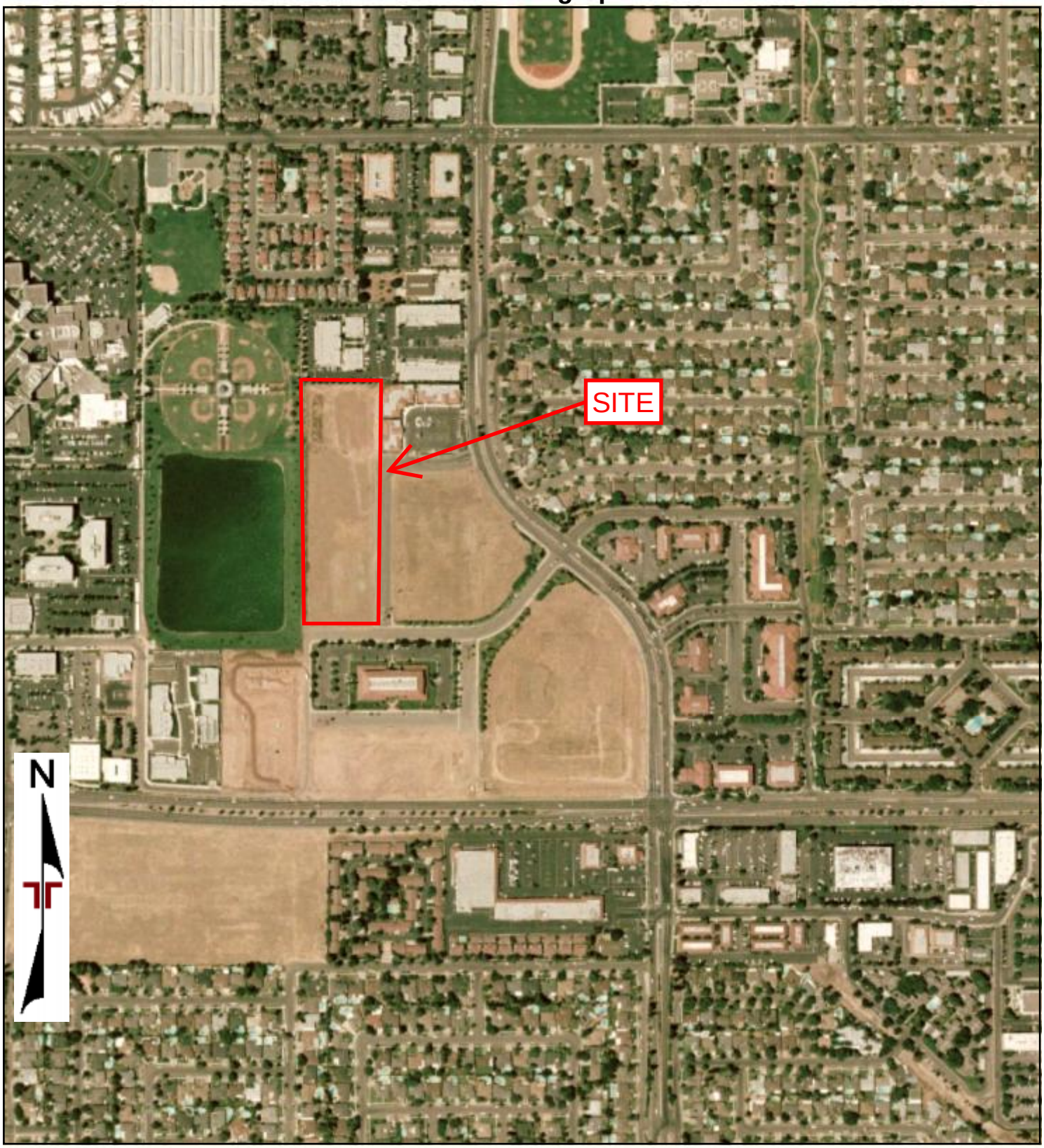
0 Feet 500 1000 2000

Project Manager	Project No: NB187030	Terracon 50 Goldenland Ct., #100 Sacramento, CA 95834	2014 AERIAL PHOTOGRAPH **PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA	Appendix
Drawn By:	Scale: As Shown			C
Checked By:	File Name:			
Approved By:	Date: 2014			



0 Feet 500 1000 2000

Project Manager	Project No: NB187030	Terracon 50 Goldenland Ct., #100 Sacramento, CA 95834	2010 AERIAL PHOTOGRAPH **PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA	Appendix
Drawn By:	Scale: As Shown			C
Checked By:	File Name:			
Approved By:	Date: 2010			



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Project Manager	Project No: NB187030	Terracon 50 Goldenland Ct., #100 Sacramento, CA 95834	2006 AERIAL PHOTOGRAPH **PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA	Appendix
Drawn By:	Scale: As Shown			C
Checked By:	File Name:			
Approved By:	Date: 2006			



0 Feet 500 1000 2000

Project Manager	Project No: NB187030	Terracon 50 Goldenland Ct., #100 Sacramento, CA 95834	1998 AERIAL PHOTOGRAPH **PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA	Appendix
Drawn By:	Scale: As Shown			C
Checked By:	File Name:			
Approved By:	Date: 1998			



0 Feet 500 1000 2000

Project Manager	Project No: NB187030	Terracon 50 Goldenland Ct., #100 Sacramento, CA 95834	1987 AERIAL PHOTOGRAPH **PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA	Appendix
Drawn By:	Scale: As Shown			C
Checked By:	File Name:			
Approved By:	Date: 1987			



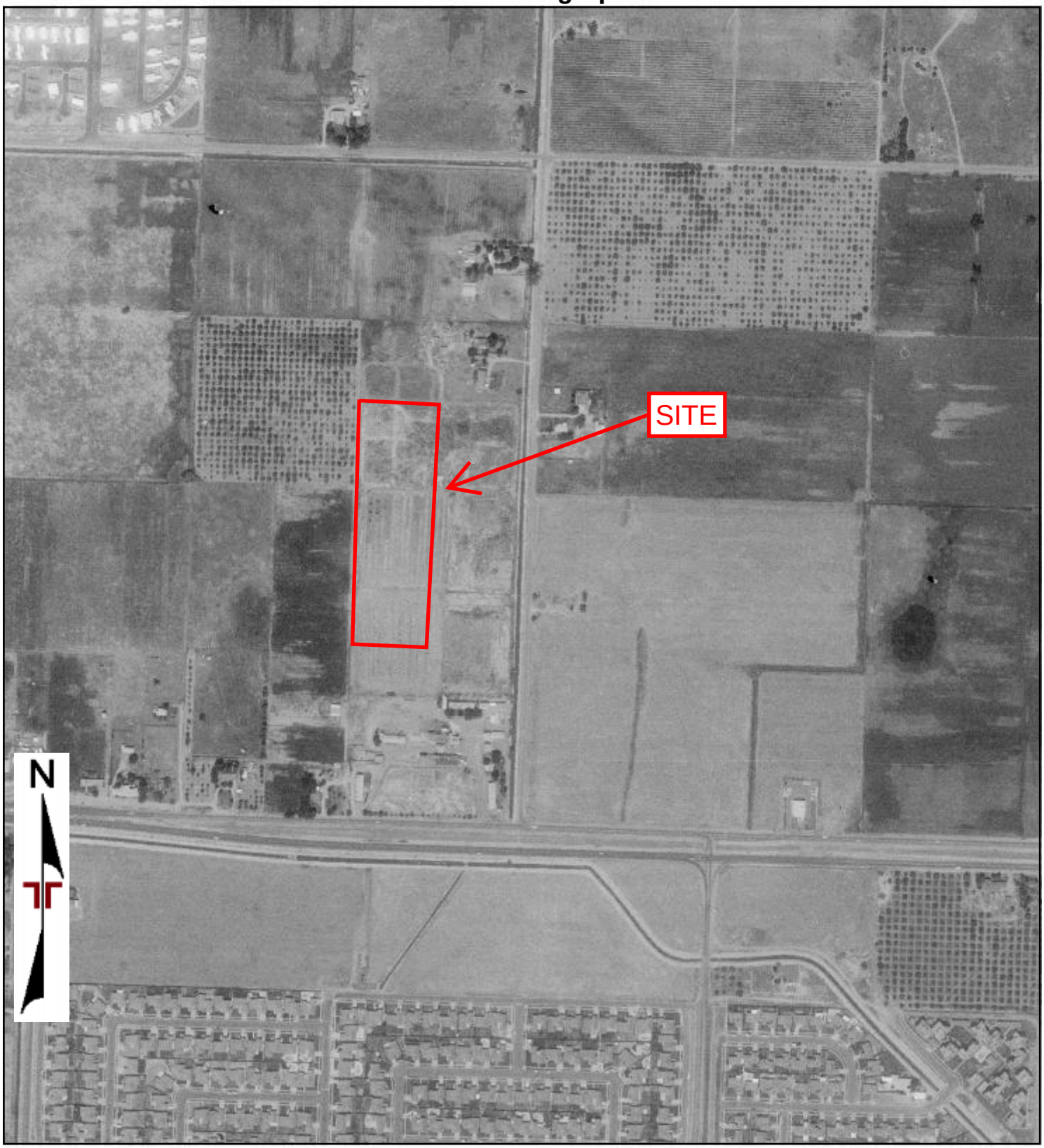
0 Feet 500 1000 2000

Project Manager	Project No: NB187030	Terracon 50 Goldenland Ct., #100 Sacramento, CA 95834	1984 AERIAL PHOTOGRAPH **PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA	Appendix
Drawn By:	Scale: As Shown			C
Checked By:	File Name:			
Approved By:	Date: 1984			



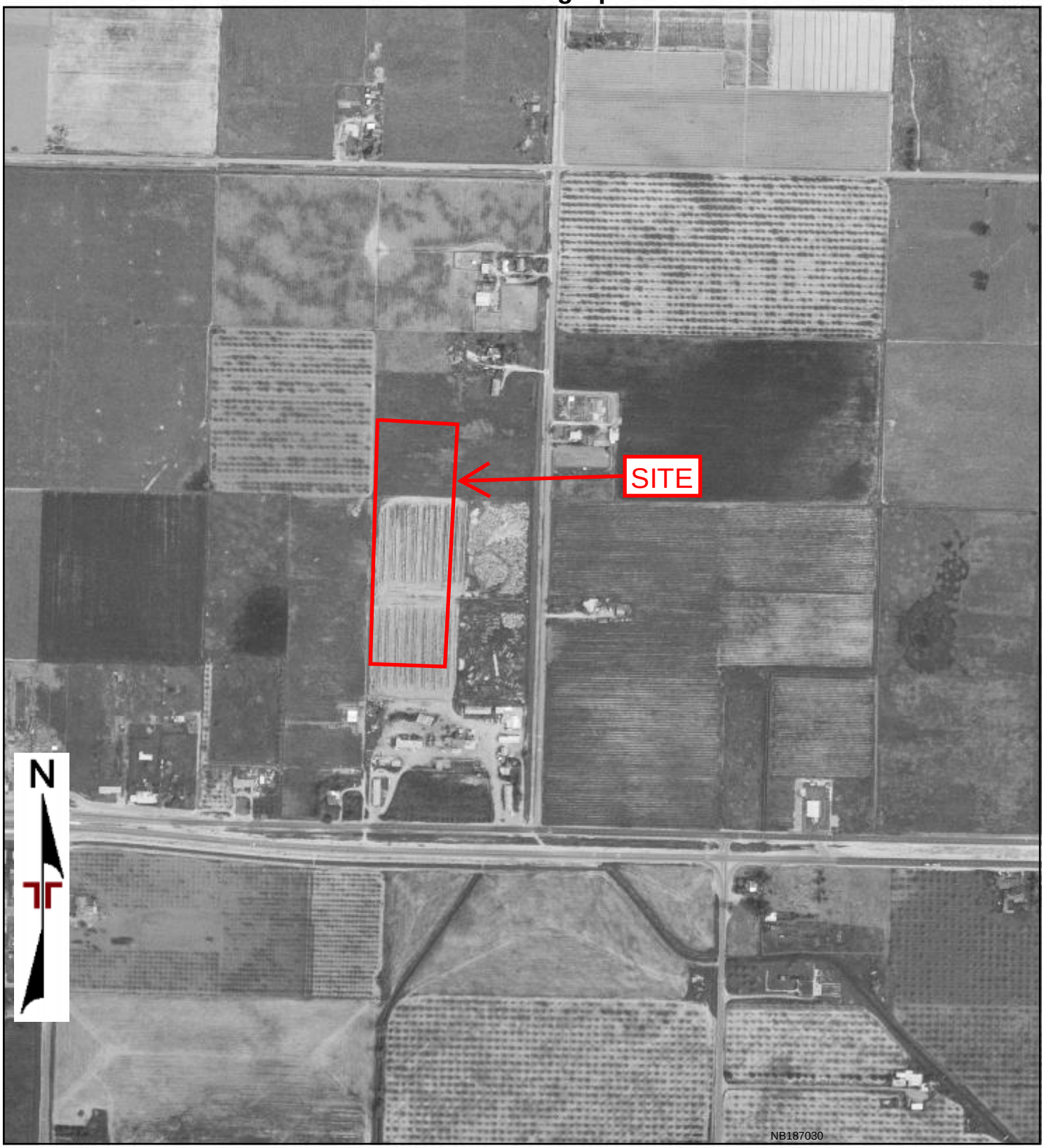
0 Feet 500 1000 2000

Project Manager	Project No: NB187030	Terracon 50 Goldenland Ct., #100 Sacramento, CA 95834	1979 AERIAL PHOTOGRAPH **PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA	Appendix
Drawn By:	Scale: As Shown			C
Checked By:	File Name:			
Approved By:	Date: 1979			



0 Feet 500 1000 2000

Project Manager	Project No: NB187030	Terracon 50 Goldenland Ct., #100 Sacramento, CA 95834	1973 AERIAL PHOTOGRAPH **PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA	Appendix
Drawn By:	Scale: As Shown			C
Checked By:	File Name:			
Approved By:	Date: 1973			

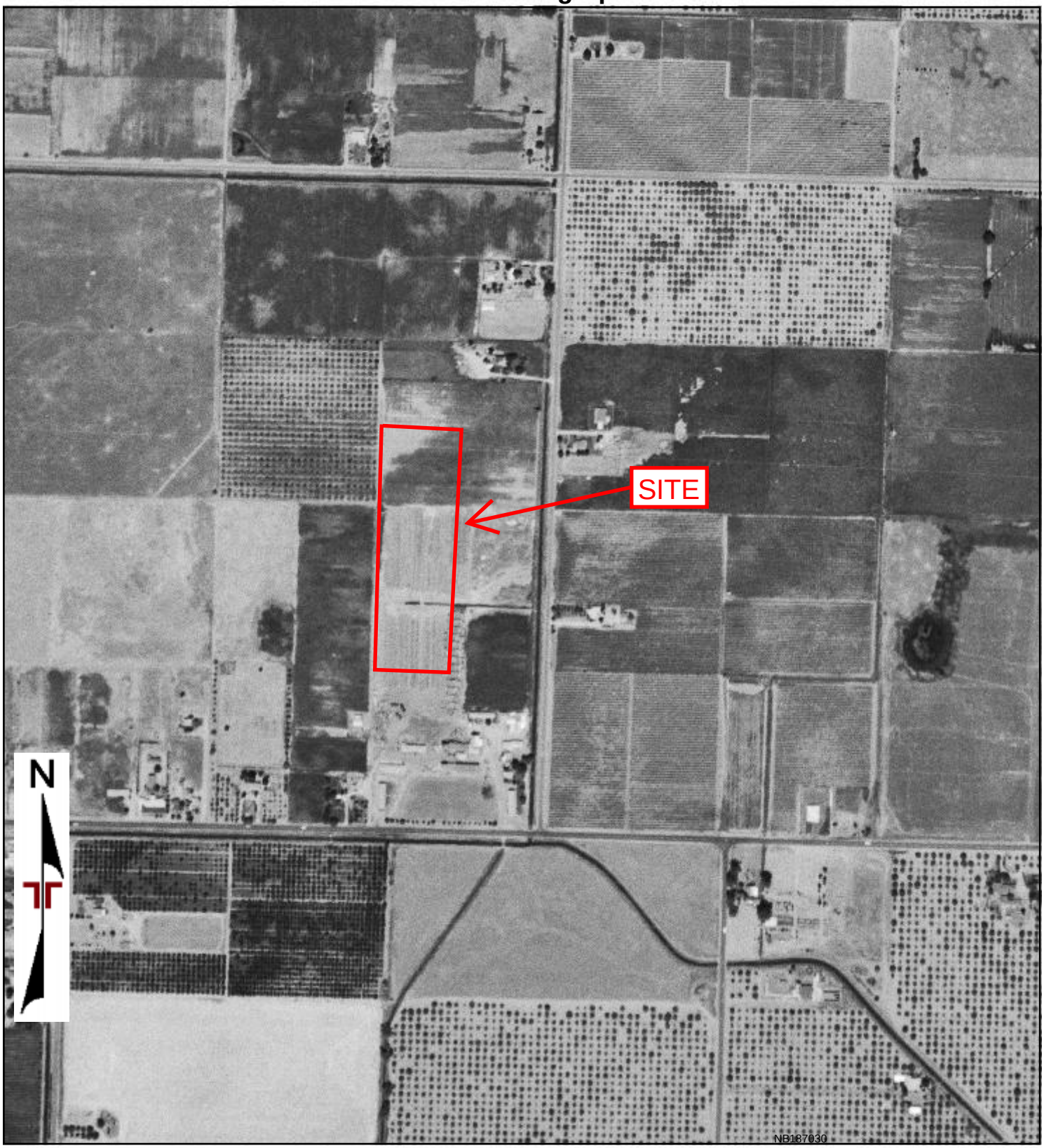


As Shown

0 Feet 500 1000 2000

50 Goldenland Ct., #100
Sacramento, CA 95834

Project Manager	Project No:	Terracon	1967 AERIAL PHOTOGRAPH
Drawn By:	Scale:		**PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA
Checked By:	File Name:		
Approved By:	Date: 1967		



As Shown

0 Feet 500 1000 2000

50 Goldenland Ct., #100
Sacramento, CA 95834

Project Manager	Project No:	Terracon	1962 AERIAL PHOTOGRAPH
Drawn By:	Scale:		**PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA
Checked By:	File Name:		
Approved By:	Date: 1962		

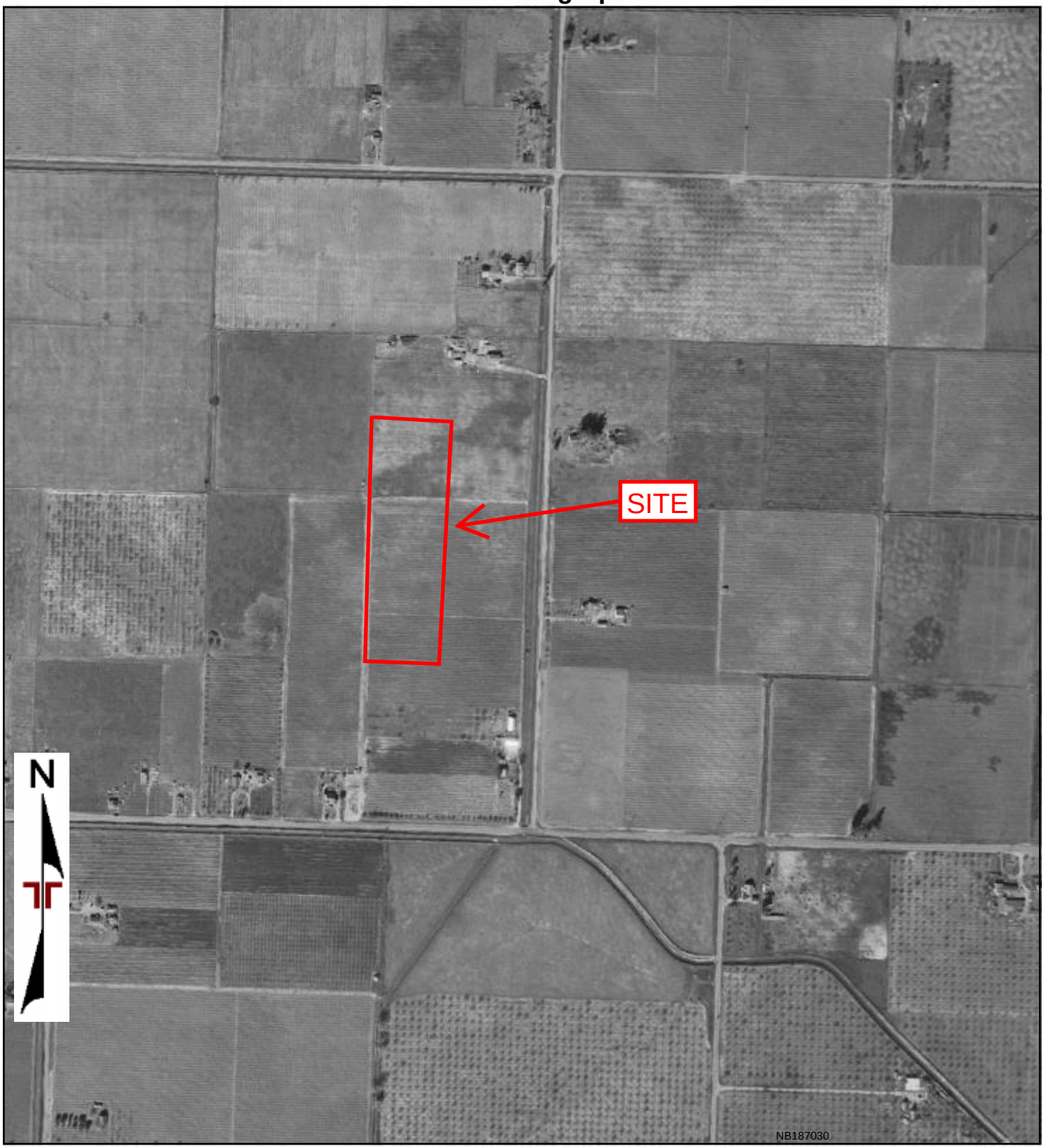


As Shown

0 Feet 500 1000 2000

50 Goldenland Ct., #100
Sacramento, CA 95834

Project Manager	Project No:	Terracon	1957 AERIAL PHOTOGRAPH
Drawn By:	Scale:		**PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA
Checked By:	File Name:		
Approved By:	Date: 1957		



As Shown

0 Feet 500 1000 2000

50 Goldenland Ct., #100
Sacramento, CA 95834

Project Manager	Project No:	Terracon	1950 AERIAL PHOTOGRAPH
Drawn By:	Scale:		**PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA
Checked By:	File Name:		
Approved By:	Date: 1950		



As Shown

0 Feet 500 1000 2000

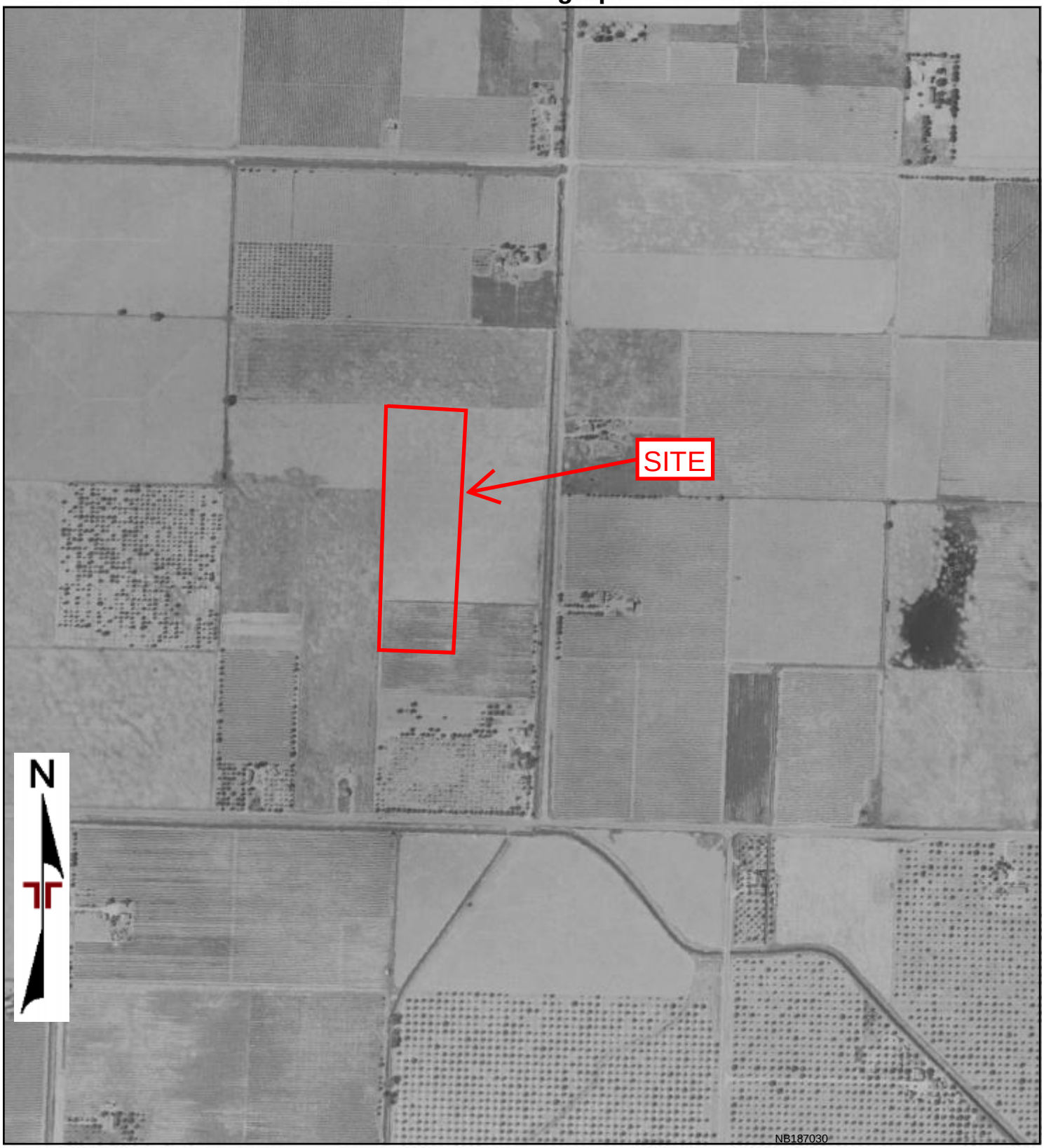
50 Goldenland Ct., #100
Sacramento, CA 95834

Project Manager	Project No:
Drawn By:	Scale:
Checked By:	File Name:
Approved By:	Date: 1946

Terracon

1946 AERIAL PHOTOGRAPH

PROPOSED KAISER FACILITY
APN 303-20-117 AND 303-20-111
FRESNO, FRESNO COUNTY, CALIFORNIA

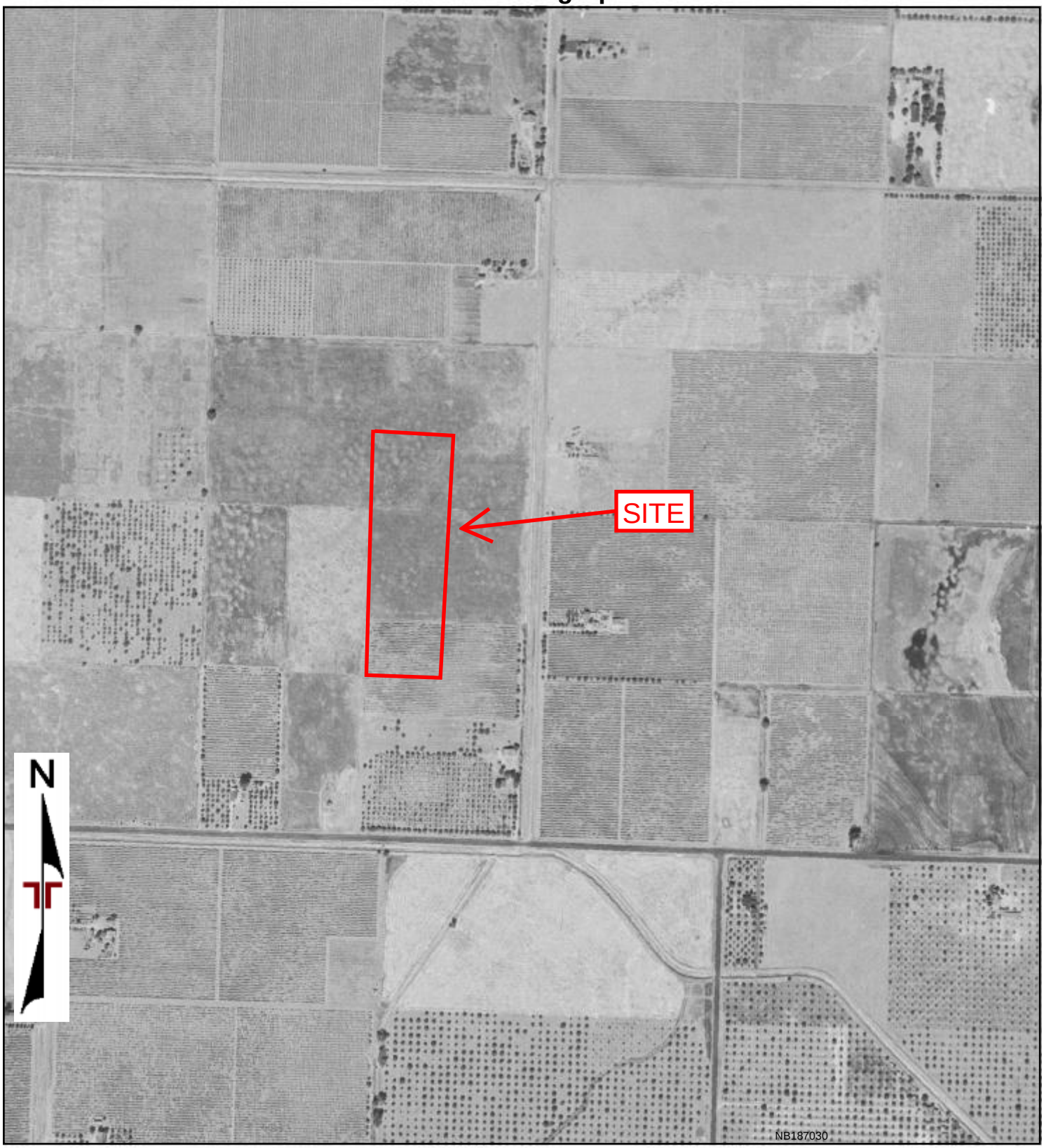


As Shown

0 Feet 500 1000 2000

50 Goldenland Ct., #100
Sacramento, CA 95834

Project Manager	Project No:	Terracon	1942 AERIAL PHOTOGRAPH
Drawn By:	Scale:		**PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA
Checked By:	File Name:		
Approved By:	Date: 1942		



As Shown

0 Feet 500 1000 2000

50 Goldenland Ct., #100
Sacramento, CA 95834

Project Manager	Project No:	Terracon	1937 AERIAL PHOTOGRAPH
Drawn By:	Scale:		**PROPOSED KAISER FACILITY** APN 303-20-117 AND 303-20-111 FRESNO, FRESNO COUNTY, CALIFORNIA
Checked By:	File Name:		
Approved By:	Date: 1937		

576 East Locust Avenue

576 East Locust Avenue

Fresno, CA 93720

Inquiry Number: 5203814.3

February 28, 2018

Certified Sanborn® Map Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

02/28/18

Site Name:

576 East Locust Avenue
576 East Locust Avenue
Fresno, CA 93720
EDR Inquiry # 5203814.3

Client Name:

Terracon
50 Goldenland Ct., #100
Sacramento, CA 95834
Contact: Megan Davey

The Sanborn Library has been searched by EDR and maps covering the target property location as provided by Terracon were identified for the years listed below. The Sanborn Library is the largest, most complete collection of fire insurance maps. The collection includes maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow, and others. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by the Sanborn Library LLC, the copyright holder for the collection. Results can be authenticated by visiting www.edrnet.com/sanborn.

The Sanborn Library is continually enhanced with newly identified map archives. This report accesses all maps in the collection as of the day this report was generated.

Certified Sanborn Results:

Certification # 11ED-4155-9CB1

PO # NA

Project NB187030

UNMAPPED PROPERTY

This report certifies that the complete holdings of the Sanborn Library, LLC collection have been searched based on client supplied target property information, and fire insurance maps covering the target property were not found.

Sanborn® Library search results

Certification #: 11ED-4155-9CB1

The Sanborn Library includes more than 1.2 million fire insurance maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow and others which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- ☑ Library of Congress
- ☑ University Publications of America
- ☑ EDR Private Collection

The Sanborn Library LLC Since 1866™

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576 East Locust Avenue
576 East Locust Avenue
Fresno, CA 93720

Inquiry Number: 5203814.5
April 10, 2018

The EDR-City Directory Abstract

Environmental Data Resources Inc

6 Armstrong Road
Shelton, CT 06484
800.352.0050
www.edrnet.com

TABLE OF CONTENTS

SECTION

Executive Summary

Findings

City Directory Images

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

DESCRIPTION

Environmental Data Resources, Inc.'s (EDR) City Directory Abstract is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's City Directory Abstract includes a search and abstract of available city directory data. For each address, the directory lists the name of the corresponding occupant at five year intervals.

Business directories including city, cross reference and telephone directories were reviewed, if available, at approximately five year intervals for the years spanning 1922 through 2014. This report compiles information gathered in this review by geocoding the latitude and longitude of properties identified and gathering information about properties within 1320 feet of the target property.

A summary of the information obtained is provided in the text of this report.

RECORD SOURCES

EDR's Digital Archive combines historical directory listings from sources such as Cole Information and Dun & Bradstreet. These standard sources of property information complement and enhance each other to provide a more comprehensive report.

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RESEARCH SUMMARY

The following research sources were consulted in the preparation of this report. An "X" indicates where information was identified in the source and provided in this report.

Year	Source	TP	Adjoining	Text Abstract	Source Image
2014	EDR Digital Archive	-	X	X	-
2010	EDR Digital Archive	-	X	X	-
2005	EDR Digital Archive	-	X	X	-
2002	R.L. Polk & Co Publishers	-	X	X	-
1996	R.L. Polk & Co Publishers	-	X	X	-
1990	R.L. Polk & Co Publishers	-	X	X	-
1986	R.L. Polk & Co Publishers	-	X	X	-
1980	R.L. Polk & Co Publishers	-	X	X	-
1975	R.L. Polk & Co Publishers	-	X	X	-
1970	R.L. Polk & Co Publisher	-	X	X	-
1965	R.L. Polk & Co Publisher	-	-	-	-
1962	Pacific Telephone	-	-	-	-

EXECUTIVE SUMMARY

Year	Source	TP	Adjoining	Text Abstract	Source Image
1958	R.L. Polk & Co Publishers	-	-	-	-
1952	R.L. Polk & Co Publishers	-	-	-	-
1947	R.L. Polk & Co Publishers	-	-	-	-
1942	R.L. Polk & Co Publishers	-	-	-	-
1937	R.L. Polk & Co Publishers	-	-	-	-
1932	R.L. Polk & Co Publishers	-	-	-	-
1927	R.L. Polk & Co Publishers	-	-	-	-
1922	Polk: Husted Directory Co.	-	-	-	-

EXECUTIVE SUMMARY

SELECTED ADDRESSES

The following addresses were selected by the client, for EDR to research. An "X" indicates where information was identified.

Address	*Type*	*Findings*
7301 North First Street	Client Entered	
7215 North First Street	Client Entered	
7160 North First Street	Client Entered	X
7194 North First Street	Client Entered	X
7202 North First Street	Client Entered	X
7210 North First Street	Client Entered	X
643 East Spruce Avenue	Client Entered	X
575 East Locust Avenue	Client Entered	X
7250 North First Street	Client Entered	
7280 North First Street	Client Entered	

FINDINGS

TARGET PROPERTY INFORMATION

ADDRESS

576 East Locust Avenue
Fresno, CA 93720

FINDINGS DETAIL

Target Property research detail.

FINDINGS

ADJOINING PROPERTY DETAIL

The following Adjoining Property addresses were researched for this report. Detailed findings are provided for each address.

1ST

7032 1ST

Year	Uses	Source
2002	WESTAMERICA BANK banks	R.L. Polk & Co Publishers
1996	VALLI WIDE BANK	R.L. Polk & Co Publishers

7062 1ST

Year	Uses	Source
2002	UNITED CALIFORNIA BANK banks	R.L. Polk & Co Publishers
1996	SANWA BANK CALIFORNIA	R.L. Polk & Co Publishers

7088 1ST

Year	Uses	Source
2002	LIFETIME FITNESS & REHAB CTR	R.L. Polk & Co Publishers
	eoxerciso & phys litness proe	R.L. Polk & Co Publishers
1996	FIRST	R.L. Polk & Co Publishers
	INTERSTATE BANK	R.L. Polk & Co Publishers

7160 1ST

Year	Uses	Source
2002	WASHINGTON MUTUAL banks	R.L. Polk & Co Publishers
1996	GREAT	R.L. Polk & Co Publishers
	WESTERN BANK	R.L. Polk & Co Publishers

7194 1ST

Year	Uses	Source
2002	Cochran Bobby L & Lynn	R.L. Polk & Co Publishers

7202 1ST

Year	Uses	Source
2002	Jo ynor Mary H	R.L. Polk & Co Publishers
	Joynor Dale C	R.L. Polk & Co Publishers

7210 1ST

Year	Uses	Source
2002	AFFORDABLE CASH REGISTER	R.L. Polk & Co Publishers

FINDINGS

Year	Uses	Source
2002	Hawkins Milton W & Jane 1 B+ A	R.L. Polk & Co Publishers
	N 1ST ST	R.L. Polk & Co Publishers
	SVC cash rogisters & supl	R.L. Polk & Co Publishers

7227 1ST

Year	Uses	Source
2002	Abandeh Mahmoud A 3 A	R.L. Polk & Co Publishers

7228 1ST

Year	Uses	Source
2002	Romero Cristino 1 El A	R.L. Polk & Co Publishers
	Romero Julia E	R.L. Polk & Co Publishers

7236 1ST

Year	Uses	Source
2002	Pearson Eva J 31 A	R.L. Polk & Co Publishers

7240 1ST

Year	Uses	Source
2002	Not Verified	R.L. Polk & Co Publishers
1996	Toler Robert	R.L. Polk & Co Publishers

7255 1ST

Year	Uses	Source
2002	PREMIER VALLEY FOODS INC food products & mfrs	R.L. Polk & Co Publishers

7259 1ST

Year	Uses	Source
2002	101 WATHEN CASTANOS building contractors	R.L. Polk & Co Publishers

7265 1ST

Year	Uses	Source
2002	CONCENTRA MEDICAL CTR	R.L. Polk & Co Publishers
	workmens compensation consult	R.L. Polk & Co Publishers

7266 1ST

Year	Uses	Source
2002	Mosher Jessica A 183+ A	R.L. Polk & Co Publishers

FINDINGS

E Birch Ave

646 E Birch Ave

Year	Uses	Source
2010	PARTY PLANNERS	EDR Digital Archive
	PARTY PLANNERS	EDR Digital Archive

E BIRCH AVE

646 E BIRCH AVE

Year	Uses	Source
2002	Hernandez Andrew D E 1+ A	R.L. Polk & Co Publishers
1990	Hernandex Andrew D	R.L. Polk & Co Publishers
1986	Hernandez Andrew D	R.L. Polk & Co Publishers

647 E BIRCH AVE

Year	Uses	Source
2002	Roby Herbert I & Diane 81+ A	R.L. Polk & Co Publishers
1996	Roby Herbert	R.L. Polk & Co Publishers
1990	Roby Herbert	R.L. Polk & Co Publishers
1986	Dungy David C	R.L. Polk & Co Publishers

659 E BIRCH AVE

Year	Uses	Source
2002	Penner Nicholas J	R.L. Polk & Co Publishers
	Penner Debbie L 81+ A	R.L. Polk & Co Publishers
1990	Penner Randall M	R.L. Polk & Co Publishers
1986	Martinez Al	R.L. Polk & Co Publishers

660 E BIRCH AVE

Year	Uses	Source
2002	Etcheverry Katherin A 81 A	R.L. Polk & Co Publishers
	Etcheverry Mandy	R.L. Polk & Co Publishers
1990	Evans Richd	R.L. Polk & Co Publishers
1986	Evans Richd	R.L. Polk & Co Publishers

667 E BIRCH AVE

Year	Uses	Source
2002	OHara Mike & Cynthia 1 A	R.L. Polk & Co Publishers
1990	Baxter Bill	R.L. Polk & Co Publishers
1986	Pitta Glenn H	R.L. Polk & Co Publishers

FINDINGS

672 E BIRCH AVE

Year	Uses	Source
2002	Wunderlich James K & Barbara 81+ A	R.L. Polk & Co Publishers
1996	Wunderlich James K	R.L. Polk & Co Publishers
1990	Wunderlich James K	R.L. Polk & Co Publishers
1986	Wunderlich James K	R.L. Polk & Co Publishers

E Birch Ave

679 E Birch Ave

Year	Uses	Source
2005	EAST FRESNO ROTARY CHARITY	EDR Digital Archive
	EAST FRESNO ROTARY CHARITY	EDR Digital Archive

E BIRCH AVE

679 E BIRCH AVE

Year	Uses	Source
2002	Oldershaw Kenneth P & Alice 81+ A	R.L. Polk & Co Publishers
1990	Oldershaw Kenneth P	R.L. Polk & Co Publishers
1986	Oldershaw Kenneth P	R.L. Polk & Co Publishers

680 E BIRCH AVE

Year	Uses	Source
2002	Char Kton Charles A & Deborah	R.L. Polk & Co Publishers
1990	Hill Mich I P	R.L. Polk & Co Publishers
1986	Litmans Roger	R.L. Polk & Co Publishers

E Birch Ave

691 E Birch Ave

Year	Uses	Source
2010	SOYSCENTS	EDR Digital Archive
	SOYSCENTS	EDR Digital Archive

E BIRCH AVE

691 E BIRCH AVE

Year	Uses	Source
2002	Klinge Matthew I 81 A	R.L. Polk & Co Publishers
	Klinge Joseph	R.L. Polk & Co Publishers

Year	Uses	Source
1990	Johnson Richd D	R.L. Polk & Co Publishers
1986	Johnson Richd Dl	R.L. Polk & Co Publishers

692 E BIRCH AVE

Year	Uses	Source
2002	Doerksen Allen F	R.L. Polk & Co Publishers
1996	Doerksen Allen	R.L. Polk & Co Publishers
1990	Doerksen Allen	R.L. Polk & Co Publishers
1986	Doerksen Allen	R.L. Polk & Co Publishers

E Birch Ave

703 E Birch Ave

Year	Uses	Source
2014	KATHY COOMBS RAYMOND COOMBS	EDR Digital Archive
	KATHY COOMBS RAYMOND COOMBS	EDR Digital Archive

747 E Birch Ave

Year	Uses	Source
2014	STEALTH SMOKE LLC	EDR Digital Archive
	STEALTH SMOKE LLC	EDR Digital Archive

757 E Birch Ave

Year	Uses	Source
2014	SIMPLY STATED	EDR Digital Archive
	SIMPLY STATED	EDR Digital Archive
2010	SIMPLY STATED	EDR Digital Archive
	SIMPLY STATED	EDR Digital Archive

765 E Birch Ave

Year	Uses	Source
2010	HOLIDAY HANDYMAN	EDR Digital Archive
	GRAHAM JAMES	EDR Digital Archive
	HOLIDAY HANDYMAN	EDR Digital Archive
	GRAHAM JAMES	EDR Digital Archive
2005	GRAHAM JAMES	EDR Digital Archive
	GRAHAM JAMES	EDR Digital Archive

773 E Birch Ave

Year	Uses	Source
2014	DORN MANAGEMENT LLC	EDR Digital Archive

Year	Uses	Source
2014	DORN MANAGEMENT LLC	EDR Digital Archive
2010	DORN MANAGEMENT LLC	EDR Digital Archive
	DORN MANAGEMENT LLC	EDR Digital Archive

786 E Birch Ave

Year	Uses	Source
2005	CREATIVE RESOURCE MANAGEMENT	EDR Digital Archive
	CREATIVE RESOURCE MANAGEMENT	EDR Digital Archive

E HERNDON AVE

401 E HERNDON AVE

Year	Uses	Source
2002	PEARSON THOMAS R OD optometrists od	R.L. Polk & Co Publishers
	MAXWELL W ANDREW MD	R.L. Polk & Co Publishers
	HARMON MICHAEL G OD optometrists od	R.L. Polk & Co Publishers
	FRIEDMAN LARRY H OD optometrists od	R.L. Polk & Co Publishers
	physicians & surgeons I	R.L. Polk & Co Publishers
	CHRISTENSEN BRIAN T OD optometrists od	R.L. Polk & Co Publishers
	DILL GERALD OD optometrists od	R.L. Polk & Co Publishers
	FOGG GARY R MD	R.L. Polk & Co Publishers
	physicians & surgeons	R.L. Polk & Co Publishers
	FOGG MAXWELL & LANIER	R.L. Polk & Co Publishers
	EYE CARE physicians & surgeons	R.L. Polk & Co Publishers
	FOGG STEVEN G MD	R.L. Polk & Co Publishers
	physicians & surgeons	R.L. Polk & Co Publishers

440 E HERNDON AVE

Year	Uses	Source
1986	No Return	R.L. Polk & Co Publishers
1980	Cams Eldon A	R.L. Polk & Co Publishers
1975	Cams Eldon A	R.L. Polk & Co Publishers
1970	Camrns Eldon A	R.L. Polk & Co Publisher

449 E HERNDON AVE

Year	Uses	Source
2002	physicians & surgeons	R.L. Polk & Co Publishers
	YOUNG HOWARD Y MD	R.L. Polk & Co Publishers

FINDINGS

Year	Uses	Source
2002	SAN JOAQUIN RADIOLOGICAL	R.L. Polk & Co Publishers
	SHISHMANIAN LEO N MD	R.L. Polk & Co Publishers
	physicians & surgeons	R.L. Polk & Co Publishers
	SHUSTER DAVID N MD physicians & surgeons	R.L. Polk & Co Publishers
	SICKLE CELL PROGRAM	R.L. Polk & Co Publishers
	physicians & surgeons	R.L. Polk & Co Publishers
	SIMPSON PRESTON MD	R.L. Polk & Co Publishers
	physicians & surgeons	R.L. Polk & Co Publishers
	SISTERS OF THE HOLY CROSS	R.L. Polk & Co Publishers
	convents & monasterie S	R.L. Polk & Co Publishers
	SPENCER TODD D MD physicians & surgeons	R.L. Polk & Co Publishers
	E HERNDON AVE	R.L. Polk & Co Publishers
	STOBBE DANIEL MD physicians & surgeons	R.L. Polk & Co Publishers
	TLC CAFE cafes	R.L. Polk & Co Publishers
	TSCHANG TAI PO MD physicians & surgeons	R.L. Polk & Co Publishers

451 E HERNDON AVE

Year	Uses	Source
1990	Jimbos	R.L. Polk & Co Publishers
	Clovis Hi Tech	R.L. Polk & Co Publishers

462 E HERNDON AVE

Year	Uses	Source
1986	Vacant	R.L. Polk & Co Publishers
1980	Kirby Kenneth	R.L. Polk & Co Publishers
1975	Kirby Kenneth	R.L. Polk & Co Publishers
1970	Bessant Art	R.L. Polk & Co Publisher

470 E HERNDON AVE

Year	Uses	Source
2002	TPG CONSULTING INC engineers transportation	R.L. Polk & Co Publishers
	JACK RILEY DEVELOPMENT real estate developers	R.L. Polk & Co Publishers
	SIERRA PACIFIC DEVELOPMENT	R.L. Polk & Co Publishers
	INC real estate developers	R.L. Polk & Co Publishers
1996	BARLOCKER	R.L. Polk & Co Publishers
	INSURANCE SVC	R.L. Polk & Co Publishers

FINDINGS

Year	Uses	Source
1996	BRUCE D BICKEL	R.L. Polk & Co Publishers
	INTERMEC CORP	R.L. Polk & Co Publishers
	OREN & OREN INC	R.L. Polk & Co Publishers
	PEARCE CORP	R.L. Polk & Co Publishers
	R J TRAVEL ASSOC	R.L. Polk & Co Publishers
	WIGINTON	R.L. Polk & Co Publishers
	PROPERTIES	R.L. Polk & Co Publishers
	Antenucci Richard	R.L. Polk & Co Publishers
	Blckel Bruce D	R.L. Polk & Co Publishers
	Oren Donaid E	R.L. Polk & Co Publishers
1990	Miller David cpa Sherwood Lehman Inc	R.L. Polk & Co Publishers
	Gilmore & Hancock Iwyrs	R.L. Polk & Co Publishers
	Gordon Dean B Iwyr	R.L. Polk & Co Publishers
	Triti Jas F Iwyr	R.L. Polk & Co Publishers
	Bateman Eichler Hill Richards Inc stocks & bends	R.L. Polk & Co Publishers
	Wiginton Real Estate Inc	R.L. Polk & Co Publishers
1980	Green Acres Landscaping	R.L. Polk & Co Publishers
1975	Vacant	R.L. Polk & Co Publishers
1970	Gentry Brice	R.L. Polk & Co Publisher

491 E HERNDON AVE

Year	Uses	Source
1990	Derrels Mini Stge	R.L. Polk & Co Publishers

510 E HERNDON AVE

Year	Uses	Source
1980	No Return	R.L. Polk & Co Publishers
1975	Cousins Dennis L	R.L. Polk & Co Publishers
1970	Cousins Dennis L	R.L. Polk & Co Publisher

568 E HERNDON AVE

Year	Uses	Source
1980	No Return	R.L. Polk & Co Publishers
1975	Simons E D	R.L. Polk & Co Publishers
1970	Hooper Chester W	R.L. Polk & Co Publisher

572 E HERNDON AVE

Year	Uses	Source
1975	Villalobos Wm	R.L. Polk & Co Publishers

FINDINGS

Year	Uses	Source
1975	Warren Louise	R.L. Polk & Co Publishers
	Palido Paul	R.L. Polk & Co Publishers
	Verdot Mary	R.L. Polk & Co Publishers
	Taylor Gwynn	R.L. Polk & Co Publishers
	Tillman Robt	R.L. Polk & Co Publishers
	Goodwin L	R.L. Polk & Co Publishers
	Lopez C	R.L. Polk & Co Publishers
	Phillips Bill	R.L. Polk & Co Publishers
	Baragas M	R.L. Polk & Co Publishers
	Medina F	R.L. Polk & Co Publishers
	Vacant	R.L. Polk & Co Publishers
	Overstreet Paul	R.L. Polk & Co Publishers
	Lugon Jose	R.L. Polk & Co Publishers
	De Borde Dennis	R.L. Polk & Co Publishers
	Vacant	R.L. Polk & Co Publishers
	Vacant	R.L. Polk & Co Publishers
	Hill Dorothy	R.L. Polk & Co Publishers
1970	A B C Bedding Co mattress mfrs	R.L. Polk & Co Publisher
	Powers Cotton Gin	R.L. Polk & Co Publisher
	San Francisco Cotton Co cotton gin	R.L. Polk & Co Publisher
	Wilmoth Margt E Mrs	R.L. Polk & Co Publisher
	Pillow Ray	R.L. Polk & Co Publisher
	Vacant	R.L. Polk & Co Publisher
	Rawrot Rickey	R.L. Polk & Co Publisher
	Turner Hugh	R.L. Polk & Co Publisher
	Walker Sandy	R.L. Polk & Co Publisher
	Hernandy Dani	R.L. Polk & Co Publisher
	Rowan Betty	R.L. Polk & Co Publisher
	Bustamonte Nasiro	R.L. Polk & Co Publisher
	Vacant	R.L. Polk & Co Publisher
	Vacant	R.L. Polk & Co Publisher
	ONeal Gloria	R.L. Polk & Co Publisher
	Wilson Jim	R.L. Polk & Co Publisher
	Sacora Ramero	R.L. Polk & Co Publisher
	Talley Alf F	R.L. Polk & Co Publisher
	Vacant	R.L. Polk & Co Publisher
	Staton Joane	R.L. Polk & Co Publisher
	Christensen Bette	R.L. Polk & Co Publisher

FINDINGS

579 E HERNDON AVE

Year	Uses	Source
1990	Valley Stairway Inc iron fixtures	R.L. Polk & Co Publishers

681 E HERNDON AVE

Year	Uses	Source
1990	No Return	R.L. Polk & Co Publishers

E Herndon Ave

1021 E Herndon Ave

Year	Uses	Source
2014	OAKHURST HEIGHTS II A CALIF L	EDR Digital Archive
	SUNFIT INC	EDR Digital Archive
	ASAI PHARMS LLC	EDR Digital Archive
	SHWEKS MEDIA	EDR Digital Archive
	OAKHURST HEIGHTS II A CALIF L	EDR Digital Archive
	SUNFIT INC	EDR Digital Archive
	ASAI PHARMS LLC	EDR Digital Archive
	SHWEKS MEDIA	EDR Digital Archive
2010	OAKHURST HEIGHTS II A CALIF L	EDR Digital Archive
	BARCUS TERI	EDR Digital Archive
	ASAI PHARMS LLC	EDR Digital Archive
	KWIK KOPY PRINTING 330	EDR Digital Archive
	OAKHURST HEIGHTS II A CALIF L	EDR Digital Archive
	BARCUS TERI	EDR Digital Archive
	ASAI PHARMS LLC	EDR Digital Archive
	KWIK KOPY PRINTING 330	EDR Digital Archive
2005	KWIK KOPY PRINTING 330	EDR Digital Archive
	NEW CARE PHARMACY INC	EDR Digital Archive
	ATCHLEY RON	EDR Digital Archive
	FISHER RAY PHARMACY INC	EDR Digital Archive
	KWIK KOPY PRINTING 330	EDR Digital Archive
	NEW CARE PHARMACY INC	EDR Digital Archive
	ATCHLEY RON	EDR Digital Archive
	FISHER RAY PHARMACY INC	EDR Digital Archive

1025 E Herndon Ave

Year	Uses	Source
2014	VILLAGE DELI	EDR Digital Archive

FINDINGS

Year	Uses	Source
2014	PHOENICIAN GARDEN	EDR Digital Archive
	VILLAGE LIQUORS & DELI	EDR Digital Archive
	VILLAGE DELI	EDR Digital Archive
	PHOENICIAN GARDEN	EDR Digital Archive
	VILLAGE LIQUORS & DELI	EDR Digital Archive
2010	VILLAGE LIQUORS & DELI	EDR Digital Archive
	VILLAGE DELI	EDR Digital Archive
	PHOENICIAN GARDEN	EDR Digital Archive
	BECKYS COUNTRY RESTAURANT	EDR Digital Archive
	VILLAGE LIQUORS & DELI	EDR Digital Archive
	VILLAGE DELI	EDR Digital Archive
	PHOENICIAN GARDEN	EDR Digital Archive
	BECKYS COUNTRY RESTAURANT	EDR Digital Archive
2005	BECKYS COUNTRY RESTAURANT	EDR Digital Archive
	PHOENICIAN GARDEN	EDR Digital Archive
	VILLAGE LIQUORS & DELI	EDR Digital Archive
	BECKYS COUNTRY RESTAURANT	EDR Digital Archive
	PHOENICIAN GARDEN	EDR Digital Archive
	VILLAGE LIQUORS & DELI	EDR Digital Archive

1040 E Herndon Ave

Year	Uses	Source
2014	PREMIER WINDOW COVERINGS	EDR Digital Archive
	HOUSE REPRESENTATIVES US	EDR Digital Archive
	NATIONAL INSUR INSPTN SVCS INC	EDR Digital Archive
	TREVINO EDWARD A DDS	EDR Digital Archive
	FRESNO ASPEN DEV A CAL L	EDR Digital Archive
	HEARING SERVICES & CONSULTANTS	EDR Digital Archive
	PACIFIC DENTAL IMAGING	EDR Digital Archive
	COBBLSTONE LAND ACQUISITION LP	EDR Digital Archive
	FRESNO-MADERA MEDICAL SOCIETY	EDR Digital Archive
	PREMIER WINDOW COVERINGS	EDR Digital Archive
	HOUSE REPRESENTATIVES US	EDR Digital Archive
	NATIONAL INSUR INSPTN SVCS INC	EDR Digital Archive
	TREVINO EDWARD A DDS	EDR Digital Archive
	FRESNO ASPEN DEV A CAL L	EDR Digital Archive
	HEARING SERVICES & CONSULTANTS	EDR Digital Archive
	PACIFIC DENTAL IMAGING	EDR Digital Archive
	COBBLSTONE LAND ACQUISITION LP	EDR Digital Archive

FINDINGS

Year	Uses	Source
2014	FRESNO-MADERA MEDICAL SOCIETY	EDR Digital Archive
2010	CALIFRNIA TRNSPLANT DNOR NTWRK	EDR Digital Archive
	MILESTONE ACQUISITIONS LLC	EDR Digital Archive
	CARDINAL INVESTMENTS LP	EDR Digital Archive
	COBBLESTONE LAND ACQUISITION	EDR Digital Archive
	HEARING SERVICES & CONSULTANTS	EDR Digital Archive
	FRESNO ASPEN DEV A CAL L	EDR Digital Archive
	EGO SHIRO DDS INC	EDR Digital Archive
	1040 E HERNDON PARTNERS A CAL	EDR Digital Archive
	HEALTH CARE SERVICES CAL DEPT	EDR Digital Archive
	HOUSE REPRESENTATIVES US	EDR Digital Archive
	WORKMAN BROS DEVELOPMENT CO	EDR Digital Archive
	UNITED THERAPY NETWORK	EDR Digital Archive
	CALIFRNIA TRNSPLANT DNOR NTWRK	EDR Digital Archive
	MILESTONE ACQUISITIONS LLC	EDR Digital Archive
	CARDINAL INVESTMENTS LP	EDR Digital Archive
	COBBLESTONE LAND ACQUISITION	EDR Digital Archive
	HEARING SERVICES & CONSULTANTS	EDR Digital Archive
	FRESNO ASPEN DEV A CAL L	EDR Digital Archive
	EGO SHIRO DDS INC	EDR Digital Archive
	1040 E HERNDON PARTNERS A CAL	EDR Digital Archive
	HEALTH CARE SERVICES CAL DEPT	EDR Digital Archive
	HOUSE REPRESENTATIVES US	EDR Digital Archive
	WORKMAN BROS DEVELOPMENT CO	EDR Digital Archive
	UNITED THERAPY NETWORK	EDR Digital Archive
2005	WORKMAN BROS DEVELOPMENT CO	EDR Digital Archive
	FRESNO ASPEN DEV A CAL L	EDR Digital Archive
	VILLAGIO EAST 6225 LLC	EDR Digital Archive
	1040 E HERNDON PARTNERS A CAL	EDR Digital Archive
	CALIFRNIA TRNSPLANT DNOR NTWRK	EDR Digital Archive
	CAPELL JOSEPH T MD INC	EDR Digital Archive
	SHARP INSURANCE & BONDING	EDR Digital Archive
	CAL LICA INSURANCE	EDR Digital Archive
	HEARING SERVICES & CONSULTANTS	EDR Digital Archive
	COBBLESTONE LAND ACQUISITION	EDR Digital Archive
	UNITED THERAPY NETWORK	EDR Digital Archive
	HEALTH SERVICES CAL DEPT	EDR Digital Archive
	WORKMAN BROS DEVELOPMENT CO	EDR Digital Archive

FINDINGS

Year	Uses	Source
2005	FRESNO ASPEN DEV A CAL L	EDR Digital Archive
	VILLAGIO EAST 6225 LLC	EDR Digital Archive
	1040 E HERNDON PARTNERS A CAL	EDR Digital Archive
	CALIFRNIA TRNSPLANT DNOR NTWRK	EDR Digital Archive
	CAPELL JOSEPH T MD INC	EDR Digital Archive
	SHARP INSURANCE & BONDING	EDR Digital Archive
	CAL LICA INSURANCE	EDR Digital Archive
	HEARING SERVICES & CONSULTANTS	EDR Digital Archive
	COBBLESTONE LAND ACQUISITION	EDR Digital Archive
	UNITED THERAPY NETWORK	EDR Digital Archive
	HEALTH SERVICES CAL DEPT	EDR Digital Archive

1044 E Herndon Ave

Year	Uses	Source
2014	CEI ENGINEERING ASSOCIATES INC	EDR Digital Archive
	CONSULTING ENGINEERS & LAND SU	EDR Digital Archive
	ARCO REALTY	EDR Digital Archive
	CEI ENGINEERING ASSOCIATES INC	EDR Digital Archive
	CONSULTING ENGINEERS & LAND SU	EDR Digital Archive
	ARCO REALTY	EDR Digital Archive
2010	ARCO REALTY	EDR Digital Archive
	GRANITE PARK KIDS FOUNDATION	EDR Digital Archive
	CEI ENGINEERING ASSOCIATES INC	EDR Digital Archive
	ARCO REALTY	EDR Digital Archive
	GRANITE PARK KIDS FOUNDATION	EDR Digital Archive
	CEI ENGINEERING ASSOCIATES INC	EDR Digital Archive
2005	JANZEN TAMBERI & WONG INC	EDR Digital Archive
	JANZEM TMBORI WONG ACCOUNTANCY	EDR Digital Archive
	WEED AND DODD ACCOUNTANCY INC	EDR Digital Archive
	BOYD INSURANCE	EDR Digital Archive
	GRANITE PARK KIDS FOUNDATION	EDR Digital Archive
	POIRIER BETTE A	EDR Digital Archive
	AMHERST FINANCIAL SERVICES	EDR Digital Archive
	JANZEN TAMBERI & WONG INC	EDR Digital Archive
	JANZEM TMBORI WONG ACCOUNTANCY	EDR Digital Archive
	WEED AND DODD ACCOUNTANCY INC	EDR Digital Archive
	BOYD INSURANCE	EDR Digital Archive
	GRANITE PARK KIDS FOUNDATION	EDR Digital Archive

FINDINGS

Year	Uses	Source
2005	POIRIER BETTE A	EDR Digital Archive
	AMHERST FINANCIAL SERVICES	EDR Digital Archive

1050 E Herndon Ave

Year	Uses	Source
2014	SOARES ANA M	EDR Digital Archive
	TERBAK ENTERPRISES	EDR Digital Archive
	PHALANX CAPITAL MANAGEMENT INC	EDR Digital Archive
	KRAEVAN PRODUCTIONS	EDR Digital Archive
	D & T ELECTRIC	EDR Digital Archive
	SOARES ANA M	EDR Digital Archive
	TERBAK ENTERPRISES	EDR Digital Archive
	PHALANX CAPITAL MANAGEMENT INC	EDR Digital Archive
	KRAEVAN PRODUCTIONS	EDR Digital Archive
	D & T ELECTRIC	EDR Digital Archive
2010	D & T ELECTRIC	EDR Digital Archive
	SAMS & ASSOCIATES	EDR Digital Archive
	LOVE ORGANICS	EDR Digital Archive
	KRAEVAN PRODUCTIONS	EDR Digital Archive
	PHALANX CAPITAL MANAGEMENT INC	EDR Digital Archive
	CHARTON ANDRE L	EDR Digital Archive
	TERBAK ENTERPRISES	EDR Digital Archive
	JP SAFETY TRAINING INC	EDR Digital Archive
	TIFANIS BY DESIGN	EDR Digital Archive
	CONCENTRIC RESOURCES	EDR Digital Archive
	COLUNGA ENTERPRISES	EDR Digital Archive
	JP SAFETY TRAINING INC	EDR Digital Archive
	D & T ELECTRIC	EDR Digital Archive
	SAMS & ASSOCIATES	EDR Digital Archive
	LOVE ORGANICS	EDR Digital Archive
	KRAEVAN PRODUCTIONS	EDR Digital Archive
	PHALANX CAPITAL MANAGEMENT INC	EDR Digital Archive
	CHARTON ANDRE L	EDR Digital Archive
	TERBAK ENTERPRISES	EDR Digital Archive
	JP SAFETY TRAINING INC	EDR Digital Archive
	TIFANIS BY DESIGN	EDR Digital Archive
	CONCENTRIC RESOURCES	EDR Digital Archive
	COLUNGA ENTERPRISES	EDR Digital Archive
	JP SAFETY TRAINING INC	EDR Digital Archive

FINDINGS

Year	Uses	Source
2005	CHARTON ANDRE L	EDR Digital Archive
	D & T ELECTRIC	EDR Digital Archive
	CHARTON ANDRE L	EDR Digital Archive
	D & T ELECTRIC	EDR Digital Archive

E HERNDON AVE

1055 E HERNDON AVE

Year	Uses	Source
1990	Building Pacific Sea Food restr	R.L. Polk & Co Publishers
	Vacant	R.L. Polk & Co Publishers
	B B Pepper Ladies Clo addl sp	R.L. Polk & Co Publishers
	Pepper B B Ladies Clothing	R.L. Polk & Co Publishers
	B B Pepper ofc	R.L. Polk & Co Publishers

E Locust Ave

575 E Locust Ave

Year	Uses	Source
2014	LAUGHLIN FALBO LEVY MORESI LLP	EDR Digital Archive
	CEDAR LANES INC	EDR Digital Archive
	HERBERT A CRUZ MD A PROFE	EDR Digital Archive
	WIRE IT INC	EDR Digital Archive
	INTEGRATED ADVANTAGE INC	EDR Digital Archive
	TEKTEGRITY INC	EDR Digital Archive
	PAUL E QUINN ACCOUNTANCY CORP	EDR Digital Archive
	RYAN CHRISTIE QUINN & HORN	EDR Digital Archive
	RANCHO DEL REY GOLF CLUB	EDR Digital Archive
	SOUTHLAND FINANCIAL INC	EDR Digital Archive
	MP 5	EDR Digital Archive
	ASHLAN & 99 DEVELOPMENT INC	EDR Digital Archive
	WATHEN GROUP	EDR Digital Archive
	MPC-2 A	EDR Digital Archive
	CALIFORNIA TEACHING FELLOWS FO	EDR Digital Archive
	CASSABON & ASSOCIATES LLP	EDR Digital Archive
	ME 24 AA CALIFORNIA CORP	EDR Digital Archive
	CASSABON MCILHATTON & ASSOC	EDR Digital Archive
	PRO SERVE PROCESS SERVICE LLC	EDR Digital Archive
	AMERICAN FINANCIAL GROUP	EDR Digital Archive

FINDINGS

Year	Uses	Source
2014	CTS CMPUTER TECH SOLUTIONS INC	EDR Digital Archive
	SHRUM GARY	EDR Digital Archive
	CM2 ACCOUNTING LLP	EDR Digital Archive
	RIVERPARK FINANCIAL GROUP	EDR Digital Archive
	PIGOTT & ASSOCIATES PROFESSNAL	EDR Digital Archive
	GREAT AMERICAN INSURANCE CO	EDR Digital Archive
	CREDIT BUREAU CONNECTION	EDR Digital Archive
	COSTANZO & ASSOC PROF CORP	EDR Digital Archive
	TRAINING POINT INC	EDR Digital Archive
	PIGGOTT AND ASSOCIATES	EDR Digital Archive
	D & S LEASING INC	EDR Digital Archive
	INVESTMENT OFFCES JOHN CVIGLIA	EDR Digital Archive
	WIRE IT INC	EDR Digital Archive
	INTEGRATED ADVANTAGE INC	EDR Digital Archive
	TEKTEGRITY INC	EDR Digital Archive
	PAUL E QUINN ACCOUNTANCY CORP	EDR Digital Archive
	RYAN CHRISTIE QUINN & HORN	EDR Digital Archive
	LAUGHLIN FALBO LEVY MORESI LLP	EDR Digital Archive
	CEDAR LANES INC	EDR Digital Archive
	HERBERT A CRUZ MD A PROFE	EDR Digital Archive
	RANCHO DEL REY GOLF CLUB	EDR Digital Archive
	SOUTHLAND FINANCIAL INC	EDR Digital Archive
	MP 5	EDR Digital Archive
	ASHLAN & 99 DEVELOPMENT INC	EDR Digital Archive
	WATHEN GROUP	EDR Digital Archive
	MPC-2 A	EDR Digital Archive
	CASSABON & ASSOCIATES LLP	EDR Digital Archive
	ME 24 AA CALIFORNIA CORP	EDR Digital Archive
	CASSABON MCILHATTON & ASSOC	EDR Digital Archive
	PRO SERVE PROCESS SERVICE LLC	EDR Digital Archive
	AMERICAN FINANCIAL GROUP	EDR Digital Archive
	CALIFORNIA TEACHING FELLOWS FO	EDR Digital Archive
	CTS CMPUTER TECH SOLUTIONS INC	EDR Digital Archive
	SHRUM GARY	EDR Digital Archive
	CM2 ACCOUNTING LLP	EDR Digital Archive
	RIVERPARK FINANCIAL GROUP	EDR Digital Archive
	GREAT AMERICAN INSURANCE CO	EDR Digital Archive
	CREDIT BUREAU CONNECTION	EDR Digital Archive

FINDINGS

Year	Uses	Source
2014	COSTANZO & ASSOC PROF CORP	EDR Digital Archive
	TRAINING POINT INC	EDR Digital Archive
	PIGOTT & ASSOCIATES PROFESSNAL	EDR Digital Archive
	INVESTMENT OFFCES JOHN CVIGLIA	EDR Digital Archive
	PIGGOTT AND ASSOCIATES	EDR Digital Archive
	D & S LEASING INC	EDR Digital Archive
2010	D & S LEASING INC	EDR Digital Archive
	IVS COMPUTER TECHNOLOGY	EDR Digital Archive
	AEGIS LENDING CORPORATION	EDR Digital Archive
	UNITED SALES	EDR Digital Archive
	AXIOM PARTNERS	EDR Digital Archive
	LAUGHLIN FALBO LEVY MORESI LLP	EDR Digital Archive
	HARGROVE & COSTANZO A PC	EDR Digital Archive
	AMERIPRISE FINANCIAL SVCS INC	EDR Digital Archive
	CRYSTAL TREE FRESNO LLC	EDR Digital Archive
	PARTNERS GENERAL INSURANC	EDR Digital Archive
	SHRUM GARY	EDR Digital Archive
	TW TELECOM INC	EDR Digital Archive
	NATIONAL INSPECTION SVCS INC	EDR Digital Archive
	MP 5CA CALIFORNIA CORPO	EDR Digital Archive
	ME 24 AA CALIFORNIA CORP	EDR Digital Archive
	CS ATHLETIC CLUB INC	EDR Digital Archive
	HEADLINER PLUMBING CO INC	EDR Digital Archive
	IN CARE INC	EDR Digital Archive
	MP 5	EDR Digital Archive
	ASHLAN & 99 DEVELOPMENT INC	EDR Digital Archive
	MPC-2 A	EDR Digital Archive
	RANCHO DEL REY GOLF CLUB	EDR Digital Archive
	HERBERT A CRUZ MD A PROFE	EDR Digital Archive
	CEDAR LANES INC	EDR Digital Archive
	KINGSVIEW MENTAL HEALTH	EDR Digital Archive
	KINGS VIEW CORP	EDR Digital Archive
	PAUL E QUINN ACCOUNTANCY CORP	EDR Digital Archive
	RYAN CHRISTIE QUINN & HORN	EDR Digital Archive
	INTEGRATED ADVANTAGE INC	EDR Digital Archive
	WIRE IT INC	EDR Digital Archive
	JOE BLAKE INC	EDR Digital Archive
	Q ENTERTAINMENT INC	EDR Digital Archive

FINDINGS

Year	Uses	Source
2010	BEARING SALES CO & SUBSIDIARIE	EDR Digital Archive
	AXIOM PARTNERS	EDR Digital Archive
	D & S LEASING INC	EDR Digital Archive
	IVS COMPUTER TECHNOLOGY	EDR Digital Archive
	AEGIS LENDING CORPORATION	EDR Digital Archive
	UNITED SALES	EDR Digital Archive
	AMERIPRISE FINANCIAL SVCS INC	EDR Digital Archive
	CRYSTAL TREE FRESNO LLC	EDR Digital Archive
	PARTNERS GENERAL INSURANC	EDR Digital Archive
	HARGROVE & COSTANZO A PC	EDR Digital Archive
	LAUGHLIN FALBO LEVY MORESI LLP	EDR Digital Archive
	SHRUM GARY	EDR Digital Archive
	TW TELECOM INC	EDR Digital Archive
	MP 5CA CALIFORNIA CORPO	EDR Digital Archive
	ME 24 AA CALIFORNIA CORP	EDR Digital Archive
	CS ATHLETIC CLUB INC	EDR Digital Archive
	NATIONAL INSPECTION SVCS INC	EDR Digital Archive
	HEADLINER PLUMBING CO INC	EDR Digital Archive
	IN CARE INC	EDR Digital Archive
	MP 5	EDR Digital Archive
	ASHLAN & 99 DEVELOPMENT INC	EDR Digital Archive
	MPC-2 A	EDR Digital Archive
	RANCHO DEL REY GOLF CLUB	EDR Digital Archive
	PAUL E QUINN ACCOUNTANCY CORP	EDR Digital Archive
	RYAN CHRISTIE QUINN & HORN	EDR Digital Archive
	INTEGRATED ADVANTAGE INC	EDR Digital Archive
	WIRE IT INC	EDR Digital Archive
	JOE BLAKE INC	EDR Digital Archive
	Q ENTERTAINMENT INC	EDR Digital Archive
	BEARING SALES CO & SUBSIDIARIE	EDR Digital Archive
	HERBERT A CRUZ MD A PROFE	EDR Digital Archive
	CEDAR LANES INC	EDR Digital Archive
	KINGSVIEW MENTAL HEALTH	EDR Digital Archive
	KINGS VIEW CORP	EDR Digital Archive
2005	KINGS VIEW CORP	EDR Digital Archive
	JAMES HORN CONSTRUCTION CO	EDR Digital Archive
	RLA CONSTRUCTION INC A CORP	EDR Digital Archive
	LEGEND OF JAKE MCCAIN LLC	EDR Digital Archive

FINDINGS

Year	Uses	Source
2005	TAC MORNINGWOOD PARTNERSHI	EDR Digital Archive
	NO MINIMUM INC	EDR Digital Archive
	BLAKE JOE INC	EDR Digital Archive
	YOSEMITE MOTOR SPEEDWAY INC	EDR Digital Archive
	INTEGRATED ADVANTAGE INC	EDR Digital Archive
	PATRICK J HORN	EDR Digital Archive
	RYAN CHRISTIE QUINN & HORN	EDR Digital Archive
	THOMAS J RYAN ACCOUNTANCY CORP	EDR Digital Archive
	PAUL E QUINN ACCOUNTANCY CORP	EDR Digital Archive
	WATHEN SPALDING G	EDR Digital Archive
	IN CARE INC	EDR Digital Archive
	ECI COMMUNICATIONS INC	EDR Digital Archive
	PENNY NEWMAN GRAIN CO	EDR Digital Archive
	MADEM LLC	EDR Digital Archive
	ATZLAN RESTAURANT INC	EDR Digital Archive
	VANDALAY INVESTMENTS	EDR Digital Archive
	STEVE J MAGALLANES CHIROPRACTI	EDR Digital Archive
	M ORTEGA PROPERTIES LLC	EDR Digital Archive
	NAJIMIAN PROPERTIES INC	EDR Digital Archive
	BEE BEST FOODMART INC	EDR Digital Archive
	ROBERT G GLMORE A PROF LAW COR	EDR Digital Archive
	HANCOCK WILLIAM F JR A PROFSN	EDR Digital Archive
	CNC BEAUTY SUPPLY INC	EDR Digital Archive
	ME 24 AA CALIFORNIA CORP	EDR Digital Archive
	MP 5CA CALIFORNIA CORPO	EDR Digital Archive
	R INGRAM III INC	EDR Digital Archive
	GARNER SINTON INC	EDR Digital Archive
	ZUL & SHANA CO INC	EDR Digital Archive
	REWA INC	EDR Digital Archive
	SIKANDER INC	EDR Digital Archive
	TIME WARNER TELECOM INC	EDR Digital Archive
	SHRUM GARY	EDR Digital Archive
	LAUGHLIN FALBO LEVY MORESI LLP	EDR Digital Archive
	TRI COUNTY	EDR Digital Archive
	RILEY RICH CONSTRUCTION	EDR Digital Archive
	ZENITH INSURANCE COMPANY	EDR Digital Archive
	HNC INSURANCE SOLUTIONS INC	EDR Digital Archive
	CHERNOW & LIEB	EDR Digital Archive

FINDINGS

Year	Uses	Source
2005	PARTNERS GENERAL INSURANC	EDR Digital Archive
	CRYSTAL TREE FRESNO LLC	EDR Digital Archive
	SERENO AT DRY CREEK HOMEOWNERS	EDR Digital Archive
	AMERIPRISE FINANCIAL SVCS INC	EDR Digital Archive
	UNITD SALES	EDR Digital Archive
	WILLIAMS ZARRELL	EDR Digital Archive
	CLOVIS CAR WASH & AUTO CENTER	EDR Digital Archive
	D & S LEASING	EDR Digital Archive
	MENDOCINO AUTO SALES & REPAIR	EDR Digital Archive
	AEGIS MORTGAGE CORPORATION	EDR Digital Archive
	JAMES HORN CONSTRUCTION CO	EDR Digital Archive
	RLA CONSTRUCTION INC A CORP	EDR Digital Archive
	LEGEND OF JAKE MCCAIN LLC	EDR Digital Archive
	TAC MORNINGWOOD PARTNERSHI	EDR Digital Archive
	NO MINIMUM INC	EDR Digital Archive
	BLAKE JOE INC	EDR Digital Archive
	YOSEMITE MOTOR SPEEDWAY INC	EDR Digital Archive
	INTEGRATED ADVANTAGE INC	EDR Digital Archive
	PATRICK J HORN	EDR Digital Archive
	RYAN CHRISTIE QUINN & HORN	EDR Digital Archive
	THOMAS J RYAN ACCOUNTANCY CORP	EDR Digital Archive
	PAUL E QUINN ACCOUNTANCY CORP	EDR Digital Archive
	KINGS VIEW CORP	EDR Digital Archive
	WATHEN SPALDING G	EDR Digital Archive
	IN CARE INC	EDR Digital Archive
	ECI COMMUNICATIONS INC	EDR Digital Archive
	ATZLAN RESTAURANT INC	EDR Digital Archive
	VANDALAY INVESTMENTS	EDR Digital Archive
	STEVE J MAGALLANES CHIROPRACTI	EDR Digital Archive
	M ORTEGA PROPERTIES LLC	EDR Digital Archive
	NAJIMIAN PROPERTIES INC	EDR Digital Archive
	BEE BEST FOODMART INC	EDR Digital Archive
	ROBERT G GLMORE A PROF LAW COR	EDR Digital Archive
	HANCOCK WILLIAM F JR A PROFSN	EDR Digital Archive
	CNC BEAUTY SUPPLY INC	EDR Digital Archive
	ME 24 AA CALIFORNIA CORP	EDR Digital Archive
	MP 5CA CALIFORNIA CORPO	EDR Digital Archive

FINDINGS

Year	Uses	Source
2005	R INGRAM III INC	EDR Digital Archive
	GARNER SINTON INC	EDR Digital Archive
	ZUL & SHANA CO INC	EDR Digital Archive
	REWA INC	EDR Digital Archive
	SIKANDER INC	EDR Digital Archive
	PENNY NEWMAN GRAIN CO	EDR Digital Archive
	MADEM LLC	EDR Digital Archive
	TIME WARNER TELECOM INC	EDR Digital Archive
	SHRUM GARY	EDR Digital Archive
	TRI COUNTY	EDR Digital Archive
	ZENITH INSURANCE COMPANY	EDR Digital Archive
	HNC INSURANCE SOLUTIONS INC	EDR Digital Archive
	CHERNOW & LIEB	EDR Digital Archive
	PARTNERS GENERAL INSURANC	EDR Digital Archive
	CRYSTAL TREE FRESNO LLC	EDR Digital Archive
	SERENO AT DRY CREEK HOMEOWNERS	EDR Digital Archive
	AMERIPRISE FINANCIAL SVCS INC	EDR Digital Archive
	RILEY RICH CONSTRUCTION	EDR Digital Archive
	LAUGHLIN FALBO LEVY MORESI LLP	EDR Digital Archive
	UNITD SALES	EDR Digital Archive
	WILLIAMS ZARRELL	EDR Digital Archive
	CLOVIS CAR WASH & AUTO CENTER	EDR Digital Archive
	D & S LEASING	EDR Digital Archive
	MENDOCINO AUTO SALES & REPAIR	EDR Digital Archive
	AEGIS MORTGAGE CORPORATION	EDR Digital Archive

E LOCUST AVE

575 E LOCUST AVE

Year	Uses	Source
2002	LDDS WORLDCOM	R.L. Polk & Co Publishers
	TIME WARNER TELECOM	R.L. Polk & Co Publishers
	telephone companies	R.L. Polk & Co Publishers
1996	ALLSTAR FINANCIAL SVC	R.L. Polk & Co Publishers
	CHERNOW & LIEB	R.L. Polk & Co Publishers
	DIGITAL	R.L. Polk & Co Publishers
	EQUIPMENT CORP	R.L. Polk & Co Publishers
	GEORGESON	R.L. Polk & Co Publishers

FINDINGS

Year	Uses	Source
1996	BELARDINELLI L	R.L. Polk & Co Publishers
	GILMORE & HANCOCK	R.L. Polk & Co Publishers
	GROWERS PRODUCE	R.L. Polk & Co Publishers
	MARTIN LINGER & CO	R.L. Polk & Co Publishers
	PENNY	R.L. Polk & Co Publishers
	NEWMAN GRAIN CO	R.L. Polk & Co Publishers
	PHYSICIANS	R.L. Polk & Co Publishers
	BILLING SVC	R.L. Polk & Co Publishers
	RYAN CHRISTIE	R.L. Polk & Co Publishers
	QUINN PROVOST	R.L. Polk & Co Publishers
	SALES KING INTL	R.L. Polk & Co Publishers
	SOUTHLAND	R.L. Polk & Co Publishers
	FINANCIAL SVC 2928 C	R.L. Polk & Co Publishers
	WATHEN	R.L. Polk & Co Publishers
	CASTANOS	R.L. Polk & Co Publishers
	WESTERN	R.L. Polk & Co Publishers
	TEMPORARY SVC	R.L. Polk & Co Publishers
	ZENITH	R.L. Polk & Co Publishers
	INSURANCE CO	R.L. Polk & Co Publishers
	Baker Kenneth S	R.L. Polk & Co Publishers
	Brocks Michael J	R.L. Polk & Co Publishers
	Chavez Donna R	R.L. Polk & Co Publishers
	Christie Joey M	R.L. Polk & Co Publishers
	Elier Frank 0	R.L. Polk & Co Publishers
	Glmore Robert G	R.L. Polk & Co Publishers
	E LOCUST AVE contd	R.L. Polk & Co Publishers
	Hancock William F	R.L. Polk & Co Publishers
	Hill Gary J I	R.L. Polk & Co Publishers
	Horn Patrick	R.L. Polk & Co Publishers
	Linger Robert L	R.L. Polk & Co Publishers
	Martin Ronald S	R.L. Polk & Co Publishers
	Peterson Jim L	R.L. Polk & Co Publishers
	Prcvosl Andre P	R.L. Polk & Co Publishers
	Quinn Paul E	R.L. Polk & Co Publishers
	Ryan Joseph A	R.L. Polk & Co Publishers
	Ryan Thomas J	R.L. Polk & Co Publishers
	Sa Hes Michael S	R.L. Polk & Co Publishers
	Shrum Gary	R.L. Polk & Co Publishers

FINDINGS

Year	Uses	Source
1996	Walders Art	R.L. Polk & Co Publishers
	Wong Diana J	R.L. Polk & Co Publishers

E Locust Ave

723 E Locust Ave

Year	Uses	Source
2014	CARO EVELYN	EDR Digital Archive
	WALKER GROUP	EDR Digital Archive
	FORTUNE GROUP INC	EDR Digital Archive
	COMPREHENSIVE FINANCIAL	EDR Digital Archive
	PAUL GESTIC	EDR Digital Archive
	AMIN SADEGHI DMD INC	EDR Digital Archive
	CARO EVELYN	EDR Digital Archive
	WALKER GROUP	EDR Digital Archive
	FORTUNE GROUP INC	EDR Digital Archive
	COMPREHENSIVE FINANCIAL	EDR Digital Archive
	PAUL GESTIC	EDR Digital Archive
	AMIN SADEGHI DMD INC	EDR Digital Archive
2010	PAUL GESTIC	EDR Digital Archive
	FORTUNE GROUP INC	EDR Digital Archive
	ORTHO TECH INTERNATIONAL INC	EDR Digital Archive
	SOCAL TXTLES IMPORT EXPORT INC	EDR Digital Archive
	COMPREHENSIVE FINANCIAL	EDR Digital Archive
	GILLIS ENTERPRISES INC	EDR Digital Archive
	VAHDAT INC	EDR Digital Archive
	CARO EVELYN	EDR Digital Archive
	KINGS CANYON PACKING SHED	EDR Digital Archive
	M D RESOURCES INC	EDR Digital Archive
	ASH & GIST ACCOUNTANCY CORP	EDR Digital Archive
	MUSICK CREEK TRACT ASSOCIATION	EDR Digital Archive
	PAUL GESTIC	EDR Digital Archive
	FORTUNE GROUP INC	EDR Digital Archive
	ORTHO TECH INTERNATIONAL INC	EDR Digital Archive
	SOCAL TXTLES IMPORT EXPORT INC	EDR Digital Archive
	COMPREHENSIVE FINANCIAL	EDR Digital Archive
	GILLIS ENTERPRISES INC	EDR Digital Archive
	CARO EVELYN	EDR Digital Archive
	VAHDAT INC	EDR Digital Archive

Year	Uses	Source
2010	KINGS CANYON PACKING SHED	EDR Digital Archive
	M D RESOURCES INC	EDR Digital Archive
	ASH & GIST ACCOUNTANCY CORP	EDR Digital Archive
	MUSICK CREEK TRACT ASSOCIATION	EDR Digital Archive
2005	ASH & GIST ACCOUNTANCY CORP	EDR Digital Archive
	M D RESOURCES INC	EDR Digital Archive
	FRESNO COUNCIL OF THE NAVY	EDR Digital Archive
	VAHDAT INC	EDR Digital Archive
	KAZAD INC	EDR Digital Archive
	TATU INNA VADA INC	EDR Digital Archive
	CARO EVELYN	EDR Digital Archive
	ASH & GIST ACCOUNTANCY CORP	EDR Digital Archive
	M D RESOURCES INC	EDR Digital Archive
	FRESNO COUNCIL OF THE NAVY	EDR Digital Archive
	CARO EVELYN	EDR Digital Archive
	VAHDAT INC	EDR Digital Archive
	KAZAD INC	EDR Digital Archive
	TATU INNA VADA INC	EDR Digital Archive

E LOCUST AVE

723 E LOCUST AVE

Year	Uses	Source
2002	117 M D RESOURCES INC	R.L. Polk & Co Publishers
	business mgmt consultants	R.L. Polk & Co Publishers
1996	ASH & GIST	R.L. Polk & Co Publishers
	BEVERLY JONES	R.L. Polk & Co Publishers
	CRAIG A	R.L. Polk & Co Publishers
	BOONE CPA	R.L. Polk & Co Publishers
	EVELYN B	R.L. Polk & Co Publishers
	AQUINO CARO MD	R.L. Polk & Co Publishers
	FLINT	R.L. Polk & Co Publishers
	PISTORESI & CO	R.L. Polk & Co Publishers
	LUSK LAW OFFICES	R.L. Polk & Co Publishers
	RESOURCE	R.L. Polk & Co Publishers
	MANAGEMENT GRP	R.L. Polk & Co Publishers
	Aquinocaro Evelyn B	R.L. Polk & Co Publishers
	Ash David E	R.L. Polk & Co Publishers
	Boone Craig A	R.L. Polk & Co Publishers

FINDINGS

Year	Uses	Source
1996	Fint A D	R.L. Polk & Co Publishers
	Gist Lowell 3006 C	R.L. Polk & Co Publishers
	Lusk Martha U 3006 C	R.L. Polk & Co Publishers
	Pisloresi Michael S	R.L. Polk & Co Publishers
1990	Building	R.L. Polk & Co Publishers
	State Farm Insurance Co	R.L. Polk & Co Publishers
	Ash David E Accountancy Corp	R.L. Polk & Co Publishers
	Vacant	R.L. Polk & Co Publishers
	Vacant	R.L. Polk & Co Publishers
	Vacant	R.L. Polk & Co Publishers
	Vacant	R.L. Polk & Co Publishers
1986	Monsanto Agricultural Products Co	R.L. Polk & Co Publishers
	Financial Advisory Associates	R.L. Polk & Co Publishers
	Ash David E Accountancy Corp	R.L. Polk & Co Publishers

E Locust Ave

745 E Locust Ave

Year	Uses	Source
2014	CORNERSTONE AMERICA	EDR Digital Archive
	NAT ASSISTANCE INC	EDR Digital Archive
	MASJID FRESNO ISLAMIC CENTER	EDR Digital Archive
	FRANK SALVIO ALLSTATE INSUR	EDR Digital Archive
	GRIFFITH FINANCIAL & INSURANCE	EDR Digital Archive
	P K B INVESTMENTS INC	EDR Digital Archive
	CASTILLO INSURANCE AGENCY	EDR Digital Archive
	PARSONS SUZANNE MIKELL DC	EDR Digital Archive
	INSPHERE INSURANCE SOLUTIONS	EDR Digital Archive
	NATURAL PATH HEALTH CTR	EDR Digital Archive
	FRANK SALVIO ALLSTATE INSUR	EDR Digital Archive
	NAT ASSISTANCE INC	EDR Digital Archive
	MASJID FRESNO ISLAMIC CENTER	EDR Digital Archive
	CORNERSTONE AMERICA	EDR Digital Archive
	GRIFFITH FINANCIAL & INSURANCE	EDR Digital Archive
	NATURAL PATH HEALTH CTR	EDR Digital Archive
	P K B INVESTMENTS INC	EDR Digital Archive
	CASTILLO INSURANCE AGENCY	EDR Digital Archive
	PARSONS SUZANNE MIKELL DC	EDR Digital Archive
	INSPHERE INSURANCE SOLUTIONS	EDR Digital Archive

FINDINGS

Year	Uses	Source
2010	PARSONS SUZANNE MIKELL DC	EDR Digital Archive
	INSPHERE INSURANCE SOLUTIONS	EDR Digital Archive
	SAFARI SENSORY INTERGRATION &	EDR Digital Archive
	CASTILLO INSURANCE AGENCY	EDR Digital Archive
	NATURAL PATH HEALTH CTR	EDR Digital Archive
	GRIFFITH FINANCIAL & INSURANCE	EDR Digital Archive
	LAW OFFCES SFIAN SLOMON DAWOOD	EDR Digital Archive
	TELECOM CONSULTANTS INC	EDR Digital Archive
	NATURAL PATH HEALTH CTR	EDR Digital Archive
	PARSONS SUZANNE MIKELL DC	EDR Digital Archive
	INSPHERE INSURANCE SOLUTIONS	EDR Digital Archive
	SAFARI SENSORY INTERGRATION &	EDR Digital Archive
	CASTILLO INSURANCE AGENCY	EDR Digital Archive
	GRIFFITH FINANCIAL & INSURANCE	EDR Digital Archive
	TELECOM CONSULTANTS INC	EDR Digital Archive
	LAW OFFCES SFIAN SLOMON DAWOOD	EDR Digital Archive
2005	CITY VANTAGE	EDR Digital Archive
	NOLTE ASSOC IN	EDR Digital Archive
	CITIZENS BUSINESS BANK	EDR Digital Archive
	TELECOM CONSULTANTS INC	EDR Digital Archive
	GRIFFITH FINANCIAL & INSURANCE	EDR Digital Archive
	CASTILLO INSURANCE AGENCY	EDR Digital Archive
	PACIFIC CHOICE SPECIALTY FOODS	EDR Digital Archive
	MEDCALF ADVISORY SERVICES	EDR Digital Archive
	QUICK & REILLY INC	EDR Digital Archive
	TELECOM CONSULTANTS INC	EDR Digital Archive
	CITY VANTAGE	EDR Digital Archive
	NOLTE ASSOC IN	EDR Digital Archive
	CITIZENS BUSINESS BANK	EDR Digital Archive
	GRIFFITH FINANCIAL & INSURANCE	EDR Digital Archive
	QUICK & REILLY INC	EDR Digital Archive
	CASTILLO INSURANCE AGENCY	EDR Digital Archive
	PACIFIC CHOICE SPECIALTY FOODS	EDR Digital Archive
	MEDCALF ADVISORY SERVICES	EDR Digital Archive

FINDINGS

E LOCUST AVE

745 E LOCUST AVE

Year	Uses	Source
2002	GRIFFITH FINANCIAL	R.L. Polk & Co Publishers
	INSURANCE insurance I I	R.L. Polk & Co Publishers
	FARMERS INSURANCE GROUP insurance	R.L. Polk & Co Publishers
1996	Gregorski Eugene	R.L. Polk & Co Publishers
	Eversole Cala	R.L. Polk & Co Publishers
	Collins Donald	R.L. Polk & Co Publishers
	TRAVEL SHOPPE	R.L. Polk & Co Publishers
	REILLY INC	R.L. Polk & Co Publishers
	QUICK	R.L. Polk & Co Publishers
	CIA 3000 C	R.L. Polk & Co Publishers
	FUNDING CORP 3000 C	R.L. Polk & Co Publishers
	CENTURION	R.L. Polk & Co Publishers
	CARPET LTD	R.L. Polk & Co Publishers
	BOGGS & SONS	R.L. Polk & Co Publishers
	ALLSTATE INSURANCE	R.L. Polk & Co Publishers
1990	Yelinek Insurance Marketing	R.L. Polk & Co Publishers
	Dilling & Deutinger Attorneys At Law	R.L. Polk & Co Publishers
	Independent Computer Center	R.L. Polk & Co Publishers
	Bogga & Sons Carpet	R.L. Polk & Co Publishers
	Qualls & Wetnight ins	R.L. Polk & Co Publishers
	American Home Care	R.L. Polk & Co Publishers
	Building	R.L. Polk & Co Publishers
1986	American Temporary Servs	R.L. Polk & Co Publishers

E Locust Ave

761 E Locust Ave

Year	Uses	Source
2014	CHANDLER STUART R	EDR Digital Archive
	CASA BLANCA HSNG PTNRS	EDR Digital Archive
	SIMONIAN JEWELERS	EDR Digital Archive
	ELITECARE MEDICAL STAFFING LLC	EDR Digital Archive
	SIERRA PACIFIC GROUP A CAL LTD	EDR Digital Archive
	SIMONIAN JEWELERS	EDR Digital Archive
	CHANDLER STUART R	EDR Digital Archive

FINDINGS

Year	Uses	Source
2014	ELITECARE MEDICAL STAFFING LLC	EDR Digital Archive
	SIERRA PACIFIC GROUP A CAL LTD	EDR Digital Archive
	CASA BLANCA HSNG PTNRS	EDR Digital Archive
2010	CASA BLANCA HSNG PTNRS	EDR Digital Archive
	SIERRA PACIFIC GROUP A CAL LTD	EDR Digital Archive
	ELITECARE MEDICAL STAFFING LLC	EDR Digital Archive
	CHANDLER STUART R	EDR Digital Archive
	A ABOGADO	EDR Digital Archive
	SIMONIAN JEWELERS	EDR Digital Archive
	SIERRA PACIFIC GROUP A CAL LTD	EDR Digital Archive
	ELITECARE MEDICAL STAFFING LLC	EDR Digital Archive
	SIMONIAN JEWELERS	EDR Digital Archive
	CASA BLANCA HSNG PTNRS	EDR Digital Archive
	CHANDLER STUART R	EDR Digital Archive
	A ABOGADO	EDR Digital Archive
2005	ELITECARE MEDICAL STAFFING LLC	EDR Digital Archive
	INTERNTNAL DRVING TRAFFIC SCHL	EDR Digital Archive
	SIERRA PACIFIC GROUP A CAL LTD	EDR Digital Archive
	INTERNTNAL DRVING TRAFFIC SCHL	EDR Digital Archive
	ELITECARE MEDICAL STAFFING LLC	EDR Digital Archive
	SIERRA PACIFIC GROUP A CAL LTD	EDR Digital Archive

E Minarets Ave

632 E Minarets Ave

Year	Uses	Source
2014	TRUJILLO INTERPRETING SERVICES	EDR Digital Archive
	TRUJILLO INTERPRETING SERVICES	EDR Digital Archive
2010	TRUJILLO INTERPRETING SERVICES	EDR Digital Archive
	TRUJILLO INTERPRETING SERVICES	EDR Digital Archive
2005	TRUJILLO INTERPRETING SERVICES	EDR Digital Archive
	TRUJILLO INTERPRETING SERVICES	EDR Digital Archive

E MINARETS AVE

632 E MINARETS AVE

Year	Uses	Source
2002	Trujillo Cesar 811 A	R.L. Polk & Co Publishers
	Trujillo Martha J	R.L. Polk & Co Publishers

Year	Uses	Source
1990	Newton James	R.L. Polk & Co Publishers
1986	Newton James W	R.L. Polk & Co Publishers

E Minarets Ave

644 E Minarets Ave

Year	Uses	Source
2005	GENESIS PARTY RENTALS	EDR Digital Archive
	GENESIS PARTY RENTALS	EDR Digital Archive

E MINARETS AVE

644 E MINARETS AVE

Year	Uses	Source
2002	b Coffman Randy A & Monica A	R.L. Polk & Co Publishers
1990	Pear son Steve	R.L. Polk & Co Publishers
1986	No Return	R.L. Polk & Co Publishers

645 E MINARETS AVE

Year	Uses	Source
2002	Kodama Joyce K 18 A	R.L. Polk & Co Publishers
	Kodama Kevin T	R.L. Polk & Co Publishers
1990	Holmes Barbara	R.L. Polk & Co Publishers
1986	Matuse Kieth A	R.L. Polk & Co Publishers

658 E MINARETS AVE

Year	Uses	Source
2002	Rios Mary A 18 A	R.L. Polk & Co Publishers
1990	Gunther J Wesley	R.L. Polk & Co Publishers
1986	Gunther J Wesley	R.L. Polk & Co Publishers

659 E MINARETS AVE

Year	Uses	Source
2002	Wanamaker Anthony D & Betty 18+ A	R.L. Polk & Co Publishers
1996	Wanamaker Tony	R.L. Polk & Co Publishers
1990	Wanamaker Tony	R.L. Polk & Co Publishers
1986	Wanemaker Tony	R.L. Polk & Co Publishers

671 E MINARETS AVE

Year	Uses	Source
2002	Nelson Jay R & Barbara 11+ A	R.L. Polk & Co Publishers

Year	Uses	Source
1990	Nelson lay R	R.L. Polk & Co Publishers
1986	Nelson Jay R	R.L. Polk & Co Publishers

E Minarets Ave

682 E Minarets Ave

Year	Uses	Source
2005	DRAGON COMPUTING	EDR Digital Archive
	DRAGON COMPUTING	EDR Digital Archive

705 E Minarets Ave

Year	Uses	Source
2005	GRANT MARK	EDR Digital Archive
	GRANT MARK	EDR Digital Archive

742 E Minarets Ave

Year	Uses	Source
2010	WILLIAM KEVIN NICKS	EDR Digital Archive
	WILLIAM KEVIN NICKS	EDR Digital Archive

767 E Minarets Ave

Year	Uses	Source
2014	KRISP ELECTRIC CO	EDR Digital Archive
	KRISP ELECTRIC CO	EDR Digital Archive

775 E Minarets Ave

Year	Uses	Source
2014	ANDREWS JANITORIAL	EDR Digital Archive
	ANDREWS JANITORIAL	EDR Digital Archive
2010	ANDREWS JANITORIAL	EDR Digital Archive
	ANDREWS JANITORIAL	EDR Digital Archive
2005	ANDREWS JANITORIAL	EDR Digital Archive
	ANDREWS JANITORIAL	EDR Digital Archive

787 E Minarets Ave

Year	Uses	Source
2014	AGSK INC	EDR Digital Archive
	AGSK INC	EDR Digital Archive

FINDINGS

E Pinedale Ave

622 E Pinedale Ave

Year	Uses	Source
2014	PHILIP BNDI IND FTNES TRAINING	EDR Digital Archive
	PHILIP BNDI IND FTNES TRAINING	EDR Digital Archive

639 E Pinedale Ave

Year	Uses	Source
2010	ADNAN HUSSAIN	EDR Digital Archive
	ADNAN HUSSAIN	EDR Digital Archive

651 E Pinedale Ave

Year	Uses	Source
2014	HOMEN M CARPET SERVICE	EDR Digital Archive
	HOMEN M CARPET SERVICE	EDR Digital Archive
2010	HOMEN M CARPET SERVICE	EDR Digital Archive
	HOMEN M CARPET SERVICE	EDR Digital Archive
2005	HOMEN M CARPET SERVICE	EDR Digital Archive
	HOMEN M CARPET SERVICE	EDR Digital Archive

663 E Pinedale Ave

Year	Uses	Source
2010	HEREDIA CONSUELO	EDR Digital Archive
	HEREDIA CONSUELO	EDR Digital Archive

703 E Pinedale Ave

Year	Uses	Source
2010	DELIGHTFUL DIFFERENCE CAT	EDR Digital Archive
	DELIGHTFUL DIFFERENCE CAT	EDR Digital Archive
2005	DELIGHTFUL DIFFERENCE CAT	EDR Digital Archive
	DELIGHTFUL DIFFERENCE CAT	EDR Digital Archive

E SPRUCE AVE

643 E SPRUCE AVE

Year	Uses	Source
2002	Cicolani George A	R.L. Polk & Co Publishers
	Cicolani Terry L 1 S A	R.L. Polk & Co Publishers
1990	Scharnick Barbar	R.L. Polk & Co Publishers
1986	Scharnick Barbar	R.L. Polk & Co Publishers

FINDINGS

Year	Uses	Source
1980	Servello Audrey Mrs	R.L. Polk & Co Publishers

656 E SPRUCE AVE

Year	Uses	Source
2002	Anderson Gerald G & Eugenia S+	R.L. Polk & Co Publishers
1990	Anderson Jerry	R.L. Polk & Co Publishers
1986	Anderson Jerry	R.L. Polk & Co Publishers
1980	Vacant	R.L. Polk & Co Publishers

657 E SPRUCE AVE

Year	Uses	Source
2002	Cuda Diana C 11+ A	R.L. Polk & Co Publishers
1990	Cuda Diana C Mrs	R.L. Polk & Co Publishers
1986	Cuda Ross	R.L. Polk & Co Publishers
1980	Cuda Ross	R.L. Polk & Co Publishers

664 E SPRUCE AVE

Year	Uses	Source
2002	Hensley Katharine	R.L. Polk & Co Publishers
	Hensley Lemuel B 9+ A	R.L. Polk & Co Publishers
1990	Hensley Lemuel B	R.L. Polk & Co Publishers
1986	Hensley Lemuel B	R.L. Polk & Co Publishers
1980	No Return	R.L. Polk & Co Publishers

671 E SPRUCE AVE

Year	Uses	Source
2002	Woodley Robert J & Margaret 8 A	R.L. Polk & Co Publishers
1990	Taylor David H	R.L. Polk & Co Publishers
1986	Taylor David M	R.L. Polk & Co Publishers
1980	Taylor David M	R.L. Polk & Co Publishers

678 E SPRUCE AVE

Year	Uses	Source
2002	Not Verified	R.L. Polk & Co Publishers
1990	Duncan Maurice P	R.L. Polk & Co Publishers
1986	Duncan Maury	R.L. Polk & Co Publishers
1980	Duncan Maury	R.L. Polk & Co Publishers

FINDINGS

683 E SPRUCE AVE

Year	Uses	Source
2002	Erickson Kendra L El	R.L. Polk & Co Publishers
	Erickson David L	R.L. Polk & Co Publishers
1990	No Return	R.L. Polk & Co Publishers
1986	Cobb Marcy	R.L. Polk & Co Publishers
1980	Rainey Robt P	R.L. Polk & Co Publishers

690 E SPRUCE AVE

Year	Uses	Source
2002	Miller Steven R	R.L. Polk & Co Publishers
1990	Craighill Cathy	R.L. Polk & Co Publishers
1986	No Return	R.L. Polk & Co Publishers
1980	Lusk John D	R.L. Polk & Co Publishers

693 E SPRUCE AVE

Year	Uses	Source
2002	Not Verified 2 Hses	R.L. Polk & Co Publishers
1990	Hill Kyle	R.L. Polk & Co Publishers
1986	Gotcher Jas M	R.L. Polk & Co Publishers
1980	Steele C Ray Jr	R.L. Polk & Co Publishers

702 E SPRUCE AVE

Year	Uses	Source
1990	Booth Ronald	R.L. Polk & Co Publishers
1986	Koltovich Wm Rev	R.L. Polk & Co Publishers
1980	Koltovich Wm Rev	R.L. Polk & Co Publishers

705 E SPRUCE AVE

Year	Uses	Source
2002	Gomez Jesus M M A	R.L. Polk & Co Publishers
	Gomez Gloria L	R.L. Polk & Co Publishers
1990	No Return	R.L. Polk & Co Publishers
1986	Advanced Carpet & Upholstery Dyer & Cleaner	R.L. Polk & Co Publishers
	Marton Janos	R.L. Polk & Co Publishers
1980	Marton Janos	R.L. Polk & Co Publishers

716 E SPRUCE AVE

Year	Uses	Source
2002	Gunter Jody R	R.L. Polk & Co Publishers

Year	Uses	Source
1996	Henk R H	R.L. Polk & Co Publishers
1990	1 enk Lloyd E	R.L. Polk & Co Publishers
1986	Henk Lloyd E	R.L. Polk & Co Publishers
1980	Henk Lloyd E	R.L. Polk & Co Publishers

719 E SPRUCE AVE

Year	Uses	Source
2002	Ledford Deborah A 121 A	R.L. Polk & Co Publishers
	Condon Peter J 11+ A	R.L. Polk & Co Publishers
1990	No Return	R.L. Polk & Co Publishers
1986	Hickson Robt	R.L. Polk & Co Publishers
1980	Ambrosini M L	R.L. Polk & Co Publishers

E Spruce Ave

743 E Spruce Ave

Year	Uses	Source
2014	LAWANSON SAMUEL A	EDR Digital Archive
	LAWANSON SAMUEL A	EDR Digital Archive
2010	LAWANSON SAMUEL A	EDR Digital Archive
	LAWANSON SAMUEL A	EDR Digital Archive
2005	LAWANSON SAMUEL A	EDR Digital Archive
	DRAPERY DOCTOR	EDR Digital Archive
	LAWANSON SAMUEL A	EDR Digital Archive
	DRAPERY DOCTOR	EDR Digital Archive

East Locust Avenue

575 East Locust Avenue

Year	Uses	Source
2002	LDDS WORLDCOM	R.L. Polk & Co Publishers
	TIME WARNER TELECOM	R.L. Polk & Co Publishers
	telephone companies	R.L. Polk & Co Publishers
1996	ALLSTAR FINANCIAL SVC	R.L. Polk & Co Publishers
	CHERNOW & LIEB	R.L. Polk & Co Publishers
	DIGITAL	R.L. Polk & Co Publishers
	EQUIPMENT CORP	R.L. Polk & Co Publishers
	GEORGESON	R.L. Polk & Co Publishers
	BELARDINELLI L	R.L. Polk & Co Publishers
	GILMORE & HANCOCK	R.L. Polk & Co Publishers

FINDINGS

Year	*Uses*	*Source*
1996	GROWERS PRODUCE	R.L. Polk & Co Publishers
	PENNY	R.L. Polk & Co Publishers
	NEWMAN GRAIN CO	R.L. Polk & Co Publishers
	PHYSICIANS	R.L. Polk & Co Publishers
	BILLING SVC	R.L. Polk & Co Publishers
	RYAN CHRISTIE	R.L. Polk & Co Publishers
	QUINN PROVOST	R.L. Polk & Co Publishers
	SALES KING INTL	R.L. Polk & Co Publishers
	SOUTHLAND	R.L. Polk & Co Publishers
	FINANCIAL SVC 2928 C	R.L. Polk & Co Publishers
	WATHEN	R.L. Polk & Co Publishers
	CASTANOS	R.L. Polk & Co Publishers
	WESTERN	R.L. Polk & Co Publishers
	TEMPORARY SVC	R.L. Polk & Co Publishers
	ZENITH	R.L. Polk & Co Publishers
	INSURANCE CO	R.L. Polk & Co Publishers
	MARTIN LINGER & CO	R.L. Polk & Co Publishers
	Baker Kenneth S	R.L. Polk & Co Publishers
	Ryan Thomas J	R.L. Polk & Co Publishers
	Linger Robert L	R.L. Polk & Co Publishers
	Brocks Michael J	R.L. Polk & Co Publishers
	Chavez Donna R	R.L. Polk & Co Publishers
	Christie Joey M	R.L. Polk & Co Publishers
	Elier Frank 0	R.L. Polk & Co Publishers
	Glmore Robert G	R.L. Polk & Co Publishers
	E LOCUST AVE contd	R.L. Polk & Co Publishers
	Hancock William F	R.L. Polk & Co Publishers
	Hill Gary J I	R.L. Polk & Co Publishers
	Horn Patrick	R.L. Polk & Co Publishers
	Martin Ronald S	R.L. Polk & Co Publishers
	Peterson Jim L	R.L. Polk & Co Publishers
	Prcvosl Andre P	R.L. Polk & Co Publishers
	Quinn Paul E	R.L. Polk & Co Publishers
	Ryan Joseph A	R.L. Polk & Co Publishers
	Sa Hes Michael S	R.L. Polk & Co Publishers
	Shrum Gary	R.L. Polk & Co Publishers
	Walders Art	R.L. Polk & Co Publishers
	Wong Diana J	R.L. Polk & Co Publishers

FINDINGS

East Spruce Avenue

643 East Spruce Avenue

Year	Uses	Source
2002	Cicolani George A	R.L. Polk & Co Publishers
	Cicolani Terry L 1 S A	R.L. Polk & Co Publishers
1990	Scharnick Barbar	R.L. Polk & Co Publishers
1986	Scharnick Barbar	R.L. Polk & Co Publishers
1980	Servello Audrey Mrs	R.L. Polk & Co Publishers

N 1st St

6767 N 1st St

Year	Uses	Source
2014	GREEN BURRITO	EDR Digital Archive
	PWM FRESNO LLC	EDR Digital Archive
	GREEN BURRITO	EDR Digital Archive
	PWM FRESNO LLC	EDR Digital Archive
2010	CARLS JR	EDR Digital Archive
	CARLS JR	EDR Digital Archive
2005	COTTEN APRIL	EDR Digital Archive
	COTTEN APRIL	EDR Digital Archive

N 1ST ST

6781 N 1ST ST

Year	Uses	Source
1975	Hi Lite Barber Salon The	R.L. Polk & Co Publishers

N 1st St

7032 N 1st St

Year	Uses	Source
2014	WESTAMERICA BANK	EDR Digital Archive
	COUNTY BANK RIVERPARK OFFICE	EDR Digital Archive
	WESTAMERICA BANK	EDR Digital Archive
	COUNTY BANK RIVERPARK OFFICE	EDR Digital Archive
2010	COUNTY BANK RIVERPARK OFFICE	EDR Digital Archive
	WESTAMERICA BANK	EDR Digital Archive
	COUNTY BANK RIVERPARK OFFICE	EDR Digital Archive
	WESTAMERICA BANK	EDR Digital Archive

Year	Uses	Source
2005	WESTAMERICA BANK	EDR Digital Archive
	WESTAMERICA BANK	EDR Digital Archive

N 1ST ST

7032 N 1ST ST

Year	Uses	Source
1990	Bank of Fresno bank & trust co	R.L. Polk & Co Publishers
1986	Bank Of Fresno comi loans	R.L. Polk & Co Publishers

7033 N 1ST ST

Year	Uses	Source
1980	Lloyds Bank Of Californ	R.L. Polk & Co Publishers

N 1st St

7062 N 1st St

Year	Uses	Source
2014	BANK OF WEST	EDR Digital Archive
	BANK OF WEST	EDR Digital Archive
2010	BANK OF WEST	EDR Digital Archive
	BANK OF WEST	EDR Digital Archive
2005	BANK OF WEST	EDR Digital Archive
	BANK OF WEST	EDR Digital Archive

N 1ST ST

7062 N 1ST ST

Year	Uses	Source
1990	Sanwa Bank bank & trust co	R.L. Polk & Co Publishers
1986	Lloyds Bank Californ	R.L. Polk & Co Publishers

N 1st St

7088 N 1st St

Year	Uses	Source
2014	WELLS FARGO BANK NATIONAL ASSN	EDR Digital Archive
	UNITED SECURITY BANK	EDR Digital Archive
	RAYMOND JAMES FINCL SVCS INC	EDR Digital Archive
	WELLS FARGO BANK NATIONAL ASSN	EDR Digital Archive
	UNITED SECURITY BANK	EDR Digital Archive

Year	Uses	Source
2014	RAYMOND JAMES FINCL SVCS INC	EDR Digital Archive
2010	RAYMOND JAMES FINANCIAL	EDR Digital Archive
	UNITED SECURITY BANK	EDR Digital Archive
	WELLS FARGO BANK NATIONAL ASSN	EDR Digital Archive
	RAYMOND JAMES FINANCIAL	EDR Digital Archive
	UNITED SECURITY BANK	EDR Digital Archive
	WELLS FARGO BANK NATIONAL ASSN	EDR Digital Archive
2005	WELLS FARGO BANK N A	EDR Digital Archive
	WELLS FARGO BANK N A	EDR Digital Archive

N 1ST ST

7088 N 1ST ST

Year	Uses	Source
1990	First Interstate Bank of Calif	R.L. Polk & Co Publishers
1986	First Interstate Bank Of California	R.L. Polk & Co Publishers
1980	United California Bank	R.L. Polk & Co Publishers

N 1st St

7110 N 1st St

Year	Uses	Source
2014	CITIZENS BUSINESS BANK	EDR Digital Archive
	CITIZENS BUSINESS BANK	EDR Digital Archive
2010	CITIZENS BUSINESS BANK	EDR Digital Archive
	CITIZENS BUSINESS BANK	EDR Digital Archive
2005	SH PROPERTIES INC	EDR Digital Archive
	SH PROPERTIES INC	EDR Digital Archive

N 1ST ST

7110 N 1ST ST

Year	Uses	Source
1990	Bank of America Nai Trust & Savings Asan	R.L. Polk & Co Publishers
1986	Bank Of America National Trust & Savings Assn	R.L. Polk & Co Publishers
1980	Bank Of Americ	R.L. Polk & Co Publishers

FINDINGS

N 1st St

7160 N 1st St

Year	Uses	Source
2014	JPMORGAN CHASE BANK NAT ASSN	EDR Digital Archive
	JPMORGAN CHASE BANK NAT ASSN	EDR Digital Archive
2010	JPMORGAN CHASE BANK NAT ASSN	EDR Digital Archive
	JPMORGAN CHASE BANK NAT ASSN	EDR Digital Archive
2005	WASHINGTON MUTUAL BANK	EDR Digital Archive
	WASHINGTON MUTUAL BANK	EDR Digital Archive

N 1ST ST

7160 N 1ST ST

Year	Uses	Source
1990	Great Western Bank	R.L. Polk & Co Publishers
1986	Great Western Savings	R.L. Polk & Co Publishers
1980	Sequoia Savings & Loan Association	R.L. Polk & Co Publishers

7194 N 1ST ST

Year	Uses	Source
1990	Cochran Bobby	R.L. Polk & Co Publishers
1986	Simone Lynn	R.L. Polk & Co Publishers
1980	Tipping John T	R.L. Polk & Co Publishers

7202 N 1ST ST

Year	Uses	Source
1990	Koch Chas D	R.L. Polk & Co Publishers
1986	Koch Charles D	R.L. Polk & Co Publishers
1980	Gregg Wm H	R.L. Polk & Co Publishers
1975	Under Constn	R.L. Polk & Co Publishers

7210 N 1ST ST

Year	Uses	Source
1990	Hawkins Melton W	R.L. Polk & Co Publishers
1986	Hawkins Melton W	R.L. Polk & Co Publishers
1980	Hawkins Melton W	R.L. Polk & Co Publishers

FINDINGS

N 1st St

7215 N 1st St

Year	Uses	Source
2014	TRENDWEST	EDR Digital Archive
	ALOHA FAMILY OPTOMETRY GROUP	EDR Digital Archive
	EAST SHAW OPTOMETRIC GROUP	EDR Digital Archive
	TRENDWEST	EDR Digital Archive
	ALOHA FAMILY OPTOMETRY GROUP	EDR Digital Archive
	EAST SHAW OPTOMETRIC GROUP	EDR Digital Archive
	IDETA RICK W OD	EDR Digital Archive
	FUNG BRYAN C DDS	EDR Digital Archive
	FUNG BRYAN C DDS	EDR Digital Archive
	IDETA RICK W OD	EDR Digital Archive
2010	ALOHA OPTIMETRICS	EDR Digital Archive
	MUNDY CRAIG R DDS	EDR Digital Archive
	MUNDY CRAIG R DDS	EDR Digital Archive
	ALOHA OPTIMETRICS	EDR Digital Archive
	EAST SHAW OPTOMETRIC GROUP	EDR Digital Archive
	ALOHA FAMILY OPTOMETRY GROUP	EDR Digital Archive
	EAST SHAW OPTOMETRIC GROUP	EDR Digital Archive
	ALOHA FAMILY OPTOMETRY GROUP	EDR Digital Archive

7225 N 1st St

Year	Uses	Source
2014	TOROSIAN & WALTER LLP	EDR Digital Archive
	TOROSIAN & WALTER LLP	EDR Digital Archive
2010	TOROSIAN & WALTER LLP	EDR Digital Archive
	TOROSIAN WALTER FINCL SVCS LLC	EDR Digital Archive
	CUMMINGS & ASSOCIATES LLC	EDR Digital Archive
	GALANTE EDWARD ELIO	EDR Digital Archive
	SUNSHINE STATE AFFORDABLE	EDR Digital Archive
	TOROSIAN & WALTER LLP	EDR Digital Archive
	TOROSIAN WALTER FINCL SVCS LLC	EDR Digital Archive
	CUMMINGS & ASSOCIATES LLC	EDR Digital Archive
	GALANTE EDWARD ELIO	EDR Digital Archive
	SUNSHINE STATE AFFORDABLE	EDR Digital Archive
2005	GALANTE EDWARD ELIO	EDR Digital Archive
	GALANTE EDWARD ELIO	EDR Digital Archive

FINDINGS

N 1ST ST

7228 N 1ST ST

Year	Uses	Source
1990	Axl Mollie Mrs	R.L. Polk & Co Publishers
1986	Ruiz Donald	R.L. Polk & Co Publishers
1980	Ruiz Donald	R.L. Polk & Co Publishers

N 1st St

7235 N 1st St

Year	Uses	Source
2014	REINTJES BYRON DDS	EDR Digital Archive
	REINTJES BYRON DDS	EDR Digital Archive
2010	REINTJES BYRON DDS	EDR Digital Archive
	REINTJES BYRON DDS	EDR Digital Archive

N 1ST ST

7236 N 1ST ST

Year	Uses	Source
1986	Pearson John L	R.L. Polk & Co Publishers
1980	Baker Earl D	R.L. Polk & Co Publishers

7240 N 1ST ST

Year	Uses	Source
1990	Toler Robt	R.L. Polk & Co Publishers
1986	Toler Robt	R.L. Polk & Co Publishers
1980	Greeley Donald J	R.L. Polk & Co Publishers

7246 N 1ST ST

Year	Uses	Source
1975	Under Constn	R.L. Polk & Co Publishers

N 1st St

7255 N 1st St

Year	Uses	Source
2014	FORWARD ADVANTAGE INC	EDR Digital Archive
	FORWARD ADVANTAGE INC	EDR Digital Archive
2010	FORWARD ADVANTAGE INC	EDR Digital Archive

FINDINGS

Year	Uses	Source
2010	LEWIS GENE	EDR Digital Archive
	WELLS FARGO HOME MORTGAGE INC	EDR Digital Archive
	PAIN	EDR Digital Archive
	FORWARD ADVANTAGE INC	EDR Digital Archive
	LEWIS GENE	EDR Digital Archive
	WELLS FARGO HOME MORTGAGE INC	EDR Digital Archive
	PAIN	EDR Digital Archive
2005	FORWARD ADVANTAGE INC	EDR Digital Archive
	FORWARD ADVANTAGE INC	EDR Digital Archive

7259 N 1st St

Year	Uses	Source
2014	BUCHANAN ESTTES TEMPERANCE INC	EDR Digital Archive
	BUCHANAN ESTTES TEMPERANCE INC	EDR Digital Archive
2010	CLOVIS TOWN AND COUNTRY V LP	EDR Digital Archive
	LMC COPPER I INC	EDR Digital Archive
	CVEC GROUP INC	EDR Digital Archive
	SERENO AT DRY CREEK INC	EDR Digital Archive
	WACAMA INC	EDR Digital Archive
	SILAXO WILLOW I LP	EDR Digital Archive
	SKYVIEW CREST LP A DELAWARE LT	EDR Digital Archive
	IVY GATE LOMA VISTA I LP A CAL	EDR Digital Archive
	HEADLINER SHOPPING CENTER LLC	EDR Digital Archive
	WATHEN- CSTANOS- MAZMANIAN INC	EDR Digital Archive
	EUROPEAN QRTER BY WTHNCASTANOS	EDR Digital Archive
	CLOVIS TOWN AND COUNTRY V LP	EDR Digital Archive
	LMC COPPER I INC	EDR Digital Archive
	CVEC GROUP INC	EDR Digital Archive
	SERENO AT DRY CREEK INC	EDR Digital Archive
	WACAMA INC	EDR Digital Archive
	SILAXO WILLOW I LP	EDR Digital Archive
	SKYVIEW CREST LP A DELAWARE LT	EDR Digital Archive
	IVY GATE LOMA VISTA I LP A CAL	EDR Digital Archive
	HEADLINER SHOPPING CENTER LLC	EDR Digital Archive
	WATHEN- CSTANOS- MAZMANIAN INC	EDR Digital Archive
	EUROPEAN QRTER BY WTHNCASTANOS	EDR Digital Archive

FINDINGS

Year	Uses	Source
2005	WATHEN-CASTANOS INC	EDR Digital Archive
	BUCHANAN ESTATES V A CAL CO	EDR Digital Archive
	SERENO AT DRY CREEK INC	EDR Digital Archive
	SILAXO WILLOW I LP	EDR Digital Archive
	ONE OLIVE TREE LP	EDR Digital Archive
	EUROPEAN BLUFFS LP	EDR Digital Archive
	HIGHLAND ASHLAN LP	EDR Digital Archive
	WACAMA INC	EDR Digital Archive
	WILCON DEVELOPMENT LP	EDR Digital Archive
	CLOVIS TOWN AND COUNTRY V LP	EDR Digital Archive
	WATHEN-CASTANOS INC	EDR Digital Archive
	BUCHANAN ESTATES V A CAL CO	EDR Digital Archive
	SERENO AT DRY CREEK INC	EDR Digital Archive
	SILAXO WILLOW I LP	EDR Digital Archive
	ONE OLIVE TREE LP	EDR Digital Archive
	EUROPEAN BLUFFS LP	EDR Digital Archive
	HIGHLAND ASHLAN LP	EDR Digital Archive
	WACAMA INC	EDR Digital Archive
	WILCON DEVELOPMENT LP	EDR Digital Archive
	CLOVIS TOWN AND COUNTRY V LP	EDR Digital Archive

7265 N 1st St

Year	Uses	Source
2014	SMITH DONALD MD	EDR Digital Archive
	CONCENTRA MEDICAL CENTERS	EDR Digital Archive
	MONTANA ANTHONY W MD	EDR Digital Archive
	CONCENTRA MEDICAL CENTERS	EDR Digital Archive
	MONTANA ANTHONY W MD	EDR Digital Archive
	SMITH DONALD MD	EDR Digital Archive
2010	VERA R EDGAR MD	EDR Digital Archive
	CONCENTRA MEDICAL CENTERS	EDR Digital Archive
	MVE INC	EDR Digital Archive
	CONCENTRA MEDICAL CENTERS	EDR Digital Archive
	VERA R EDGAR MD	EDR Digital Archive
	MVE INC	EDR Digital Archive
2005	CONCENTRA INC	EDR Digital Archive
	CONCENTRA INC	EDR Digital Archive

FINDINGS

7266 N 1st St

Year	Uses	Source
2010	OMEGA TILE	EDR Digital Archive
	OMEGA TILE	EDR Digital Archive

N 1ST ST

7266 N 1ST ST

Year	Uses	Source
1990	No Return	R.L. Polk & Co Publishers
1986	No Return	R.L. Polk & Co Publishers
1980	Brown Wm M	R.L. Polk & Co Publishers
1975	Under Constn	R.L. Polk & Co Publishers

7268 N 1ST ST

Year	Uses	Source
1975	Greeley Donald J	R.L. Polk & Co Publishers

N 1st St

7269 N 1st St

Year	Uses	Source
2014	PROFESSIONAL DENTAL CARE	EDR Digital Archive
	PROFESSIONAL DENTAL CARE	EDR Digital Archive
2010	PROFESSIONAL DENTAL CARE	EDR Digital Archive
	PROFESSIONAL DENTAL CARE	EDR Digital Archive
2005	PROFESSIONAL DENTAL CARE	EDR Digital Archive
	PROFESSIONAL DENTAL CARE	EDR Digital Archive

7275 N 1st St

Year	Uses	Source
2014	LYNCH JOSEPH	EDR Digital Archive
	LYNDOW FINANCIAL	EDR Digital Archive
	PHYS MED INC	EDR Digital Archive
	LYNCH JOSEPH	EDR Digital Archive
	LYNDOW FINANCIAL	EDR Digital Archive
	PHYS MED INC	EDR Digital Archive
2010	BARRETT BUSINESS SERVICES INC	EDR Digital Archive
	LYNDOW FINANCIAL	EDR Digital Archive
	LYNCH JOSEPH	EDR Digital Archive
	BARRETT BUSINESS SERVICES INC	EDR Digital Archive

Year	Uses	Source
2010	LYNDOW FINANCIAL	EDR Digital Archive
	LYNCH JOSEPH	EDR Digital Archive
2005	INTERCARE INSURANCE SERVICES	EDR Digital Archive
	BARRETT BUSINESS SERVICES INC	EDR Digital Archive
	INTERCARE INSURANCE SERVICES	EDR Digital Archive
	BARRETT BUSINESS SERVICES INC	EDR Digital Archive

N 1ST ST

7285 N 1ST ST

Year	Uses	Source
1986	Taco Bell	R.L. Polk & Co Publishers

N 1st St

7311 N 1st St

Year	Uses	Source
2005	KIDDIE KARE SCHOOLS INC	EDR Digital Archive
	KIDDIE KARE SCHOOLS INC	EDR Digital Archive

7335 N 1st St

Year	Uses	Source
2014	BARRY MURRAY P MD INC	EDR Digital Archive
	CALIFORNIA SKIN SPA	EDR Digital Archive
	CALIFORNIA VEIN AND LASER CTR	EDR Digital Archive
	TRAVEL MEDICAL CLINIC	EDR Digital Archive
	ZIYAR LATIF MD INC	EDR Digital Archive
	BARRY MURRAY P MD INC	EDR Digital Archive
	ZIYAR LATIF MD INC	EDR Digital Archive
	CALIFORNIA SKIN SPA	EDR Digital Archive
	CALIFORNIA VEIN AND LASER CTR	EDR Digital Archive
	TRAVEL MEDICAL CLINIC	EDR Digital Archive
2010	CALIFORNIA VEIN AND LASER CTR	EDR Digital Archive
	CALIFORNIA SKIN SPA	EDR Digital Archive
	A CONFIDENTIAL RECOVERY	EDR Digital Archive
	HOME PREFERRED	EDR Digital Archive
	ZIYAR LATIF MD INC	EDR Digital Archive
	BARRY MURRAY P MD INC	EDR Digital Archive
	GIESBRECHT MD	EDR Digital Archive
	ZIYAR LATIF MD INC	EDR Digital Archive

FINDINGS

Year	Uses	Source
2010	CALIFORNIA VEIN AND LASER CTR	EDR Digital Archive
	CALIFORNIA SKIN SPA	EDR Digital Archive
	BARRY MURRAY P MD INC	EDR Digital Archive
	GIESBRECHT MD	EDR Digital Archive
	A CONFIDENTIAL RECOVERY	EDR Digital Archive
	HOME PREFERRED	EDR Digital Archive
2005	A CONFIDENTIAL RECOVERY	EDR Digital Archive
	SMOYER DAVIS GROUP	EDR Digital Archive
	GEORGE HAMILTON CPA PC	EDR Digital Archive
	CALIFORNIA VEIN & LASER CENTER	EDR Digital Archive
	BARRY MURRAY P MD INC	EDR Digital Archive
	GEORGE HAMILTON CPA PC	EDR Digital Archive
	BARRY MURRAY P MD INC	EDR Digital Archive
	A CONFIDENTIAL RECOVERY	EDR Digital Archive
	SMOYER DAVIS GROUP	EDR Digital Archive
	CALIFORNIA VEIN & LASER CENTER	EDR Digital Archive

7337 N 1st St

Year	Uses	Source
2014	STANTON M LEVY LAW CORPORATION	EDR Digital Archive
	JAMES J MELE INC	EDR Digital Archive
	HS THANDI INC	EDR Digital Archive
	WEST CECILE PHD	EDR Digital Archive
	REEVES LAKE LAND COMPANY LTD	EDR Digital Archive
	MELE GERALD A & ASSOC INC	EDR Digital Archive
	WEST CECILE PHD	EDR Digital Archive
	REEVES LAKE LAND COMPANY LTD	EDR Digital Archive
	MELE GERALD A & ASSOC INC	EDR Digital Archive
	STANTON M LEVY LAW CORPORATION	EDR Digital Archive
	JAMES J MELE INC	EDR Digital Archive
	HS THANDI INC	EDR Digital Archive
2010	HS THANDI INC	EDR Digital Archive
	STANTON M LEVY LAW CORPORATION	EDR Digital Archive
	JAMES J MELE INC	EDR Digital Archive
	MELE GERALD A & ASSOC INC	EDR Digital Archive
	REEVES LAKE LAND COMPANY LTD	EDR Digital Archive
	WEST CECILE PHD	EDR Digital Archive
	BENNETT J DAVID PHD	EDR Digital Archive
	MELE GERALD A & ASSOC INC	EDR Digital Archive

FINDINGS

Year	Uses	Source
2010	REEVES LAKE LAND COMPANY LTD	EDR Digital Archive
	WEST CECILE PHD	EDR Digital Archive
	BENNETT J DAVID PHD	EDR Digital Archive
	HS THANDI INC	EDR Digital Archive
	STANTON M LEVY LAW CORPORATION	EDR Digital Archive
	JAMES J MELE INC	EDR Digital Archive
2005	MELE JAMES J INC	EDR Digital Archive
	HS THANDI INC	EDR Digital Archive
	LEVY STANTON M LAW CORP	EDR Digital Archive
	SIERRA EDUCATION & RESEARCH IN	EDR Digital Archive
	VIO VEHICLES INTERNATIONAL	EDR Digital Archive
	BENNETT J DAVID PHD	EDR Digital Archive
	BAUER INVESTMENTS INC	EDR Digital Archive
	WEST CECILE PHD	EDR Digital Archive
	REALTY PROPERTY MANAGEMENT	EDR Digital Archive
	MELE GERALD A & ASSOC INC	EDR Digital Archive
	REEVES LAKE LAND COMPANY LTD	EDR Digital Archive
	BENNETT J DAVID PHD	EDR Digital Archive
	BAUER INVESTMENTS INC	EDR Digital Archive
	WEST CECILE PHD	EDR Digital Archive
	REALTY PROPERTY MANAGEMENT	EDR Digital Archive
	MELE GERALD A & ASSOC INC	EDR Digital Archive
	REEVES LAKE LAND COMPANY LTD	EDR Digital Archive
	MELE JAMES J INC	EDR Digital Archive
	HS THANDI INC	EDR Digital Archive
	LEVY STANTON M LAW CORP	EDR Digital Archive
	SIERRA EDUCATION & RESEARCH IN	EDR Digital Archive
	VIO VEHICLES INTERNATIONAL	EDR Digital Archive

7339 N 1st St

Year	Uses	Source
2010	PHYS MED INC	EDR Digital Archive
	PHYS MED INC	EDR Digital Archive
2005	PHYS MED INC	EDR Digital Archive
	PHYS MED INC	EDR Digital Archive

7341 N 1st St

Year	Uses	Source
2014	SUPERIOR STAFFING SERVICES	EDR Digital Archive

Year	Uses	Source
2014	HAMLIN CHARLES CPA	EDR Digital Archive
	SIKORA SHARMAYNE CPA	EDR Digital Archive
	A & D TRANS CORP USA	EDR Digital Archive
	INFINITY HOME LOAN	EDR Digital Archive
	BAR PSYCHOLOGICAL GROUP	EDR Digital Archive
	SUPERIOR STAFFING SERVICES	EDR Digital Archive
	HAMLIN CHARLES CPA	EDR Digital Archive
	SIKORA SHARMAYNE CPA	EDR Digital Archive
	A & D TRANS CORP USA	EDR Digital Archive
	INFINITY HOME LOAN	EDR Digital Archive
	BAR PSYCHOLOGICAL GROUP	EDR Digital Archive
2010	BAR PSYCHOLOGICAL GROUP	EDR Digital Archive
	INFINITY HOME LOAN	EDR Digital Archive
	HAMLIN CHARLES CPA	EDR Digital Archive
	A&A LIVESCAN LLC	EDR Digital Archive
	HEISDORF ROBERT LCSW LMFT	EDR Digital Archive
	BAR PSYCHOLOGICAL GROUP	EDR Digital Archive
	INFINITY HOME LOAN	EDR Digital Archive
	HAMLIN CHARLES CPA	EDR Digital Archive
	A&A LIVESCAN LLC	EDR Digital Archive
	HEISDORF ROBERT LCSW LMFT	EDR Digital Archive
2005	WOMENS SONOGRAPHY CENTER	EDR Digital Archive
	HAMLIN CHARLES CPA	EDR Digital Archive
	WINCHELL & ASSOC	EDR Digital Archive
	BAR PSYCHOLOGICAL GROUP	EDR Digital Archive
	VOLKOFF WILLIAM J MS LMFT	EDR Digital Archive
	WOMENS SONOGRAPHY CENTER	EDR Digital Archive
	HAMLIN CHARLES CPA	EDR Digital Archive
	WINCHELL & ASSOC	EDR Digital Archive
	BAR PSYCHOLOGICAL GROUP	EDR Digital Archive
	VOLKOFF WILLIAM J MS LMFT	EDR Digital Archive

N Financial Dr

7100 N Financial Dr

Year	Uses	Source
2014	ST LOUIS DAVID J INC	EDR Digital Archive
	ST LOUIS DAVID J INC	EDR Digital Archive
2010	ST LOUIS DAVID J INC	EDR Digital Archive

Year	Uses	Source
2010	LESCOULIE DONALD P	EDR Digital Archive
	REYNOLDS RUSS ATTY AT LAW	EDR Digital Archive
	ST LOUIS DAVID J INC	EDR Digital Archive
	LESCOULIE DONALD P	EDR Digital Archive
	REYNOLDS RUSS ATTY AT LAW	EDR Digital Archive

7170 N Financial Dr

Year	Uses	Source
2014	LICENSING CRTIFICATION CAL OFF	EDR Digital Archive
	COLLURA JULIE LAW OFFICES OF	EDR Digital Archive
	FIRST CAPITAL FINCL RESOURCES	EDR Digital Archive
	SOLIMAN E PHD	EDR Digital Archive
	GREGORY N CHERNEY PHD	EDR Digital Archive
	VALERIE FORWARD PHD	EDR Digital Archive
	LICENSING CRTIFICATION CAL OFF	EDR Digital Archive
	COLLURA JULIE LAW OFFICES OF	EDR Digital Archive
	FIRST CAPITAL FINCL RESOURCES	EDR Digital Archive
	SOLIMAN E PHD	EDR Digital Archive
	GREGORY N CHERNEY PHD	EDR Digital Archive
	VALERIE FORWARD PHD	EDR Digital Archive
2010	GREGORY N CHERNEY PHD	EDR Digital Archive
	VALERIE FORWARD PHD	EDR Digital Archive
	DEARING MELISSA PSYD	EDR Digital Archive
	FIRST CAPITAL FINCL RESOURCES	EDR Digital Archive
	HENKELS & MCCOY INC	EDR Digital Archive
	MILLIGAN DAVID L LAW OFFICE	EDR Digital Archive
	LICENSING & CERTIFICATION OFF	EDR Digital Archive
	GREGORY N CHERNEY PHD	EDR Digital Archive
	VALERIE FORWARD PHD	EDR Digital Archive
	DEARING MELISSA PSYD	EDR Digital Archive
	FIRST CAPITAL FINCL RESOURCES	EDR Digital Archive
	HENKELS & MCCOY INC	EDR Digital Archive
	MILLIGAN DAVID L LAW OFFICE	EDR Digital Archive
	LICENSING & CERTIFICATION OFF	EDR Digital Archive
2005	HEALTH SERVICES CAL DEPT	EDR Digital Archive
	LICENSING & CERTIFICATION OFF	EDR Digital Archive
	GREGORY N CHERNEY PHD	EDR Digital Archive
	SCIARONI BRIAN L PHD	EDR Digital Archive
	CHATEAU RIDGE PROPERTIES	EDR Digital Archive

Year	Uses	Source
2005	ACCIDENTAL INJURY LAW CENTER	EDR Digital Archive
	HEALTH SERVICES CAL DEPT	EDR Digital Archive
	LICENSING & CERTIFICATION OFF	EDR Digital Archive
	GREGORY N CHERNEY PHD	EDR Digital Archive
	SCIARONI BRIAN L PHD	EDR Digital Archive
	CHATEAU RIDGE PROPERTIES	EDR Digital Archive
	ACCIDENTAL INJURY LAW CENTER	EDR Digital Archive

North First Street

7160 North First Street

Year	Uses	Source
2002	WASHINGTON MUTUAL banks	R.L. Polk & Co Publishers
1996	GREAT	R.L. Polk & Co Publishers
	WESTERN BANK	R.L. Polk & Co Publishers
1990	Great Western Bank	R.L. Polk & Co Publishers
1986	Great Western Savings	R.L. Polk & Co Publishers
1980	Sequoia Savings & Loan Association	R.L. Polk & Co Publishers

7194 North First Street

Year	Uses	Source
2002	Cochran Bobby L & Lynn	R.L. Polk & Co Publishers
1990	Cochran Bobby	R.L. Polk & Co Publishers
1986	Simone Lynn	R.L. Polk & Co Publishers
1980	Tipping John T	R.L. Polk & Co Publishers

7202 North First Street

Year	Uses	Source
2002	Joynor Dale C	R.L. Polk & Co Publishers
	Jo ynor Mary H	R.L. Polk & Co Publishers
1990	Koch Chas D	R.L. Polk & Co Publishers
1986	Koch Charles D	R.L. Polk & Co Publishers
1980	Gregg Wm H	R.L. Polk & Co Publishers
1975	Under Constn	R.L. Polk & Co Publishers

7210 North First Street

Year	Uses	Source
2002	AFFORDABLE CASH REGISTER	R.L. Polk & Co Publishers
	SVC cash rogisters & supl	R.L. Polk & Co Publishers
	N 1ST ST	R.L. Polk & Co Publishers

FINDINGS

Year	Uses	Source
2002	Hawkins Milton W & Jane 1 B+ A	R.L. Polk & Co Publishers
1990	Hawkins Melton W	R.L. Polk & Co Publishers
1986	Hawkins Melton W	R.L. Polk & Co Publishers
1980	Hawkins Melton W	R.L. Polk & Co Publishers

FINDINGS

TARGET PROPERTY: ADDRESS NOT IDENTIFIED IN RESEARCH SOURCE

The following Target Property addresses were researched for this report, and the addresses were not identified in the research source.

Address Researched	Address Not Identified in Research Source
576 East Locust Avenue	2014, 2010, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922

ADJOINING PROPERTY: ADDRESSES NOT IDENTIFIED IN RESEARCH SOURCE

The following Adjoining Property addresses were researched for this report, and the addresses were not identified in research source.

Address Researched	Address Not Identified in Research Source
1021 E Herndon Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
1021 E Herndon Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
1025 E Herndon Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
1025 E Herndon Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
1040 E Herndon Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
1040 E Herndon Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
1044 E Herndon Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
1044 E Herndon Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
1050 E Herndon Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
1050 E Herndon Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
1055 E HERNDON AVE	2014, 2010, 2005, 2002, 1996, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
401 E HERNDON AVE	2014, 2010, 2005, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
440 E HERNDON AVE	2014, 2010, 2005, 2002, 1996, 1990, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
449 E HERNDON AVE	2014, 2010, 2005, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
451 E HERNDON AVE	2014, 2010, 2005, 2002, 1996, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
462 E HERNDON AVE	2014, 2010, 2005, 2002, 1996, 1990, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922

FINDINGS

Address Researched	Address Not Identified in Research Source
470 E HERNDON AVE	2014, 2010, 2005, 1986, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
491 E HERNDON AVE	2014, 2010, 2005, 2002, 1996, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
510 E HERNDON AVE	2014, 2010, 2005, 2002, 1996, 1990, 1986, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
568 E HERNDON AVE	2014, 2010, 2005, 2002, 1996, 1990, 1986, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
572 E HERNDON AVE	2014, 2010, 2005, 2002, 1996, 1990, 1986, 1980, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
575 E LOCUST AVE	2014, 2010, 2005, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
575 E Locust Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
575 E Locust Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
575 East Locust Avenue	2014, 2010, 2005, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
579 E HERNDON AVE	2014, 2010, 2005, 2002, 1996, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
622 E Pinedale Ave	2010, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
622 E Pinedale Ave	2010, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
632 E Minarets Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
632 E Minarets Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
632 E MINARETS AVE	2014, 2010, 2005, 1996, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
639 E Pinedale Ave	2014, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
639 E Pinedale Ave	2014, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
643 E SPRUCE AVE	2014, 2010, 2005, 1996, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
643 East Spruce Avenue	2014, 2010, 2005, 1996, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
644 E Minarets Ave	2014, 2010, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
644 E MINARETS AVE	2014, 2010, 2005, 1996, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
644 E Minarets Ave	2014, 2010, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
645 E MINARETS AVE	2014, 2010, 2005, 1996, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
646 E BIRCH AVE	2014, 2010, 2005, 1996, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922

FINDINGS

Address Researched	Address Not Identified in Research Source
646 E Birch Ave	2014, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
646 E Birch Ave	2014, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
647 E BIRCH AVE	2014, 2010, 2005, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
651 E Pinedale Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
651 E Pinedale Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
656 E SPRUCE AVE	2014, 2010, 2005, 1996, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
657 E SPRUCE AVE	2014, 2010, 2005, 1996, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
658 E MINARETS AVE	2014, 2010, 2005, 1996, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
659 E BIRCH AVE	2014, 2010, 2005, 1996, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
659 E MINARETS AVE	2014, 2010, 2005, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
660 E BIRCH AVE	2014, 2010, 2005, 1996, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
663 E Pinedale Ave	2014, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
663 E Pinedale Ave	2014, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
664 E SPRUCE AVE	2014, 2010, 2005, 1996, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
667 E BIRCH AVE	2014, 2010, 2005, 1996, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
671 E MINARETS AVE	2014, 2010, 2005, 1996, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
671 E SPRUCE AVE	2014, 2010, 2005, 1996, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
672 E BIRCH AVE	2014, 2010, 2005, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
6767 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
6767 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
678 E SPRUCE AVE	2014, 2010, 2005, 1996, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
6781 N 1ST ST	2014, 2010, 2005, 2002, 1996, 1990, 1986, 1980, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
679 E BIRCH AVE	2014, 2010, 2005, 1996, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
679 E Birch Ave	2014, 2010, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922

FINDINGS

Address Researched	Address Not Identified in Research Source
679 E Birch Ave	2014, 2010, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
680 E BIRCH AVE	2014, 2010, 2005, 1996, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
681 E HERNDON AVE	2014, 2010, 2005, 2002, 1996, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
682 E Minarets Ave	2014, 2010, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
682 E Minarets Ave	2014, 2010, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
683 E SPRUCE AVE	2014, 2010, 2005, 1996, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
690 E SPRUCE AVE	2014, 2010, 2005, 1996, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
691 E BIRCH AVE	2014, 2010, 2005, 1996, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
691 E Birch Ave	2014, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
691 E Birch Ave	2014, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
692 E BIRCH AVE	2014, 2010, 2005, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
693 E SPRUCE AVE	2014, 2010, 2005, 1996, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
702 E SPRUCE AVE	2014, 2010, 2005, 2002, 1996, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
703 E Birch Ave	2010, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
703 E Birch Ave	2010, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
703 E Pinedale Ave	2014, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
703 E Pinedale Ave	2014, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7032 1ST	2014, 2010, 2005, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7032 N 1ST ST	2014, 2010, 2005, 2002, 1996, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7032 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7032 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7033 N 1ST ST	2014, 2010, 2005, 2002, 1996, 1990, 1986, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
705 E Minarets Ave	2014, 2010, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
705 E Minarets Ave	2014, 2010, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922

FINDINGS

Address Researched	Address Not Identified in Research Source
705 E SPRUCE AVE	2014, 2010, 2005, 1996, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7062 1ST	2014, 2010, 2005, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7062 N 1ST ST	2014, 2010, 2005, 2002, 1996, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7062 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7062 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7088 1ST	2014, 2010, 2005, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7088 N 1ST ST	2014, 2010, 2005, 2002, 1996, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7088 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7088 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7100 N Financial Dr	2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7100 N Financial Dr	2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7110 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7110 N 1ST ST	2014, 2010, 2005, 2002, 1996, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7110 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
716 E SPRUCE AVE	2014, 2010, 2005, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7160 1ST	2014, 2010, 2005, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7160 N 1ST ST	2014, 2010, 2005, 2002, 1996, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7160 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7160 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7160 North First Street	2014, 2010, 2005, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7170 N Financial Dr	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7170 N Financial Dr	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
719 E SPRUCE AVE	2014, 2010, 2005, 1996, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7194 1ST	2014, 2010, 2005, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922

FINDINGS

Address Researched	Address Not Identified in Research Source
7194 N 1ST ST	2014, 2010, 2005, 2002, 1996, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7194 North First Street	2014, 2010, 2005, 1996, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7202 1ST	2014, 2010, 2005, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7202 N 1ST ST	2014, 2010, 2005, 2002, 1996, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7202 North First Street	2014, 2010, 2005, 1996, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7210 1ST	2014, 2010, 2005, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7210 N 1ST ST	2014, 2010, 2005, 2002, 1996, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7210 North First Street	2014, 2010, 2005, 1996, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7215 N 1st St	2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7215 N 1st St	2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7215 North First Street	2014, 2010, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7225 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7225 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7227 1ST	2014, 2010, 2005, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7228 1ST	2014, 2010, 2005, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7228 N 1ST ST	2014, 2010, 2005, 2002, 1996, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
723 E LOCUST AVE	2014, 2010, 2005, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
723 E Locust Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
723 E Locust Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7235 N 1st St	2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7235 N 1st St	2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7236 1ST	2014, 2010, 2005, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7236 N 1ST ST	2014, 2010, 2005, 2002, 1996, 1990, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7240 1ST	2014, 2010, 2005, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922

FINDINGS

Address Researched	Address Not Identified in Research Source
7240 N 1ST ST	2014, 2010, 2005, 2002, 1996, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7246 N 1ST ST	2014, 2010, 2005, 2002, 1996, 1990, 1986, 1980, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7250 North First Street	2014, 2010, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7255 1ST	2014, 2010, 2005, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7255 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7255 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7259 1ST	2014, 2010, 2005, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7259 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7259 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7265 1ST	2014, 2010, 2005, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7265 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7265 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7266 1ST	2014, 2010, 2005, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7266 N 1st St	2014, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7266 N 1ST ST	2014, 2010, 2005, 2002, 1996, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7266 N 1st St	2014, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7268 N 1ST ST	2014, 2010, 2005, 2002, 1996, 1990, 1986, 1980, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7269 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7269 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7275 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7275 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7280 North First Street	2014, 2010, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7285 N 1ST ST	2014, 2010, 2005, 2002, 1996, 1990, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7311 N 1st St	2014, 2010, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922

FINDINGS

Address Researched	Address Not Identified in Research Source
7311 N 1st St	2014, 2010, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7335 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7335 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7337 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7337 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7339 N 1st St	2014, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7339 N 1st St	2014, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7341 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
7341 N 1st St	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
742 E Minarets Ave	2014, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
742 E Minarets Ave	2014, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
743 E Spruce Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
743 E Spruce Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
745 E Locust Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
745 E LOCUST AVE	2014, 2010, 2005, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
745 E Locust Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
747 E Birch Ave	2010, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
747 E Birch Ave	2010, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
757 E Birch Ave	2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
757 E Birch Ave	2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
761 E Locust Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
761 E Locust Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
765 E Birch Ave	2014, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
765 E Birch Ave	2014, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922

FINDINGS

Address Researched	Address Not Identified in Research Source
767 E Minarets Ave	2010, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
767 E Minarets Ave	2010, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
773 E Birch Ave	2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
773 E Birch Ave	2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
775 E Minarets Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
775 E Minarets Ave	2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
786 E Birch Ave	2014, 2010, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
786 E Birch Ave	2014, 2010, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
787 E Minarets Ave	2010, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922
787 E Minarets Ave	2010, 2005, 2002, 1996, 1990, 1986, 1980, 1975, 1970, 1965, 1962, 1958, 1952, 1947, 1942, 1937, 1932, 1927, 1922

APPENDIX D
ENVIRONMENTAL DATABASE INFORMATION

Proposed Kaiser Facility
576 East Locust Avenue
Fresno, CA 93720

Inquiry Number: 5252546.1s
April 10, 2018

The EDR Radius Map™ Report with GeoCheck®

6 Armstrong Road, 4th floor
Shelton, CT 06484
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TABLE OF CONTENTS

SECTION	PAGE
Executive Summary	ES1
Overview Map	2
Detail Map	3
Map Findings Summary	4
Map Findings	8
Orphan Summary	23
Government Records Searched/Data Currency Tracking	GR-1

GEOCHECK ADDENDUM

Physical Setting Source Addendum	A-1
Physical Setting Source Summary	A-2
Physical Setting SSURGO Soil Map	A-5
Physical Setting Source Map	A-10
Physical Setting Source Map Findings	A-12
Physical Setting Source Records Searched	PSGR-1

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with any questions or comments.

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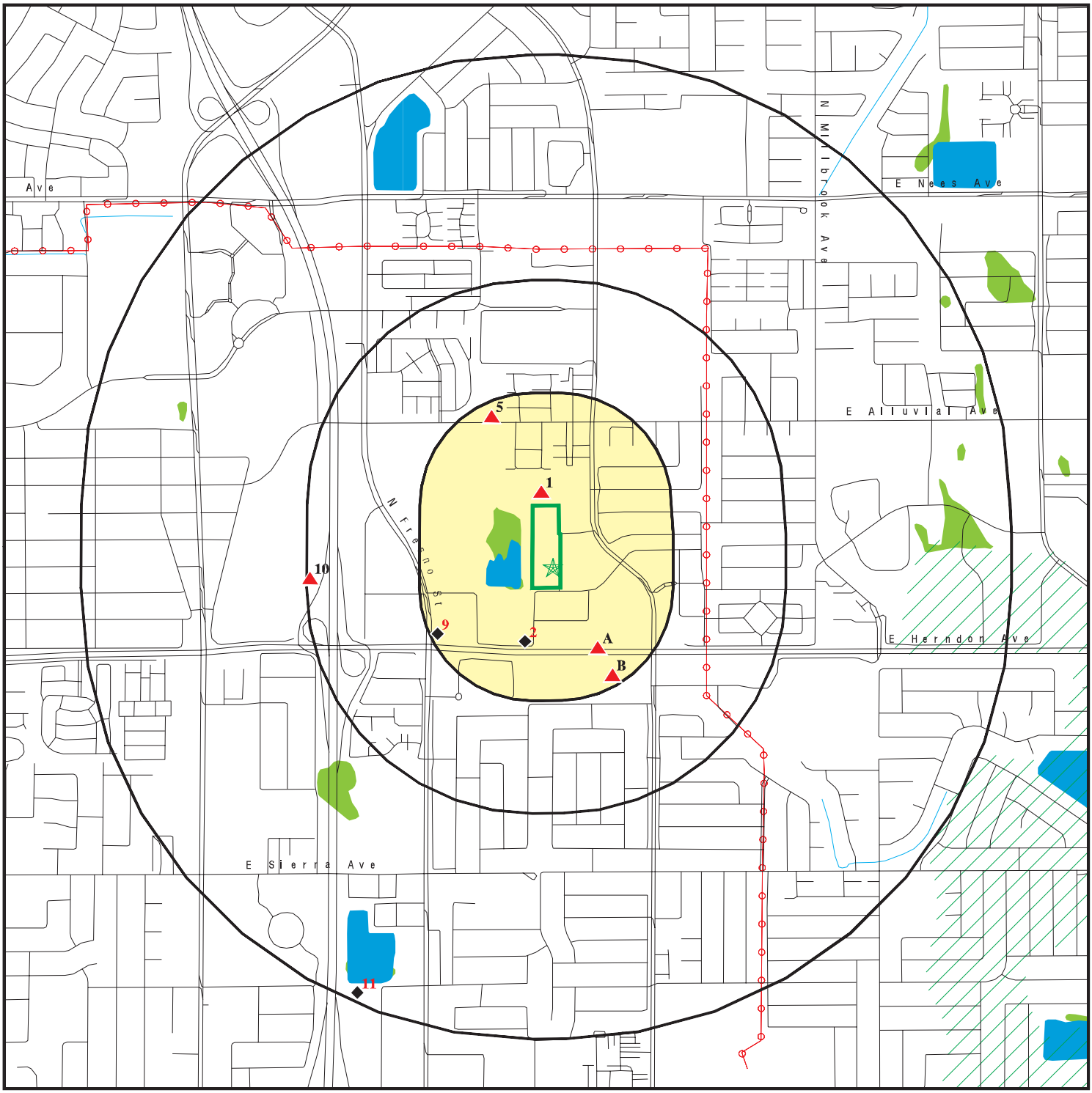
MAPPED SITES SUMMARY

Target Property Address:
576 EAST LOCUST AVENUE
FRESNO, CA 93720

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
1	CONCENTRA-FRESNO NOR	7265 N FIRST ST #105	CUPA Listings	Higher	165, 0.031, North
2	FRESNO VASCULAR ACCE	586 E HERNDON AVE #1	CUPA Listings	Lower	631, 0.120, SSW
A3	CALCOT	800 HERNDON	HIST CORTESE	Higher	828, 0.157, SSE
A4	CALCOT, LTD.	800 W. HERNDON AVENU	RCRA-LQG	Higher	828, 0.157, SSE
5	DERREL'S MINI STORAG	382 E ALLUVIAL #29	CUPA Listings	Higher	1151, 0.218, NNW
B6	JONES CLEANING CENTE	6735 N FIRST STE 113	FINDS, ECHO, DRYCLEANERS	Higher	1191, 0.226, SSE
B7	JONES DRY CLEANING	6735 N FIRST STE 113	RCRA-SQG, HAZNET	Higher	1191, 0.226, SSE
B8	JONES DRY CLEANING	6735 N 1ST ST STE 11	DRYCLEANERS	Higher	1191, 0.226, SSE
9	CHILI'S GRILL & BAR	7010 N FRESNO	CUPA Listings	Lower	1229, 0.233, WSW
10	PINEDALE AREA GROUND	PINEDALE/N. FRESNO A	RESPONSE, ENVIROSTOR, HIST Cal-Sites, Cortese,...	Higher	2600, 0.492, West
11	FRESNO IMAGING CENTE	6191 N THESTA	ENVIROSTOR, CUPA Listings, EMI	Lower	5160, 0.977, SSW

OVERVIEW MAP - 5252546.1S



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

National Priority List Sites

Dept. Defense Sites

0 1/4 1/2 1 Miles

Indian Reservations BIA

Power transmission lines

100-year flood zone

500-year flood zone

National Wetland Inventory

State Wetlands

Areas of Concern

N

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Proposed Kaiser Facility ADDRESS: 576 East Locust Avenue Fresno CA 93720 LAT/LONG: 36.839958 / 119.776264	CLIENT: Terracon CONTACT: Megan Davey INQUIRY #: 5252546.1s DATE: April 10, 2018 9:02 am

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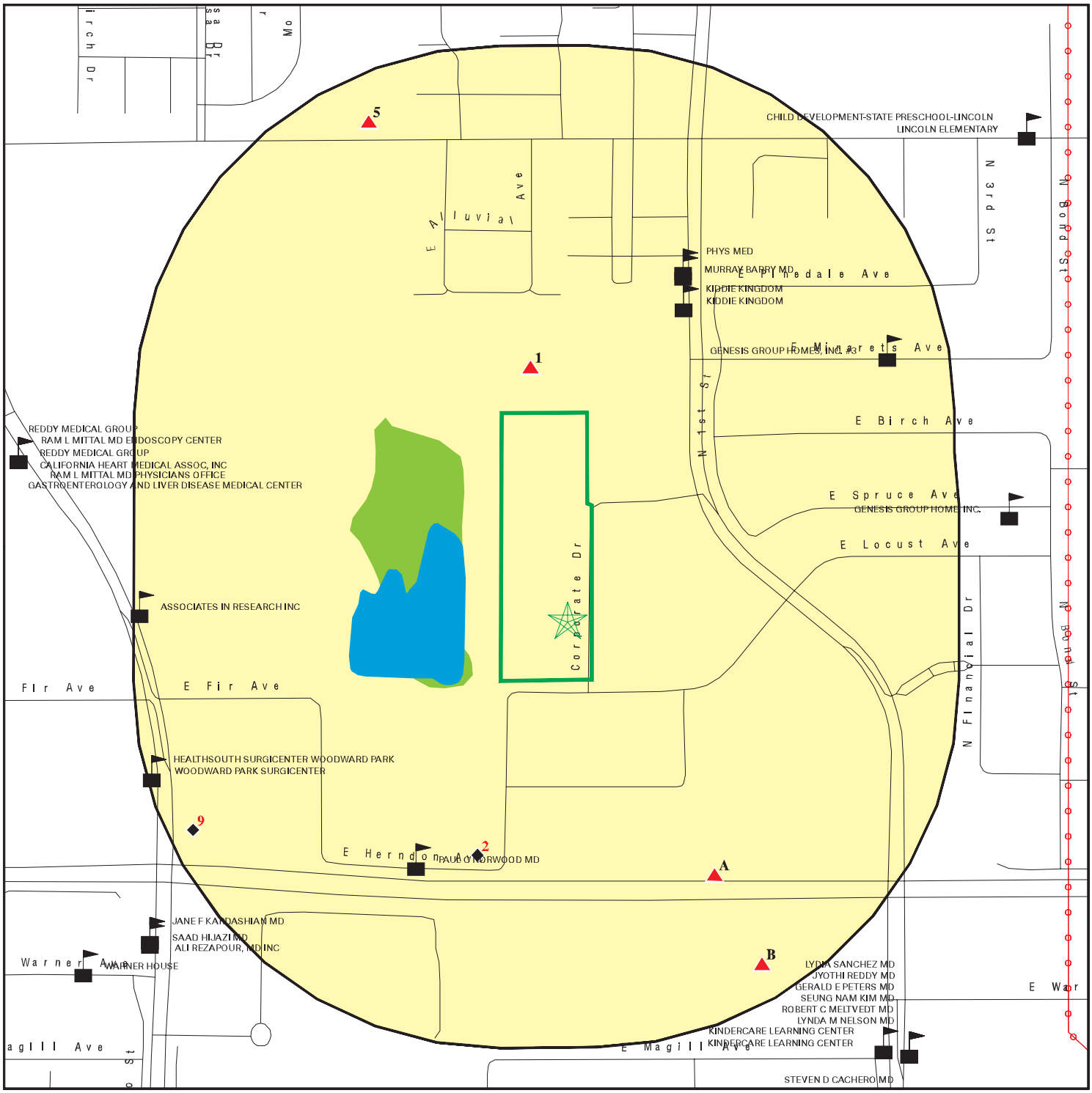
DETAIL MAP - 5252546.1S



0 1/16 1/8 1/4 Miles

- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Power transmission lines
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands
- Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Proposed Kaiser Facility	CLIENT:	Terracon
ADDRESS:	576 East Locust Avenue Fresno CA 93720	CONTACT:	Megan Davey
LAT/LONG:	36.839958 / 119.776264	INQUIRY #:	5252546.1s
		DATE:	April 10, 2018 9:05 am

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MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	TP		NR	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site list								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	1	NR	NR	NR	1
RCRA-SQG	0.250		0	1	NR	NR	NR	1
RCRA-CESQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
State- and tribal - equivalent NPL								
RESPONSE	1.000		0	0	1	0	NR	1
State- and tribal - equivalent CERCLIS								
ENVIROSTOR	1.000		0	0	1	1	NR	2
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
LUST	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
INDIAN LUST	0.500		0	0	0	NR	NR	0
SLIC	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250		0	0	NR	NR	NR	0
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal voluntary cleanup sites								
INDIAN VCP	0.500		0	0	0	NR	NR	0
VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
WMUDS/SWAT	0.500		0	0	0	NR	NR	0
SWRCY	0.500		0	0	0	NR	NR	0
HAULERS	TP		NR	NR	NR	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	TP		NR	NR	NR	NR	NR	0
HIST Cal-Sites	1.000		0	0	1	0	NR	1
SCH	0.250		0	0	NR	NR	NR	0
CDL	TP		NR	NR	NR	NR	NR	0
Toxic Pits	1.000		0	0	0	0	NR	0
US CDL	TP		NR	NR	NR	NR	NR	0
Local Lists of Registered Storage Tanks								
SWEEPS UST	0.250		0	0	NR	NR	NR	0
HIST UST	0.250		0	0	NR	NR	NR	0
CA FID UST	0.250		0	0	NR	NR	NR	0
Local Land Records								
LIENS	TP		NR	NR	NR	NR	NR	0
LIENS 2	TP		NR	NR	NR	NR	NR	0
DEED	0.500		0	0	0	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
CHMIRS	TP		NR	NR	NR	NR	NR	0
LDS	TP		NR	NR	NR	NR	NR	0
MCS	TP		NR	NR	NR	NR	NR	0
SPILLS 90	TP		NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.250		0	0	NR	NR	NR	0
FINDS	TP		NR	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0
ECHO	TP		NR	NR	NR	NR	NR	0
DOCKET HWC	TP		NR	NR	NR	NR	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
CA BOND EXP. PLAN	1.000		0	0	0	0	NR	0
Cortese	0.500		0	0	1	NR	NR	1
CUPA Listings	0.250		2	2	NR	NR	NR	4
DRYCLEANERS	0.250		0	2	NR	NR	NR	2
EMI	TP		NR	NR	NR	NR	NR	0
ENF	TP		NR	NR	NR	NR	NR	0
Financial Assurance	TP		NR	NR	NR	NR	NR	0
HAZNET	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
ICE	TP		NR	NR	NR	NR	NR	0
HIST CORTESE	0.500		0	1	1	NR	NR	2
HWP	1.000		0	0	0	0	NR	0
HWT	0.250		0	0	NR	NR	NR	0
MINES	0.250		0	0	NR	NR	NR	0
MWMP	0.250		0	0	NR	NR	NR	0
NPDES	TP		NR	NR	NR	NR	NR	0
PEST LIC	TP		NR	NR	NR	NR	NR	0
PROC	0.500		0	0	0	NR	NR	0
Notify 65	1.000		0	0	0	0	NR	0
UIC	TP		NR	NR	NR	NR	NR	0
WASTEWATER PITS	0.500		0	0	0	NR	NR	0
WDS	TP		NR	NR	NR	NR	NR	0
WIP	0.250		0	0	NR	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		0	NR	NR	NR	NR	0
EDR Hist Cleaner	0.125		0	NR	NR	NR	NR	0
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA LF	TP		NR	NR	NR	NR	NR	0
RGA LUST	TP		NR	NR	NR	NR	NR	0
- Totals --		0	2	7	5	1	0	15

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

1
North
< 1/8
0.031 mi.
165 ft.

CONCENTRA-FRESNO NORTH
7265 N FIRST ST #105
FRESNO, CA 93720

CUPA Listings **S116735393**
N/A

Relative:
Higher

Actual:
349 ft.

CUPA FRESNO:

Facility ID:	FA0283698
APM Number:	30320122
CERS Id:	10494775
GIS Latitude:	36.842443
GIS Longitude:	-119.776717
Program Element:	HAZ MAT DISCLOSURE-BELOW REPORTING QUANTITY

2
SSW
< 1/8
0.120 mi.
631 ft.

FRESNO VASCULAR ACCESS CENTER
586 E HERNDON AVE #103
FRESNO, CA 93720

CUPA Listings **S116348310**
N/A

Relative:
Lower

Actual:
342 ft.

CUPA FRESNO:

Facility ID:	FA0283617
APM Number:	30320143
CERS Id:	10487926
GIS Latitude:	36.837948
GIS Longitude:	-119.777824
Program Element:	HAZ MAT DISCLOSURE-BELOW REPORTING QUANTITY

A3
SSE
1/8-1/4
0.157 mi.
828 ft.

CALCOT
800 HERNDON
PINEDALE, CA 93650

Site 1 of 2 in cluster A

HIST CORTESE **S105025568**
N/A

Relative:
Higher

Actual:
345 ft.

HIST CORTESE:

Region:	CORTESE
Facility County Code:	10
Reg By:	CALSI
Reg Id:	10220002

A4
SSE
1/8-1/4
0.157 mi.
828 ft.

CALCOT, LTD.
800 W. HERNDON AVENUE
FRESNO, CA 93711

Site 2 of 2 in cluster A

RCRA-LQG **1012175569**
CAL000017194

Relative:
Higher

Actual:
345 ft.

RCRA-LQG:

Date form received by agency:	09/26/2008
Facility name:	CALCOT, LTD.
Facility address:	800 W. HERNDON AVENUE FRESNO, CA 93711
EPA ID:	CAL000017194
Contact:	ROBERT NORRIS
Contact country:	US
Contact telephone:	661-395-6877
Contact email:	BNORRIS@CALCOT.COM
EPA Region:	09

CALCOT, LTD. (Continued) **1012175569**

Classification: Large Quantity Generator
Description: Handler: generates 1,000 kg or more of hazardous waste during any calendar month; or generates more than 1 kg of acutely hazardous waste during any calendar month; or generates more than 100 kg of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month; or generates 1 kg or less of acutely hazardous waste during any calendar month, and accumulates more than 1 kg of acutely hazardous waste at any time; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates more than 100 kg of that material at any time

Owner/Operator Summary:
Owner/operator name: CLYDE KEPLY
Owner/operator country: US
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 06/01/1954

Owner/operator name: CALCOT, LTD.
Owner/operator address: P.O. BOX 259
BAKERSFIELD, CA 93302
Owner/operator country: US
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: 06/01/1951

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D007
. Waste name: CHROMIUM

. Waste code: D008
. Waste name: LEAD

Violation Status: No violations found

5
NNW
1/8-1/4
0.218 mi.
1151 ft.

DERREL'S MINI STORAGE
382 E ALLUVIAL #29
FRESNO, CA 93720

CUPA Listings

S105418626
N/A

Relative: Higher

Actual: 354 ft.

CUPA FRESNO:

Facility ID:	FA0275311
APM Number:	30319009
GIS Latitude:	36.84566
GIS Longitude:	-119.778709
Program Element:	HAZ MAT DISCLOSURE-BELOW REPORTING QUANTITY

Facility ID:	FA0275311
APM Number:	30319009
GIS Latitude:	36.84566
GIS Longitude:	-119.778709
Program Element:	HAZARDOUS WASTE GENERATOR (CESQG)

B6
SSE
1/8-1/4
0.226 mi.
1191 ft.

JONES CLEANING CENTERS INC
6735 N FIRST STE 113
FRESNO, CA 93710

FINDS
ECHO
DRYCLEANERS

1008152733
N/A

Site 1 of 3 in cluster B

Relative: Higher

Actual: 345 ft.

FINDS:

Registry ID: 110018962461

Environmental Interest/Information System

California Hazardous Waste Tracking System - Datamart (HWTS-DATAMART) provides California with information on hazardous waste shipments for generators, transporters, and treatment, storage, and disposal facilities.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1008152733
Registry ID:	110018962461
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110018962461

DRYCLEANERS:

EPA Id:	CAD981614613
NAICS Code:	81232
NAICS Description:	Drycleaning and Laundry Services (except Coin-Operated)
SIC Code:	7211
SIC Description:	Power Laundries, Family and Commercial
Create Date:	04/10/1987
Facility Active:	No

JONES CLEANING CENTERS INC (Continued) **1008152733**

Inactive Date:	06/30/2004
Owner Name:	ROBIN KRAEMER
Owner Address:	2089 W SHAW FRESNO
Owner Telephone:	0000000000
Contact Name:	ROBIN KRAEMER
Contact Address:	7280 N REMINGTON AVE
Contact Telephone:	5594475416
Mailing Address 1:	436 E BULLARD AVE
Mailing City:	FRESNO
Mailing State:	CA
Mailing Zip:	937103404
Region Code:	1

B7 **JONES DRY CLEANING** **RCRA-SQG** **1000220810**
SSE **6735 N FIRST STE 113** **HAZNET** **CAD981614555**
1/8-1/4 **FRESNO, CA 93710**
0.226 mi.
1191 ft. **Site 2 of 3 in cluster B**

Relative:
Higher

Actual:
345 ft.

RCRA-SQG:

Date form received by agency:	11/25/1986
Facility name:	JONES DRY CLEANING
Facility address:	6735 N FIRST STE 113 FRESNO, CA 93710
EPA ID:	CAD981614555
Mailing address:	N FIRST STE 113 FRESNO, CA 93710
Contact:	ENVIRONMENTAL MANAGER
Contact address:	6735 N FIRST STE 113 FRESNO, CA 93710
Contact country:	US
Contact telephone:	209-431-6892
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	ROBIN KRAEMER
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator telephone:	415-555-1212
Legal status:	Private
Owner/Operator Type:	Owner
Owner/operator name:	NOT REQUIRED
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator telephone:	415-555-1212
Legal status:	Private
Owner/Operator Type:	Operator

Handler Activities Summary:
U.S. importer of hazardous waste: No

JONES DRY CLEANING (Continued) **1000220810**

Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Violation Status: No violations found

HAZNET:
envid: 1000220810
Year: 2003
GEPAID: CAD981614555
Contact: ROBIN KRAEMER
Telephone: 5594316892
Mailing Address: 436 E BULLARD AVE
Mailing City,St,Zip: FRESNO, CA 937103404
TSD EPA ID: CAT000613893
Waste Category: Liquids with halogenated organic compounds >= 1,000 Mg./L
Disposal Method: Transfer Station
Tons: 0.1
Facility County: Fresno

envid: 1000220810
Year: 2003
GEPAID: CAD981614555
Contact: ROBIN KRAEMER
Telephone: 5594316892
Mailing Address: 436 E BULLARD AVE
Mailing City,St,Zip: FRESNO, CA 937103404
TSD EPA ID: CAT000613893
Waste Category: Liquids with halogenated organic compounds >= 1,000 Mg./L
Disposal Method: Transfer Station
Tons: 0.1
Facility County: Fresno

envid: 1000220810
Year: 2002
GEPAID: CAD981614555
Contact: ROBIN KRAEMER
Telephone: 5594316892
Mailing Address: 436 E BULLARD AVE
Mailing City,St,Zip: FRESNO, CA 937103404
TSD EPA ID: CAT000613893
Waste Category: Liquids with halogenated organic compounds >= 1,000 Mg./L
Disposal Method: Transfer Station
Tons: 0.52
Facility County: Fresno

envid: 1000220810

JONES DRY CLEANING (Continued) **1000220810**

Year:	2002
GEPAID:	CAD981614555
Contact:	ROBIN KRAEMER
Telephone:	5594316892
Mailing Address:	436 E BULLARD AVE
Mailing City,St,Zip:	FRESNO, CA 937103404
TSD EPA ID:	CAT000613893
Waste Category:	Liquids with halogenated organic compounds >= 1,000 Mg./L
Disposal Method:	Transfer Station
Tons:	0.52
Facility County:	Fresno

envid:	1000220810
Year:	2001
GEPAID:	CAD981614555
Contact:	ROBIN KRAEMER
Telephone:	5594316892
Mailing Address:	436 E BULLARD AVE
Mailing City,St,Zip:	FRESNO, CA 937103404
TSD EPA ID:	CAT000613893
Waste Category:	Liquids with halogenated organic compounds >= 1,000 Mg./L
Disposal Method:	Transfer Station
Tons:	0.88
Facility County:	Fresno

Click this hyperlink while viewing on your computer to access
15 additional CA_HAZNET: record(s) in the EDR Site Report.

B8
SSE
1/8-1/4
0.226 mi.
1191 ft.

JONES DRY CLEANING **DRYCLEANERS** **S106245252**
6735 N 1ST ST STE 113 **N/A**
FRESNO, CA 93710

Site 3 of 3 in cluster B

Relative:
Higher

Actual:
345 ft.

DRYCLEANERS:

EPA Id:	CAD981614555
NAICS Code:	81232
NAICS Description:	Drycleaning and Laundry Services (except Coin-Operated)
SIC Code:	7211
SIC Description:	Power Laundries, Family and Commercial
Create Date:	04/10/1987
Facility Active:	No
Inactive Date:	06/30/2003
Owner Name:	ROBIN KRAEMER
Owner Address:	6735 N 1ST ST STE 113
Owner Telephone:	0000000000
Contact Name:	ROBIN KRAEMER
Contact Address:	6735 N 1ST ST STE 113
Contact Telephone:	5594316892
Mailing Address 1:	436 E BULLARD AVE
Mailing City:	FRESNO
Mailing State:	CA
Mailing Zip:	937103404
Region Code:	1

9
WSW
1/8-1/4
0.233 mi.
1229 ft.

CHILI'S GRILL & BAR
7010 N FRESNO
FRESNO, CA 93720

CUPA Listings **S117684708**
N/A

Relative:
Lower

Actual:
342 ft.

CUPA FRESNO:

Facility ID:	FA0268705
APM Number:	30318046
CERS Id:	10623751
GIS Latitude:	36.837971
GIS Longitude:	-119.780564
Program Element:	MV FUEL/OIL/PROPANE ONLY IN AGST/UST MODEL PL

10
West
1/4-1/2
0.492 mi.
2600 ft.

PINEDALE AREA GROUNDWATER
PINEDALE/N. FRESNO AREA
FRESNO, CA 93650

RESPONSE **S101272710**
ENVIROSTOR **N/A**
HIST Cal-Sites
Cortese
HIST CORTESE

Relative:
Higher

Actual:
343 ft.

RESPONSE:

Facility ID:	10990001
Site Type:	State Response
Site Type Detail:	State Response or NPL
Acres:	0
National Priorities List:	NO
Cleanup Oversight Agencies:	SMBRP
Lead Agency Description:	DTSC - Site Cleanup Program
Supervisor:	Kevin Shaddy
Division Branch:	Cleanup San Joaquin
Site Code:	100168
Site Mgmt. Req.:	NONE SPECIFIED
Assembly:	23
Senate:	08
Status:	Backlog
Status Date:	09/08/2008
Restricted Use:	NO
Funding:	Responsible Party
Latitude:	36.83972
Longitude:	-119.785
APN:	NONE SPECIFIED
Past Use:	DEGREASING FACILITY
Potential COC :	Tetrachloroethylene (PCE Trichloroethylene (TCE
Confirmed COC:	Tetrachloroethylene (PCE Trichloroethylene (TCE
Potential Description:	AQUI
Alias Name:	110033611535
Alias Type:	EPA (FRS #)
Alias Name:	P12274
Alias Type:	PCode
Alias Name:	100168
Alias Type:	Project Code (Site Code)
Alias Name:	10990001
Alias Type:	Envirostor ID Number

Completed Info:

Completed Area Name:	PROJECT WIDE
Completed Document Type:	Remedial Investigation Report
Completed Date:	03/30/1991
Comments:	FRIFS - South Herndon TCE Plume.

PINEDALE AREA GROUNDWATER (Continued) **S101272710**

Completed Area Name: PROJECT WIDE
Completed Document Type: Public Participation Plan / Community Relations Plan
Completed Date: 03/30/1989

ENVIROSTOR:
Facility ID: 10990001
Status: Backlog
Status Date: 09/08/2008
Site Code: 100168
Site Type: State Response
Site Type Detailed: State Response or NPL
Acres: 0
NPL: NO
Regulatory Agencies: SMBRP
Lead Agency: SMBRP
Supervisor: Kevin Shaddy
Division Branch: Cleanup San Joaquin
Assembly: 23
Senate: 08
Restricted Use: NO
Site Mgmt Req: NONE SPECIFIED
Funding: Responsible Party
Latitude: 36.83972
Longitude: -119.785
APN: NONE SPECIFIED
Past Use: DEGREASING FACILITY
Potential COC: Tetrachloroethylene (PCE Trichloroethylene (TCE
Confirmed COC: Tetrachloroethylene (PCE Trichloroethylene (TCE
Potential Description: AQUI
Alias Name: 110033611535
Alias Type: EPA (FRS #)
Alias Name: P12274
Alias Type: PCode
Alias Name: 100168
Alias Type: Project Code (Site Code)
Alias Name: 10990001
Alias Type: Envirostor ID Number

Completed Info:
Completed Area Name: PROJECT WIDE
Completed Document Type: Remedial Investigation Report
Completed Date: 03/30/1991
Comments: FRIFS - South Herndon TCE Plume.

Completed Area Name: PROJECT WIDE
Completed Document Type: Public Participation Plan / Community Relations Plan
Completed Date: 03/30/1989

Calsite:
Region: SACRAMENTO
Facility ID: 10990001
Facility Type: RP
Type: RESPONSIBLE PARTY
Branch: CC
Branch Name: CENTRAL CALIFORNIA

PINEDALE AREA GROUNDWATER (Continued) **S101272710**

State Senate District: 01011989
Status: BACKLOG, POTENTIAL ANNUAL WORKPLAN (AWP) SITE
Status Name: BACKLOG - POTENTIAL AWP SITE
Lead Agency: DEPT OF TOXIC SUBSTANCES CONTROL
NPL: Not Listed
SIC Code: 99
SIC Name: NONCLASSIFIABLE ESTABLISHMENTS
Groundwater Contamination: Confirmed
Lat/Long (dms): 0 0 0 / 0 0 0
State Assembly District Code: 29
State Senate District Code: 14
Facility ID: 10990001
Activity: PPP
Activity Name: PUBLIC PARTICIPATION PLAN
Proposed Budget: 0
Comments Date: 03301989
Est Person-Yrs to complete: 0
Activity Status: BKLG
Definition of Status: BACKLOG - POTENTIAL AWP SITE
Liquids Removed (Gals): 0
Liquids Treated (Gals): 0
For Commercial Reuse: 0
For Industrial Reuse: 0
For Residential Reuse: 0
Unknown Type: 0
Facility ID: 10990001
Activity: FRIFS
Activity Name: FOCUSED REMEDIAL INVESTIGATION/FEASIBILITY STUDY
AWP Code: HNTCE
Proposed Budget: 0
Comments Date: 03301991
Est Person-Yrs to complete: 0
Activity Status: BKLG
Definition of Status: BACKLOG - POTENTIAL AWP SITE
Liquids Removed (Gals): 0
Liquids Treated (Gals): 0
For Commercial Reuse: 0
For Industrial Reuse: 0
For Residential Reuse: 0
Unknown Type: 0
Facility ID: 10990001
Activity: COST
Activity Name: COST RECOVERY
AWP Code: STLMT
Proposed Budget: 0
Comments Date: 11131998
Est Person-Yrs to complete: 0
Activity Status: BKLG
Definition of Status: BACKLOG - POTENTIAL AWP SITE
Liquids Removed (Gals): 0
Liquids Treated (Gals): 0
For Commercial Reuse: 0
For Industrial Reuse: 0
For Residential Reuse: 0
Unknown Type: 0
Alternate Address: PINEDALE/N. FRESNO AREA
Alternate City,St,Zip: FRESNO, CA 93650

PINEDALE AREA GROUNDWATER (Continued) **S101272710**

Background Info:	Pinedale Area Groundwater is an area groundwater problem, with a number of apparent source areas in the Pinedale area of North Fresno County. Identified sources have been separated into the following separate sites for investigation and remediation purposes: Industrial Waste Processing, Calcot and the Vendo Company. Trichloroethylene (TCE), perchloroethylene (PCE) and other volatile organic compounds (VOCs) were found in the groundwater samples in a plume two miles south of the source areas and one-and-one-half miles wide. To date, five municipal supply wells have been closed due to TCE contamination above the action level. Work completed to date includes a PRP search; a soil gas survey; private well sampling; and installation of 7 groundwater monitoring wells.
Comments Date:	11131998
Comments:	COVERS DTSC OVERSIGHT COSTS ASSOCIATED WITH THE VENDO COMPANY
Comments Date:	11131998
Comments:	SITE INCURRED BY DTSC THROUGH MARCH 31, 1998.
Comments Date:	01011989
Comments:	This is the date the site was first listed pursuant to
Comments Date:	01011989
Comments:	section 25356.
Comments Date:	03301991
Comments:	FRIFS - South Herndon TCE Plume.
Comments Date:	07251991
Comments:	Regional groundwater problem. Contaminants include TCE, PCE,
Comments Date:	07251991
Comments:	and VOCs.
Comments Date:	09062000
Comments:	Refer to the Vendo Company Report (CALSITES # 10590001) for
Comments Date:	09062000
Comments:	more information regarding the investigation and cleanup of the
Comments Date:	09062000
Comments:	area ground water problem.
Comments Date:	11131998
Comments:	COST/STLMT -- A SETTLEMENT WAS EXECUTED BY DTSC AND THE VENDO
Comments Date:	11131998
Comments:	COMPANY TO COVER DTSC RESPONSE COSTS ASSOCIATED WITH THE
Comments Date:	11131998
Comments:	PINEDALE GROUNDWATER SITE FOR WHICH THE VENDO COMPANY IS A
Comments Date:	11131998
Comments:	RESPONSIBLE PARTY, INCURRED BY DTSC THROUGH NOVEMBER 13, 1998.
Comments Date:	11131998
Comments:	THE STIPULATION FOR SETTLEMENT AND DISMISSAL OF ACTION WAS
Comments Date:	11131998
Comments:	APPROVED BY THE U.S. DISTRICT COURT FOR THE EASTERN DISTRICT
Comments Date:	11131998
Comments:	OF CALIFORNIA AND FILED ON 11/13/98. THE SETTLEMENT ALSO
ID Name:	CALSTARS CODE
ID Value:	100168
ID Name:	BEP DATABASE PCODE
ID Value:	P12274
Alternate Name:	PINEDALE AREA GROUNDWATER

CORTESE:

Region:	CORTESE
Envirostor Id:	10990001
Site/Facility Type:	STATE RESPONSE

PINEDALE AREA GROUNDWATER (Continued) **S101272710**

Cleanup Status: BACKLOG
Status Date: 09/08/2008
Site Code: 100168
Latitude: 36.839722
Longitude: -119.785
Flag: envirostor
File Name: Haz Waste & Substances Sites

HIST CORTESE:
Region: CORTESE
Facility County Code: 10
Reg By: CALSI
Reg Id: 10990001

11
SSW
1/2-1
0.977 mi.
5160 ft.

FRESNO IMAGING CENTER **ENVIROSTOR** **S107620984**
6191 N THESTA **CUPA Listings** **N/A**
FRESNO, CA 93710 **EMI**

Relative:
Lower

Actual:
334 ft.

ENVIROSTOR:
Facility ID: 71003130
Status: Inactive - Needs Evaluation
Site Type: Tiered Permit
Site Type Detailed: Tiered Permit
NPL: NO
Regulatory Agencies: NONE SPECIFIED
Lead Agency: NONE SPECIFIED
Division Branch: Cleanup San Joaquin
Assembly: 23
Senate: 08
Restricted Use: NO
Site Mgmt Req: NONE SPECIFIED
Latitude: 36.82635
Longitude: -119.7840
APN: NONE SPECIFIED
Past Use: NONE SPECIFIED
Potential COC: NONE SPECIFIED
Confirmed COC: NONE SPECIFIED
Potential Description: NONE SPECIFIED
Alias Name: CAD983596354
Alias Type: EPA Identification Number
Alias Name: 110002853993
Alias Type: EPA (FRS #)
Alias Name: 71003130
Alias Type: Envirostor ID Number

Completed Info:

CUPA FRESNO:
Facility ID: FA0271156
APM Number: 40918059
CERS Id: 10696882
GIS Latitude: 36.826353
GIS Longitude: -119.784075
Program Element: CLOSED HAZARDOUS WASTE TREATMENT UNIT

FRESNO IMAGING CENTER (Continued) **S107620984**

Facility ID: FA0271156
APM Number: 40918059
CERS Id: 10696882
GIS Latitude: 36.826353
GIS Longitude: -119.784075
Program Element: CLOSED HAZARDOUS WASTE TREATMENT UNIT

Facility ID: FA0271156
APM Number: 40918059
CERS Id: 10696882
GIS Latitude: 36.826353
GIS Longitude: -119.784075
Program Element: CLOSED HAZARDOUS WASTE TREATMENT UNIT

Facility ID: FA0271156
APM Number: 40918059
CERS Id: 10696882
GIS Latitude: 36.826353
GIS Longitude: -119.784075
Program Element: CLOSED HAZARDOUS WASTE TREATMENT UNIT

Facility ID: FA0271156
APM Number: 40918059
CERS Id: 10696882
GIS Latitude: 36.826353
GIS Longitude: -119.784075
Program Element: HAZ MAT DISCLOSURE-BELOW REPORTING QUANTITY

Facility ID: FA0271156
APM Number: 40918059
CERS Id: 10696882
GIS Latitude: 36.826353
GIS Longitude: -119.784075
Program Element: HAZARDOUS WASTE GENERATOR (CESQG)

EMI:
Year: 2004
County Code: 10
Air Basin: SJV
Facility ID: 3910
Air District Name: SJU
SIC Code: 8071
Air District Name: SAN JOAQUIN VALLEY UNIFIED APCD
Total Organic Hydrocarbon Gases Tons/Yr: 7.73754E-05
Reactive Organic Gases Tons/Yr: 6.474E-05
Carbon Monoxide Emissions Tons/Yr: 0.00067002
NOX - Oxides of Nitrogen Tons/Yr: 0.00572884
SOX - Oxides of Sulphur Tons/Yr: 0.00018486
Particulate Matter Tons/Yr: 5.53566E-05
Part. Matter 10 Micrometers and Smllr Tons/Yr: 5.4028E-05

Year: 2005
County Code: 10
Air Basin: SJV
Facility ID: 3910
Air District Name: SJU
SIC Code: 8071

FRESNO IMAGING CENTER (Continued) **S107620984**

Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Total Organic Hydrocarbon Gases Tons/Yr:	.0000773754049668221
Reactive Organic Gases Tons/Yr:	.0000647400013357401
Carbon Monoxide Emissions Tons/Yr:	.000670020013824105
NOX - Oxides of Nitrogen Tons/Yr:	.00572884011819959
SOX - Oxides of Sulphur Tons/Yr:	.000184860003814101
Particulate Matter Tons/Yr:	.0000553565585191865
Part. Matter 10 Micrometers and Smllr Tons/Yr:	.0000540280011147261

Year:	2006
County Code:	10
Air Basin:	SJV
Facility ID:	3910
Air District Name:	SJU
SIC Code:	8071
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Total Organic Hydrocarbon Gases Tons/Yr:	.0000773754049668221
Reactive Organic Gases Tons/Yr:	.0000647400013357401
Carbon Monoxide Emissions Tons/Yr:	.000670020013824105
NOX - Oxides of Nitrogen Tons/Yr:	.00572884011819959
SOX - Oxides of Sulphur Tons/Yr:	.000184860003814101
Particulate Matter Tons/Yr:	.0000553565585191865
Part. Matter 10 Micrometers and Smllr Tons/Yr:	.0000540280011147261

Year:	2007
County Code:	10
Air Basin:	SJV
Facility ID:	3910
Air District Name:	SJU
SIC Code:	8071
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Total Organic Hydrocarbon Gases Tons/Yr:	.0000773754049668221
Reactive Organic Gases Tons/Yr:	.0000647400013357401
Carbon Monoxide Emissions Tons/Yr:	.000670020013824105
NOX - Oxides of Nitrogen Tons/Yr:	.00572884011819959
SOX - Oxides of Sulphur Tons/Yr:	.0000055120001137256
Particulate Matter Tons/Yr:	.0000553565585191865
Part. Matter 10 Micrometers and Smllr Tons/Yr:	.0000540280011147261

Year:	2008
County Code:	10
Air Basin:	SJV
Facility ID:	3910
Air District Name:	SJU
SIC Code:	8071
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Total Organic Hydrocarbon Gases Tons/Yr:	.0000773754049668221
Reactive Organic Gases Tons/Yr:	.0000647400013357401
Carbon Monoxide Emissions Tons/Yr:	.000670020013824105
NOX - Oxides of Nitrogen Tons/Yr:	.00572884011819959
SOX - Oxides of Sulphur Tons/Yr:	.0000055120001137256
Particulate Matter Tons/Yr:	.0000553565585191865
Part. Matter 10 Micrometers and Smllr Tons/Yr:	.0000540280011147261

Year:	2009
County Code:	10
Air Basin:	SJV

FRESNO IMAGING CENTER (Continued) **S107620984**

Facility ID:	3910
Air District Name:	SJU
SIC Code:	8071
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Total Organic Hydrocarbon Gases Tons/Yr:	7.7375404966822104E-5
Reactive Organic Gases Tons/Yr:	6.4740001335740106E-5
Carbon Monoxide Emissions Tons/Yr:	6.7002001382410496E-4
NOX - Oxides of Nitrogen Tons/Yr:	5.7288401181995897E-3
SOX - Oxides of Sulphur Tons/Yr:	5.5120001137256597E-6
Particulate Matter Tons/Yr:	5.5356558519186497E-5
Part. Matter 10 Micrometers and Smllr Tons/Yr:	5.4028001114726101E-5

Year:	2010
County Code:	10
Air Basin:	SJV
Facility ID:	3910
Air District Name:	SJU
SIC Code:	8071
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Total Organic Hydrocarbon Gases Tons/Yr:	7.7327596510099101E-5
Reactive Organic Gases Tons/Yr:	6.4700000000000001E-5
Carbon Monoxide Emissions Tons/Yr:	6.7000000000000002E-4
NOX - Oxides of Nitrogen Tons/Yr:	5.7299999999999999E-3
SOX - Oxides of Sulphur Tons/Yr:	5.5099999999999998E-6
Particulate Matter Tons/Yr:	5.5327868852459001E-5
Part. Matter 10 Micrometers and Smllr Tons/Yr:	5.3999999999999998E-5

Year:	2011
County Code:	10
Air Basin:	SJV
Facility ID:	3910
Air District Name:	SJU
SIC Code:	8071
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Total Organic Hydrocarbon Gases Tons/Yr:	7.7375404967e-005
Reactive Organic Gases Tons/Yr:	6.4740001336e-005
Carbon Monoxide Emissions Tons/Yr:	0.00067002001382
NOX - Oxides of Nitrogen Tons/Yr:	0.0057288401182
SOX - Oxides of Sulphur Tons/Yr:	5.5120001137e-006
Particulate Matter Tons/Yr:	5.5356558519e-005
Part. Matter 10 Micrometers and Smllr Tons/Yr:	5.4028001115e-005

Year:	2012
County Code:	10
Air Basin:	SJV
Facility ID:	3910
Air District Name:	SJU
SIC Code:	8071
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Total Organic Hydrocarbon Gases Tons/Yr:	7.7375404967e-005
Reactive Organic Gases Tons/Yr:	6.4740001336e-005
Carbon Monoxide Emissions Tons/Yr:	0.00067002001382
NOX - Oxides of Nitrogen Tons/Yr:	0.0057288401182
SOX - Oxides of Sulphur Tons/Yr:	5.5120001137e-006
Particulate Matter Tons/Yr:	5.5356558519e-005
Part. Matter 10 Micrometers and Smllr Tons/Yr:	5.4028001115e-005

FRESNO IMAGING CENTER (Continued) **S107620984**

Year:	2013
County Code:	10
Air Basin:	SJV
Facility ID:	3910
Air District Name:	SJU
SIC Code:	8071
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Total Organic Hydrocarbon Gases Tons/Yr:	7.3648264087e-005
Reactive Organic Gases Tons/Yr:	6.47e-005
Carbon Monoxide Emissions Tons/Yr:	0.00067
NOX - Oxides of Nitrogen Tons/Yr:	0.00573
SOX - Oxides of Sulphur Tons/Yr:	5.51e-006
Particulate Matter Tons/Yr:	5.5327868852e-005
Part. Matter 10 Micrometers and Smllr Tons/Yr:	5.4e-005

Year:	2014
County Code:	10
Air Basin:	SJV
Facility ID:	3910
Air District Name:	SJU
SIC Code:	8071
Air District Name:	SAN JOAQUIN VALLEY APCD
Total Organic Hydrocarbon Gases Tons/Yr:	7.3693797764e-005
Reactive Organic Gases Tons/Yr:	6.4740001336e-005
Carbon Monoxide Emissions Tons/Yr:	0.00067002001382
NOX - Oxides of Nitrogen Tons/Yr:	0.0057288401182
SOX - Oxides of Sulphur Tons/Yr:	5.5120001137e-006
Particulate Matter Tons/Yr:	5.5356558519e-005
Part. Matter 10 Micrometers and Smllr Tons/Yr:	5.4028001115e-005

Year:	2015
County Code:	10
Air Basin:	SJV
Facility ID:	3910
Air District Name:	SJU
SIC Code:	8071
Air District Name:	SAN JOAQUIN VALLEY APCD
Total Organic Hydrocarbon Gases Tons/Yr:	0.0002640865111
Reactive Organic Gases Tons/Yr:	0.000232
Carbon Monoxide Emissions Tons/Yr:	0.0024
NOX - Oxides of Nitrogen Tons/Yr:	0.0205
SOX - Oxides of Sulphur Tons/Yr:	1.97e-005
Particulate Matter Tons/Yr:	0.00019774590164
Part. Matter 10 Micrometers and Smllr Tons/Yr:	0.000193

Count: 75 records. ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
FRESNO	S114651287	MILE HI PRODUCE STAND	41359 HIGHWAY 168		RGA LUST
FRESNO	S114685757	SHAVER MAINTENANCE STATION	HIGHWAY 168		RGA LUST
FRESNO	S112922744	SAN JUAQUIN SAND & GRAVEL	8286 HWY 41 NORTH	93720	HAZNET
FRESNO	1022836334	SAN JOAQUIN SAND & GRAVEL	8286 HWY 41 NORTH	93720	ABANDONED MINES
FRESNO	U001591967	LAWRENCE D. COBB ESTATE	8804 HIGHWAY 41	93710	HIST UST
FRESNO	U001591945	COBB RANCH	8805 HIGHWAY 41	93710	HIST UST
FRESNO	S112978769	CALTRANS D-6/EA06-0F2704	RTE 41 & 168 NB/SB PM R21.4-	93720	HAZNET
FRESNO	S117702266	HWY 5 PM 20 4 TO 66 1	HWY 5 PM 20 4 TO 66 1		NPDES
FRESNO	S121022977	HYATT PLACE FRESNO	7333 & 7345 NORTH FRESNO ST.	93720	NPDES
FRESNO	S114695011	SQUAW VALLEY GAS STATION	HWY 89		RGA LUST
FRESNO	S114710096	UNKNOWN	HWY 99 @ THORNE		RGA LUST
FRESNO	S114710094	UNKNOWN	HIGHWAY 99 @ THORNE		RGA LUST
FRESNO	S114581584	BEACON TRUCKSTOP #51-3	3767 HWY 99 S		RGA LUST
FRESNO	S114674918	RED TRIANGLE OIL CO.	38440 HIGHWAY 99		RGA LUST
FRESNO	S114710113	UNKNOWN	0 HWY 99 @ THORNE		RGA LUST
FRESNO	S114726133	CEDAR AVE. RECYCLING & TRANSFER ST	HWY 99 / BETWEEN NORTH AVE.& C		RGA LF
FRESNO	S114710368	UNKNOWN	HWY 99 & THORNE		RGA LUST
FRESNO	S114710369	UNKNOWN	HWY 99 AT THORNE		RGA LUST
FRESNO	S114710364	UNKNOWN	HIGHWAY 99 @ THOR		RGA LUST
FRESNO	S114710365	UNKNOWN	HIGHWAY 99 @ THORNE		RGA LUST
FRESNO	S118494795	COUNTY OF FRESNO	AMERICAN AVE & SR 99		EMI
FRESNO	S109281295	COUNTY OF FRESNO	AMERICAN AVE AND SR 99		EMI
FRESNO	S114567011	7-UP BOTTLING CO	1865 ANNA S		RGA LUST
FRESNO	S107533433		376 W CARUTHERS AVE (X HWY 41)		CDL
FRESNO	S114663479	OLD RIVER ROCK SITE	0 CORNELIA & HERNDON		RGA LUST
FRESNO	S114663478	OLD RIVER ROCK SITE	CORNELIA & HERNDON AVE W		RGA LUST
FRESNO	S114663484	OLD RIVER ROCK SITE	CORNELIA & HERNDON AVE W		RGA LUST
FRESNO	S114663482	OLD RIVER ROCK SITE	? CORNELIA & HERNDON AVE W		RGA LUST
FRESNO	S114663481	OLD RIVER ROCK SITE	? CORNELIA & HERNDON A		RGA LUST
FRESNO	S114729762	LIGHT LINE UNITED MISSION	N/W CRNR OF NORTH & NEWMAN, FR		RGA LF
FRESNO	S117711016	SKY PARK MARKET PLACE	S E HERNDON AND BRAWLEY		NPDES
FRESNO	S118495013	UNIVAR USA INC	FRESNO ST		EMI
FRESNO	S114713658	UNOCAL SS#31158	5790 FRESNO N		RGA LUST
FRESNO	S114587071	BRITZ FERTILIZERS	21817 FRESNO-COALINGA R		RGA LUST
FRESNO	S114582331	BENNY'S AUTO SALES	3741 GOLDEN STATE		RGA LUST
FRESNO	S114728019	FRESNO UNITED METAL	3270 SOUTH GOLDEN STATE		RGA LF
FRESNO	S114700870	TEXACO TERMINAL STATIONS	4025 GOLDEN STATE		RGA LUST
FRESNO	S114696747	SUBERBAN PROPANE	3363 GOLDEN STATE AVE S		RGA LUST
FRESNO	S114578387	AT & SF-CALWA RAIL YARD	2989 GOLDEN STATE BVLD		RGA LUST
FRESNO	S114682482	SANTA FE INTERMODAL YARD	2989 GOLDEN STATE BLVD		RGA LUST
FRESNO	S114725617	BURLINGTON NORTHERN SANTA FE DS	2989 S GOLDEN STATE BLVD.		RGA LF
FRESNO	S114646876	MAINTENANCE YARD	1490 HERNDON AVE E		RGA LUST
FRESNO	S114656848	MORRIS COCOLA	706 HERNDON W		RGA LUST

Count: 75 records. ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
FRESNO	S114624358	FRESNO CO-OP TRUCKING	53 HERNDON W		RGA LUST
FRESNO	S117701776	HERNDON AVE PALM TO CEDAR	HERNDON AVE PALM TO CEDAR		NPDES
FRESNO	S118408801	COBB RANCH	8805 NO HIWAY 41	93710	HIST UST
FRESNO	S118412237	LAWRENCE D COBB ESTATE	8804 HIWAY 41-N	93710	HIST UST
FRESNO	S114710358	UNKNOWN	? HWY 99 @ THORNE		RGA LUST
FRESNO	S118494660	ZIM INDUSTRIES INC	JEFFERSON & GOLDEN STATE		EMI
FRESNO	S103442284	GENTZ CONSTRUCTION COMPANY-JEF	JEFFERSON AVE.		WMUDS/SWAT
FRESNO	S113749555	ZIM INDUSTRIES INC	JEFFERSON/GOLDEN STATE		EMI
FRESNO	S114590767	CALTRANS	MARKS AVENUE & HIGHWAY 180		RGA LUST
FRESNO	S110654083	CALTRANS	MARKS AVENUE & HIGHWAY 180		LUST
FRESNO	S108541432	CALTRANS	MARKS AVENUE & HIGHWAY 180		LUST
FRESNO	S114591196	CALTRANS	MARKS AVENUE & HIGHWAY 180		RGA LUST
FRESNO	S114726240	CHATEAU FRESNO LANDFILL	MUSCAT AVE 1/4 MI W OF CHATEAU		RGA LF
FRESNO	S103441811	NEILSON AVENUE PRIVATE	NEAR 10-AA-0019		WMUDS/SWAT
FRESNO	S117348204	PARK CROSSING SHOPPING CENTER PH 1	NEC FRESNO ST AND FRIANT RD	93720	NPDES
FRESNO	S114617778	EZ TRIP/ GRANTLAND SHELL FOODM	6639 PARKWAY N		RGA LUST
FRESNO	S114656690	MOORE TRUCK LINES	3693 PARKWAY N		RGA LUST
FRESNO	S114597938	CHEVRON - PARKWAY	3996 PARKWAY N		RGA LUST
FRESNO	S114597937	CHEVRON - PARKWAY	3996 PARKWAY N		RGA LUST
FRESNO	S114565719	(FORMERLY) T'NT BESTWAY	180 PARKWAY S		RGA LUST
FRESNO	S114628595	GRANTLAND SHELL FOODMART	6639 PARKWAY N		RGA LUST
FRESNO	S114699120	TED SMITH (TSE BRAKES)	3187 PARKWAY S		RGA LUST
FRESNO	S114698106	T'NT BESTWAY	180 PARKWAY S		RGA LUST
FRESNO	S114722381	WILLIG FREIGHT LINES	3128 PARKWAY DR		RGA LUST
FRESNO	1006426282	ARCHIE GOH DEBRIS FIRE SITE	POSTAL ADDRESS IS UNAVAILABLE		SEMS
FRESNO	S117715346	WENDYS KFC FRESNO DEV	SEC BLACKSTONE AVE & SPRUCE ST	93720	NPDES
FRESNO	S107540747		SOUTHBOUND HWY 99 @ BELMONT		CDL
FRESNO	S119087343	SIERRA PACIFIC ORTHPEDIC CENTER	SPALDING AND SPRUCE AVENUES	93720	NPDES
FRESNO	S117715702	WILLOW AVE SHAW TO HERNDON	WILLOW AVE SHAW TO HERNDON		NPDES
LATON	S112902030	HENKELS & MCCOY INC	STATE RTE 41 & ELKHORN AVE	93720	HAZNET
PINEDALE	S100833342	PINEDALE AREA GROUND WATER	PINEDALE AND PART OF FRESNO	93650	CA BOND EXP. PLAN
SEASIDE	S117712589	THE HOME DEPOT	NEC OF STATE HWY 1 AND CANYON	93720	NPDES

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
CA	AST	Aboveground Petroleum Storage Tank Facilities	California Environmental Protection Agency	07/06/2016	07/12/2016	09/19/2016
CA	BROWNFIELDS	Considered Brownfieds Sites Listing	State Water Resources Control Board	12/22/2017	12/26/2017	01/31/2018
CA	CA BOND EXP. PLAN	Bond Expenditure Plan	Department of Health Services	01/01/1989	07/27/1994	08/02/1994
CA	CA FID UST	Facility Inventory Database	California Environmental Protection Agency	10/31/1994	09/05/1995	09/29/1995
CA	CDL	Clandestine Drug Labs	Department of Toxic Substances Control	06/30/2017	08/18/2017	09/21/2017
CA	CHMIRS	California Hazardous Material Incident Report System	Office of Emergency Services	02/15/2018	02/20/2018	04/03/2018
CA	CORTESE	"Cortese" Hazardous Waste & Substances Sites List	CAL EPA/Office of Emergency Information	02/08/2018	02/08/2018	02/08/2018
CA	DEED	Deed Restriction Listing	DTSC and SWRCB	02/08/2018	02/08/2018	02/08/2018
CA	DRYCLEANERS	Cleaner Facilities	Department of Toxic Substance Control	12/01/2017	02/02/2018	03/16/2018
CA	EMI	Emissions Inventory Data	California Air Resources Board	12/31/2015	03/21/2017	08/15/2017
CA	ENF	Enforcement Action Listing	State Water Resoruces Control Board	01/22/2018	01/24/2018	03/19/2018
CA	ENVIROSTOR	EnviroStor Database	Department of Toxic Substances Control	01/30/2018	01/31/2018	03/19/2018
CA	Financial Assurance 1	Financial Assurance Information Listing	Department of Toxic Substances Control	01/22/2018	01/24/2018	03/20/2018
CA	Financial Assurance 2	Financial Assurance Information Listing	California Integrated Waste Management Board	02/14/2018	02/16/2018	04/03/2018
CA	HAULERS	Registered Waste Tire Haulers Listing	Integrated Waste Management Board	02/08/2018	02/09/2018	03/20/2018
CA	HAZNET	Facility and Manifest Data	California Environmental Protection Agency	12/31/2016	07/12/2017	10/17/2017
CA	HIST CAL-SITES	Calsites Database	Department of Toxic Substance Control	08/08/2005	08/03/2006	08/24/2006
CA	HIST CORTESE	Hazardous Waste & Substance Site List	Department of Toxic Substances Control	04/01/2001	01/22/2009	04/08/2009
CA	HIST UST	Hazardous Substance Storage Container Database	State Water Resources Control Board	10/15/1990	01/25/1991	02/12/1991
CA	HWP	EnviroStor Permitted Facilities Listing	Department of Toxic Substances Control	02/20/2018	02/21/2018	04/03/2018
CA	HWT	Registered Hazardous Waste Transporter Database	Department of Toxic Substances Control	01/08/2018	01/09/2018	02/06/2018
CA	ICE	ICE	Department of Toxic Subsances Control	02/20/2018	02/21/2018	04/03/2018
CA	LDS	Land Disposal Sites Listing (GEOTRACKER)	State Water Qualilty Control Board	03/12/2018	03/14/2018	03/21/2018
CA	LIENS	Environmental Liens Listing	Department of Toxic Substances Control	11/30/2017	12/01/2017	01/11/2018
CA	LUST	Leaking Underground Fuel Tank Report (GEOTRACKER)	State Water Resources Control Board	03/12/2018	03/14/2018	03/21/2018
CA	LUST REG 1	Active Toxic Site Investigation	California Regional Water Quality Control Boa	02/01/2001	02/28/2001	03/29/2001
CA	LUST REG 2	Fuel Leak List	California Regional Water Quality Control Boa	09/30/2004	10/20/2004	11/19/2004
CA	LUST REG 3	Leaking Underground Storage Tank Database	California Regional Water Quality Control Boa	05/19/2003	05/19/2003	06/02/2003
CA	LUST REG 4	Underground Storage Tank Leak List	California Regional Water Quality Control Boa	09/07/2004	09/07/2004	10/12/2004
CA	LUST REG 5	Leaking Underground Storage Tank Database	California Regional Water Quality Control Boa	07/01/2008	07/22/2008	07/31/2008
CA	LUST REG 6L	Leaking Underground Storage Tank Case Listing	California Regional Water Quality Control Boa	09/09/2003	09/10/2003	10/07/2003
CA	LUST REG 6V	Leaking Underground Storage Tank Case Listing	California Regional Water Quality Control Boa	06/07/2005	06/07/2005	06/29/2005
CA	LUST REG 7	Leaking Underground Storage Tank Case Listing	California Regional Water Quality Control Boa	02/26/2004	02/26/2004	03/24/2004
CA	LUST REG 8	Leaking Underground Storage Tanks	California Regional Water Quality Control Boa	02/14/2005	02/15/2005	03/28/2005
CA	LUST REG 9	Leaking Underground Storage Tank Report	California Regional Water Quality Control Boa	03/01/2001	04/23/2001	05/21/2001
CA	MCS	Military Cleanup Sites Listing (GEOTRACKER)	State Water Resources Control Board	03/12/2018	03/14/2018	03/21/2018
CA	MINES	Mines Site Location Listing	Department of Conservation	12/11/2017	12/12/2017	01/12/2018
CA	MWMP	Medical Waste Management Program Listing	Department of Public Health	11/29/2017	12/05/2017	01/16/2018
CA	NOTIFY 65	Proposition 65 Records	State Water Resources Control Board	12/14/2017	12/15/2017	01/16/2018
CA	NPDES	NPDES Permits Listing	State Water Resources Control Board	02/14/2018	02/14/2018	03/15/2018
CA	PEST LIC	Pesticide Regulation Licenses Listing	Department of Pesticide Regulation	12/04/2017	12/05/2017	01/16/2018
CA	PROC	Certified Processors Database	Department of Conservation	12/11/2017	12/12/2017	01/16/2018
CA	RESPONSE	State Response Sites	Department of Toxic Substances Control	01/30/2018	01/31/2018	03/19/2018
CA	RGA LF	Recovered Government Archive Solid Waste Facilities List	Department of Resources Recycling and Recover		07/01/2013	01/13/2014
CA	RGA LUST	Recovered Government Archive Leaking Underground Storage Tan	State Water Resources Control Board		07/01/2013	12/30/2013
CA	SCH	School Property Evaluation Program	Department of Toxic Substances Control	01/30/2018	01/31/2018	03/19/2018
CA	SLIC	Statewide SLIC Cases (GEOTRACKER)	State Water Resources Control Board	03/12/2018	03/14/2018	03/21/2018

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
CA	SLIC REG 1	Active Toxic Site Investigations	California Regional Water Quality Control Boa	04/03/2003	04/07/2003	04/25/2003
CA	SLIC REG 2	Spills, Leaks, Investigation & Cleanup Cost Recovery Listing	Regional Water Quality Control Board San Fran	09/30/2004	10/20/2004	11/19/2004
CA	SLIC REG 3	Spills, Leaks, Investigation & Cleanup Cost Recovery Listing	California Regional Water Quality Control Boa	05/18/2006	05/18/2006	06/15/2006
CA	SLIC REG 4	Spills, Leaks, Investigation & Cleanup Cost Recovery Listing	Region Water Quality Control Board Los Angele	11/17/2004	11/18/2004	01/04/2005
CA	SLIC REG 5	Spills, Leaks, Investigation & Cleanup Cost Recovery Listing	Regional Water Quality Control Board Central	04/01/2005	04/05/2005	04/21/2005
CA	SLIC REG 6L	SLIC Sites	California Regional Water Quality Control Boa	09/07/2004	09/07/2004	10/12/2004
CA	SLIC REG 6V	Spills, Leaks, Investigation & Cleanup Cost Recovery Listing	Regional Water Quality Control Board, Victorv	05/24/2005	05/25/2005	06/16/2005
CA	SLIC REG 7	SLIC List	California Regional Quality Control Board, Co	11/24/2004	11/29/2004	01/04/2005
CA	SLIC REG 8	Spills, Leaks, Investigation & Cleanup Cost Recovery Listing	California Region Water Quality Control Board	04/03/2008	04/03/2008	04/14/2008
CA	SLIC REG 9	Spills, Leaks, Investigation & Cleanup Cost Recovery Listing	California Regional Water Quality Control Boa	09/10/2007	09/11/2007	09/28/2007
CA	SPILLS 90	SPILLS90 data from FirstSearch	FirstSearch	06/06/2012	01/03/2013	02/22/2013
CA	SWEEPS UST	SWEEPS UST Listing	State Water Resources Control Board	06/01/1994	07/07/2005	08/11/2005
CA	SWF/LF (SWIS)	Solid Waste Information System	Department of Resources Recycling and Recover	02/12/2018	02/14/2018	04/03/2018
CA	SWRCY	Recycler Database	Department of Conservation	12/11/2017	12/12/2017	01/17/2018
CA	TOXIC PITS	Toxic Pits Cleanup Act Sites	State Water Resources Control Board	07/01/1995	08/30/1995	09/26/1995
CA	UIC	UIC Listing	Deaprtment of Conservation	12/11/2017	12/12/2017	01/17/2018
CA	UST	Active UST Facilities	SWRCB	03/12/2018	03/14/2018	03/29/2018
CA	UST MENDOCINO	Mendocino County UST Database	Department of Public Health	02/28/2018	03/01/2018	03/28/2018
CA	VCP	Voluntary Cleanup Program Properties	Department of Toxic Substances Control	01/30/2018	01/31/2018	03/19/2018
CA	WASTEWATER PITS	Oil Wastewater Pits Listing	RWQCB, Central Valley Region	04/15/2015	04/17/2015	06/23/2015
CA	WDS	Waste Discharge System	State Water Resources Control Board	06/19/2007	06/20/2007	06/29/2007
CA	WIP	Well Investigation Program Case List	Los Angeles Water Quality Control Board	07/03/2009	07/21/2009	08/03/2009
CA	WMUDS/SWAT	Waste Management Unit Database	State Water Resources Control Board	04/01/2000	04/10/2000	05/10/2000
US	2020 COR ACTION	2020 Corrective Action Program List	Environmental Protection Agency	04/22/2013	03/03/2015	03/09/2015
US	ABANDONED MINES	Abandoned Mines	Department of Interior	12/20/2017	12/21/2017	03/23/2018
US	BRS	Biennial Reporting System	EPA/NTIS	12/31/2015	02/22/2017	09/28/2017
US	COAL ASH DOE	Steam-Electric Plant Operation Data	Department of Energy	12/31/2005	08/07/2009	10/22/2009
US	COAL ASH EPA	Coal Combustion Residues Surface Impoundments List	Environmental Protection Agency	07/01/2014	09/10/2014	10/20/2014
US	CONSENT	Superfund (CERCLA) Consent Decrees	Department of Justice, Consent Decree Library	09/30/2017	11/10/2017	01/12/2018
US	CORRACTS	Corrective Action Report	EPA	12/11/2017	12/26/2017	02/09/2018
US	DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations	EPA, Region 9	01/12/2009	05/07/2009	09/21/2009
US	DOCKET HWC	Hazardous Waste Compliance Docket Listing	Environmental Protection Agency	06/27/2017	11/21/2017	01/12/2018
US	DOD	Department of Defense Sites	USGS	12/31/2005	11/10/2006	01/11/2007
US	DOT OPS	Incident and Accident Data	Department of Transporation, Office of Pipeli	07/31/2012	08/07/2012	09/18/2012
US	Delisted NPL	National Priority List Deletions	EPA	12/11/2017	12/22/2017	01/05/2018
US	ECHO	Enforcement & Compliance History Information	Environmental Protection Agency	01/13/2018	01/19/2018	03/02/2018
US	EDR Hist Auto	EDR Exclusive Historical Auto Stations	EDR, Inc.			
US	EDR Hist Cleaner	EDR Exclusive Historical Cleaners	EDR, Inc.			
US	EDR MGP	EDR Proprietary Manufactured Gas Plants	EDR, Inc.			
US	EPA WATCH LIST	EPA WATCH LIST	Environmental Protection Agency	08/30/2013	03/21/2014	06/17/2014
US	ERNS	Emergency Response Notification System	National Response Center, United States Coast	01/16/2018	01/19/2018	03/23/2018
US	FEDERAL FACILITY	Federal Facility Site Information listing	Environmental Protection Agency	11/07/2016	01/05/2017	04/07/2017
US	FEDLAND	Federal and Indian Lands	U.S. Geological Survey	12/31/2005	02/06/2006	01/11/2007
US	FEMA UST	Underground Storage Tank Listing	FEMA	05/15/2017	05/30/2017	10/13/2017
US	FINDS	Facility Index System/Facility Registry System	EPA	02/21/2018	02/23/2018	03/23/2018
US	FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fu	EPA/Office of Prevention, Pesticides and Toxi	04/09/2009	04/16/2009	05/11/2009
US	FTTS INSP	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fu	EPA	04/09/2009	04/16/2009	05/11/2009

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
US	FUDS	Formerly Used Defense Sites	U.S. Army Corps of Engineers	01/31/2015	07/08/2015	10/13/2015
US	FUELS PROGRAM	EPA Fuels Program Registered Listing	EPA	02/20/2018	02/21/2018	03/23/2018
US	FUSRAP	Formerly Utilized Sites Remedial Action Program	Department of Energy	12/23/2016	12/27/2016	02/17/2017
US	HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing	Environmental Protection Agency	10/19/2006	03/01/2007	04/10/2007
US	HIST FTTS INSP	FIFRA/TSCA Tracking System Inspection & Enforcement Case Lis	Environmental Protection Agency	10/19/2006	03/01/2007	04/10/2007
US	HMIRS	Hazardous Materials Information Reporting System	U.S. Department of Transportation	01/19/2018	01/19/2018	03/23/2018
US	ICIS	Integrated Compliance Information System	Environmental Protection Agency	11/18/2016	11/23/2016	02/10/2017
US	IHS OPEN DUMPS	Open Dumps on Indian Land	Department of Health & Human Serivces, Indian	04/01/2014	08/06/2014	01/29/2015
US	INDIAN LUST R1	Leaking Underground Storage Tanks on Indian Land	EPA Region 1	04/14/2017	07/27/2017	10/06/2017
US	INDIAN LUST R10	Leaking Underground Storage Tanks on Indian Land	EPA Region 10	04/25/2017	11/07/2017	12/08/2017
US	INDIAN LUST R4	Leaking Underground Storage Tanks on Indian Land	EPA Region 4	10/14/2016	01/27/2017	05/05/2017
US	INDIAN LUST R5	Leaking Underground Storage Tanks on Indian Land	EPA, Region 5	04/26/2017	07/27/2017	10/13/2017
US	INDIAN LUST R6	Leaking Underground Storage Tanks on Indian Land	EPA Region 6	04/24/2017	07/27/2017	10/06/2017
US	INDIAN LUST R7	Leaking Underground Storage Tanks on Indian Land	EPA Region 7	04/14/2017	07/27/2017	10/06/2017
US	INDIAN LUST R8	Leaking Underground Storage Tanks on Indian Land	EPA Region 8	05/01/2017	07/27/2017	10/13/2017
US	INDIAN LUST R9	Leaking Underground Storage Tanks on Indian Land	Environmental Protection Agency	04/13/2017	07/27/2017	10/13/2017
US	INDIAN ODI	Report on the Status of Open Dumps on Indian Lands	Environmental Protection Agency	12/31/1998	12/03/2007	01/24/2008
US	INDIAN RESERV	Indian Reservations	USGS	12/31/2014	07/14/2015	01/10/2017
US	INDIAN UST R1	Underground Storage Tanks on Indian Land	EPA, Region 1	04/14/2017	07/27/2017	10/06/2017
US	INDIAN UST R10	Underground Storage Tanks on Indian Land	EPA Region 10	04/25/2017	07/27/2017	10/13/2017
US	INDIAN UST R4	Underground Storage Tanks on Indian Land	EPA Region 4	10/14/2016	01/27/2017	05/05/2017
US	INDIAN UST R5	Underground Storage Tanks on Indian Land	EPA Region 5	04/26/2017	07/27/2017	10/06/2017
US	INDIAN UST R6	Underground Storage Tanks on Indian Land	EPA Region 6	04/24/2017	07/27/2017	12/08/2017
US	INDIAN UST R7	Underground Storage Tanks on Indian Land	EPA Region 7	05/02/2017	07/27/2017	10/06/2017
US	INDIAN UST R8	Underground Storage Tanks on Indian Land	EPA Region 8	05/01/2017	07/27/2017	10/13/2017
US	INDIAN UST R9	Underground Storage Tanks on Indian Land	EPA Region 9	04/13/2017	07/27/2017	10/13/2017
US	INDIAN VCP R1	Voluntary Cleanup Priority Listing	EPA, Region 1	07/27/2015	09/29/2015	02/18/2016
US	INDIAN VCP R7	Voluntary Cleanup Priority Lisitng	EPA, Region 7	03/20/2008	04/22/2008	05/19/2008
US	LEAD SMELTER 1	Lead Smelter Sites	Environmental Protection Agency	01/09/2018	02/06/2018	03/02/2018
US	LEAD SMELTER 2	Lead Smelter Sites	American Journal of Public Health	04/05/2001	10/27/2010	12/02/2010
US	LIENS 2	CERCLA Lien Information	Environmental Protection Agency	12/11/2017	12/22/2017	01/12/2018
US	LUCIS	Land Use Control Information System	Department of the Navy	05/22/2017	06/13/2017	09/15/2017
US	MLTS	Material Licensing Tracking System	Nuclear Regulatory Commission	08/30/2016	09/08/2016	10/21/2016
US	NPL	National Priority List	EPA	12/11/2017	12/22/2017	01/05/2018
US	NPL LIENS	Federal Superfund Liens	EPA	10/15/1991	02/02/1994	03/30/1994
US	ODI	Open Dump Inventory	Environmental Protection Agency	06/30/1985	08/09/2004	09/17/2004
US	PADS	PCB Activity Database System	EPA	06/01/2017	06/09/2017	10/13/2017
US	PCB TRANSFORMER	PCB Transformer Registration Database	Environmental Protection Agency	05/24/2017	11/30/2017	12/15/2017
US	PRP	Potentially Responsible Parties	EPA	10/25/2013	10/17/2014	10/20/2014
US	Proposed NPL	Proposed National Priority List Sites	EPA	12/11/2017	12/22/2017	01/05/2018
US	RAATS	RCRA Administrative Action Tracking System	EPA	04/17/1995	07/03/1995	08/07/1995
US	RADINFO	Radiation Information Database	Environmental Protection Agency	10/02/2017	10/05/2017	10/13/2017
US	RCRA NonGen / NLR	RCRA - Non Generators / No Longer Regulated	Environmental Protection Agency	12/11/2017	12/26/2017	02/09/2018
US	RCRA-CESQG	RCRA - Conditionally Exempt Small Quantity Generators	Environmental Protection Agency	12/11/2017	12/26/2017	02/09/2018
US	RCRA-LQG	RCRA - Large Quantity Generators	Environmental Protection Agency	12/11/2017	12/26/2017	02/09/2018
US	RCRA-SQG	RCRA - Small Quantity Generators	Environmental Protection Agency	12/11/2017	12/26/2017	02/09/2018
US	RCRA-TSDF	RCRA - Treatment, Storage and Disposal	Environmental Protection Agency	12/11/2017	12/26/2017	02/09/2018

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
US	RMP	Risk Management Plans	Environmental Protection Agency	11/02/2017	11/17/2017	12/08/2017
US	ROD	Records Of Decision	EPA	12/11/2017	12/22/2017	01/12/2018
US	SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing	Environmental Protection Agency	01/01/2017	02/03/2017	04/07/2017
US	SEMS	Superfund Enterprise Management System	EPA	12/11/2017	12/22/2017	01/12/2018
US	SEMS-ARCHIVE	Superfund Enterprise Management System Archive	EPA	12/11/2017	12/22/2017	01/12/2018
US	SSTS	Section 7 Tracking Systems	EPA	12/31/2009	12/10/2010	02/25/2011
US	TRIS	Toxic Chemical Release Inventory System	EPA	12/31/2016	01/10/2018	01/12/2018
US	TSCA	Toxic Substances Control Act	EPA	12/31/2016	06/21/2017	01/05/2018
US	UMTRA	Uranium Mill Tailings Sites	Department of Energy	06/23/2017	10/11/2017	11/03/2017
US	US AIRS (AFS)	Aerometric Information Retrieval System Facility Subsystem (	EPA	10/12/2016	10/26/2016	02/03/2017
US	US AIRS MINOR	Air Facility System Data	EPA	10/12/2016	10/26/2016	02/03/2017
US	US BROWNFIELDS	A Listing of Brownfields Sites	Environmental Protection Agency	01/19/2018	01/19/2018	02/09/2018
US	US CDL	Clandestine Drug Labs	Drug Enforcement Administration	01/09/2018	01/24/2018	02/09/2018
US	US ENG CONTROLS	Engineering Controls Sites List	Environmental Protection Agency	11/13/2017	11/27/2017	02/09/2018
US	US FIN ASSUR	Financial Assurance Information	Environmental Protection Agency	01/11/2018	01/19/2018	03/02/2018
US	US HIST CDL	National Clandestine Laboratory Register	Drug Enforcement Administration	01/19/2018	01/24/2018	02/09/2018
US	US INST CONTROL	Sites with Institutional Controls	Environmental Protection Agency	11/13/2017	11/27/2017	02/09/2018
US	US MINES	Mines Master Index File	Department of Labor, Mine Safety and Health A	10/29/2017	11/28/2017	01/12/2018
US	US MINES 2	Ferrous and Nonferrous Metal Mines Database Listing	USGS	12/05/2005	02/29/2008	04/18/2008
US	US MINES 3	Active Mines & Mineral Plants Database Listing	USGS	04/14/2011	06/08/2011	09/13/2011
US	UXO	Unexploded Ordnance Sites	Department of Defense	09/30/2016	10/31/2017	01/12/2018
CT	CT MANIFEST	Hazardous Waste Manifest Data	Department of Energy & Environmental Protecti	01/03/2018	02/14/2018	03/22/2018
NJ	NJ MANIFEST	Manifest Information	Department of Environmental Protection	12/31/2016	04/11/2017	07/27/2017
NY	NY MANIFEST	Facility and Manifest Data	Department of Environmental Conservation	12/31/2017	01/31/2018	03/09/2018
PA	PA MANIFEST	Manifest Information	Department of Environmental Protection	12/31/2016	07/25/2017	09/25/2017
RI	RI MANIFEST	Manifest information	Department of Environmental Management	12/31/2017	02/23/2018	04/09/2018
WI	WI MANIFEST	Manifest Information	Department of Natural Resources	12/31/2016	04/13/2017	07/14/2017
US	AHA Hospitals	Sensitive Receptor: AHA Hospitals	American Hospital Association, Inc.			
US	Medical Centers	Sensitive Receptor: Medical Centers	Centers for Medicare & Medicaid Services			
US	Nursing Homes	Sensitive Receptor: Nursing Homes	National Institutes of Health			
US	Public Schools	Sensitive Receptor: Public Schools	National Center for Education Statistics			
US	Private Schools	Sensitive Receptor: Private Schools	National Center for Education Statistics			
CA	Daycare Centers	Sensitive Receptor: Licensed Facilities	Department of Social Services			
US	Flood Zones	100-year and 500-year flood zones	Emergency Management Agency (FEMA)			
US	NWI	National Wetlands Inventory	U.S. Fish and Wildlife Service			
CA	State Wetlands	Wetland Inventory	Department of Fish & Game			
US	Topographic Map	Current USGS 7.5 Minute Topographic Map	U.S. Geological Survey			
US	Oil/Gas Pipelines		PennWell Corporation			
US	Electric Power Transmission Line Data		PennWell Corporation			

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date

STREET AND ADDRESS INFORMATION

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GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

PROPOSED KAISER FACILITY
576 EAST LOCUST AVENUE
FRESNO, CA 93720

TARGET PROPERTY COORDINATES

Latitude (North):	36.839958 - 36° 50' 23.85''
Longitude (West):	119.776264 - 119° 46' 34.55''
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	252428.7
UTM Y (Meters):	4080513.8
Elevation:	343 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	5603170 FRESNO NORTH, CA
Version Date:	2012

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principal investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

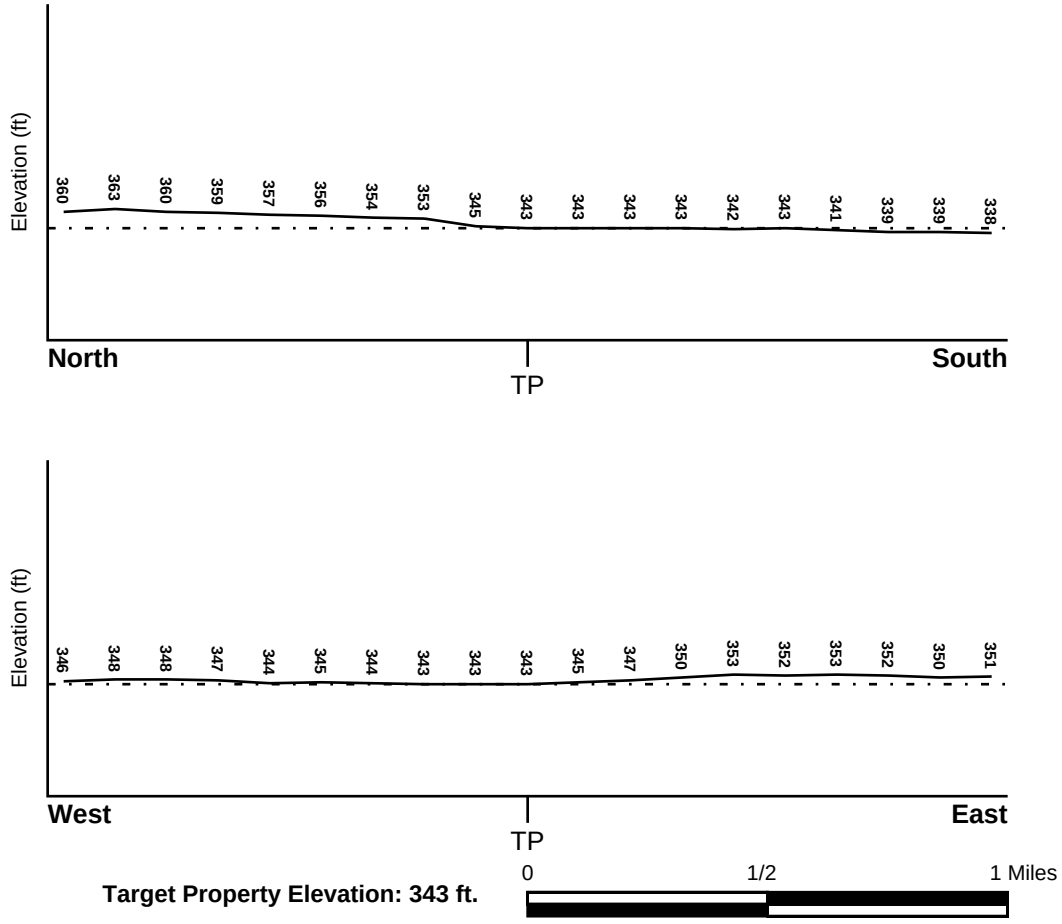
TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General SSW

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Flood Plain Panel at Target Property	FEMA Source Type
06019C1560H	FEMA FIRM Flood data

Additional Panels in search area:	FEMA Source Type
Not Reported	

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
FRESNO NORTH	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data*:

Search Radius:	1.25 miles
Status:	Not found

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

* ©1996 Site−specific hydrogeological data gathered by CERCLIS Alerts, Inc., Bainbridge Island, WA. All rights reserved. All of the information and opinions presented are those of the cited EPA report(s), which were completed under a Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) investigation.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

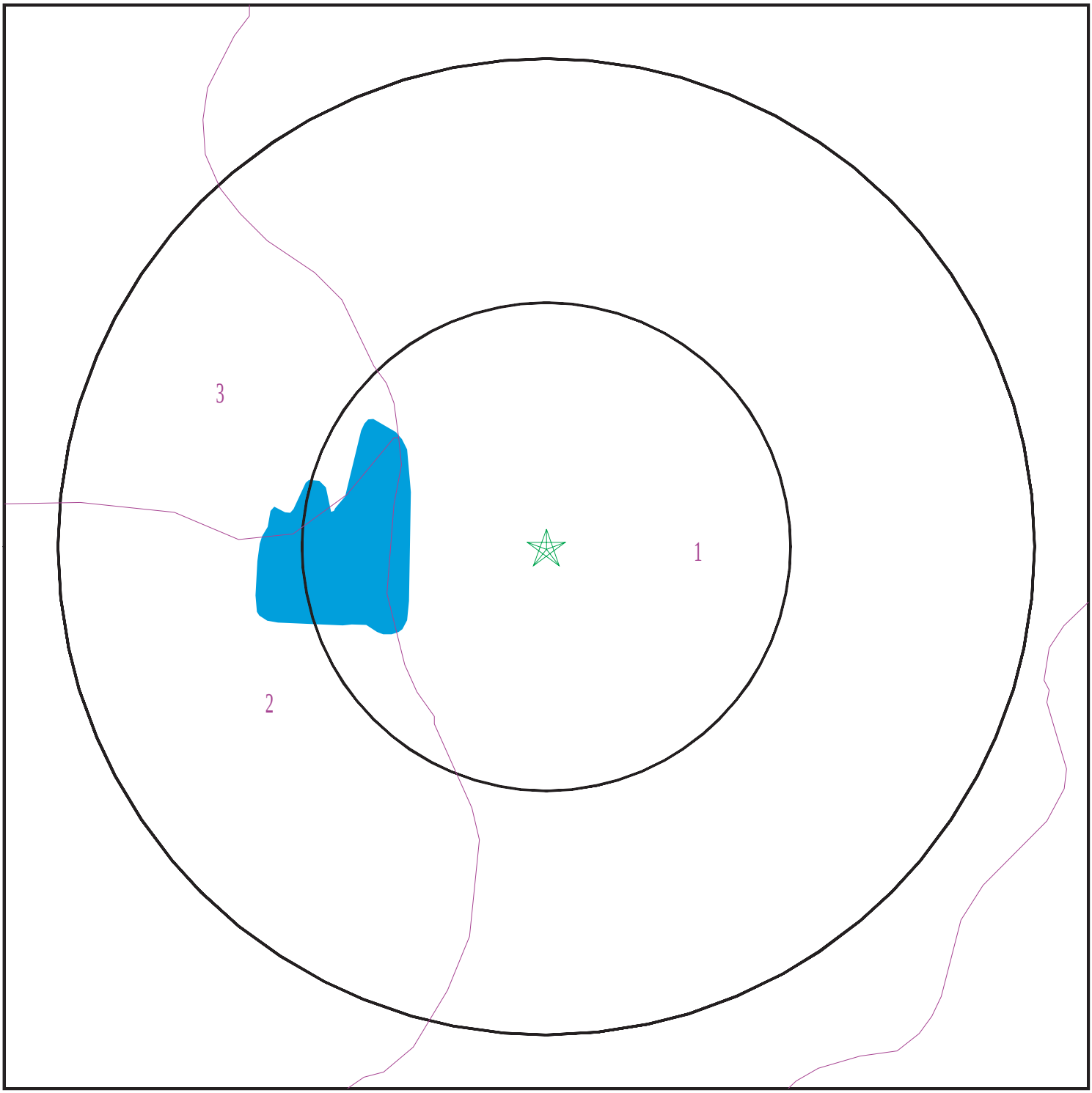
Era:	Cenozoic
System:	Quaternary
Series:	Quaternary
Code:	Q *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Stratifed Sequence

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 5252546.1s



Target Property
SSURGO Soil
Water

0 1/16 1/8 1/4 Miles

N

SITE NAME:	Proposed Kaiser Facility	CLIENT:	Terracon
ADDRESS:	576 East Locust Avenue Fresno CA 93720	CONTACT:	Megan Davey
LAT/LONG:	36.839958 / 119.776264	INQUIRY #:	5252546.1s
		DATE:	April 10, 2018 9:06 am

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GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: SAN JOAQUIN

Soil Surface Texture: loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Moderately well drained

Hydric Status: Partially hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	16 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 6.5 Min: 5.6
2	16 inches	27 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand.	Max: 4 Min: 1.4	Max: 7.3 Min: 6.1
3	27 inches	29 inches	clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.42 Min: 0.01	Max: 7.3 Min: 6.1
4	29 inches	35 inches	cemented	Not reported	Not reported	Max: 0 Min: 0	Max: Min:

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
5	35 inches	59 inches	coarse sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 1.4 Min: 0.42	Max: 7.3 Min: 6.1

Soil Map ID: 2

Soil Component Name: SAN JOAQUIN

Soil Surface Texture: loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Moderately well drained

Hydric Status: Partially hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 6.5 Min: 5.6
2	7 inches	18 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand.	Max: 4 Min: 1.4	Max: 7.3 Min: 6.1

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
3	18 inches	22 inches	clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.42 Min: 0.01	Max: 7.3 Min: 6.1
4	22 inches	35 inches	cemented	Not reported	Not reported	Max: 0 Min: 0	Max: Min:
5	35 inches	59 inches	coarse sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 1.4 Min: 0.42	Max: 7.3 Min: 6.1

Soil Map ID: 3

Soil Component Name: SAN JOAQUIN

Soil Surface Texture: sandy loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Moderately well drained

Hydric Status: Partially hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 6.5 Min: 5.6

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	7 inches	11 inches	clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.42 Min: 0.01	Max: 7.3 Min: 6.1
3	11 inches	24 inches	cemented	Not reported	Not reported	Max: 0 Min: 0	Max: Min:
4	24 inches	59 inches	coarse sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 1.4 Min: 0.42	Max: 7.3 Min: 6.1

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
A3	USGS40000178535	1/4 - 1/2 Mile NNE
4	USGS40000178347	1/4 - 1/2 Mile SW
14	USGS40000178341	1/2 - 1 Mile WSW
15	USGS40000178533	1/2 - 1 Mile NE
C17	USGS40000178271	1/2 - 1 Mile SSW
20	USGS40000178357	1/2 - 1 Mile ESE
22	USGS40000178687	1/2 - 1 Mile North

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

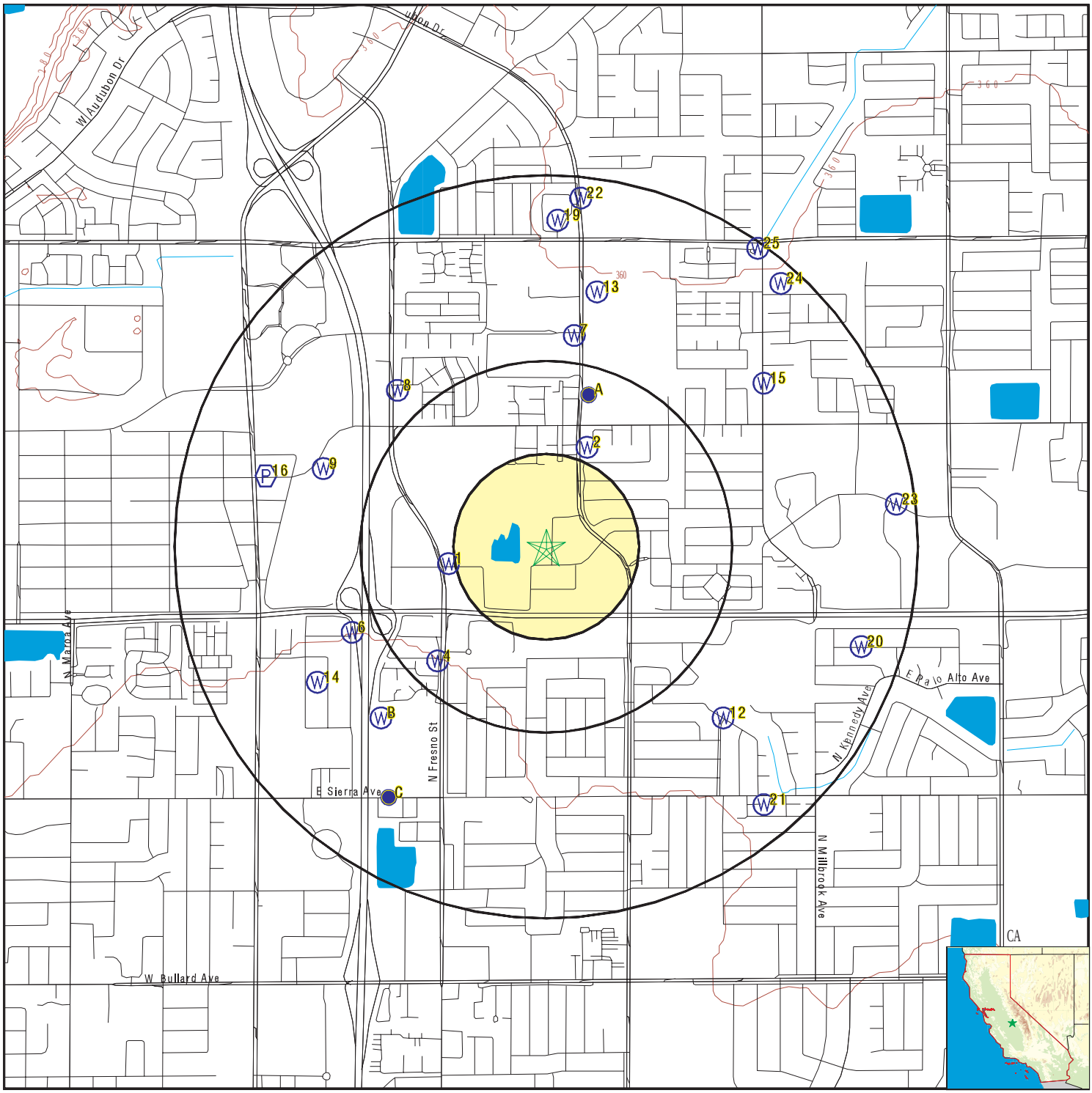
MAP ID	WELL ID	LOCATION FROM TP
16	CA1010026	1/2 - 1 Mile WNW

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
1	CADW60000027124	1/4 - 1/2 Mile West
2	11144	1/4 - 1/2 Mile NNE
A5	CADW60000002505	1/4 - 1/2 Mile NNE
6	11608	1/2 - 1 Mile WSW
7	CADW60000030036	1/2 - 1 Mile North
8	11143	1/2 - 1 Mile NW
9	11140	1/2 - 1 Mile WNW
B10	11607	1/2 - 1 Mile SW
B11	11610	1/2 - 1 Mile SW
12	11606	1/2 - 1 Mile SE
13	CADW60000030035	1/2 - 1 Mile NNE
C18	11609	1/2 - 1 Mile SSW
19	CADW60000015213	1/2 - 1 Mile North
21	CADW60000030001	1/2 - 1 Mile SE
23	11147	1/2 - 1 Mile East
24	11146	1/2 - 1 Mile NE
25	CADW60000002504	1/2 - 1 Mile NE

PHYSICAL SETTING SOURCE MAP - 5252546.1s



- County Boundary
- Major Roads
- Contour Lines
- Earthquake Fault Lines
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons
- Groundwater Flow Direction
- Indeterminate Groundwater Flow at Location
- Groundwater Flow Varies at Location
- Closest Hydrogeological Data
- Oil, gas or related wells

SITE NAME:	Proposed Kaiser Facility	CLIENT:	Terracon
ADDRESS:	576 East Locust Avenue Fresno CA 93720	CONTACT:	Megan Davey
		INQUIRY #:	5252546.1s
LAT/LONG:	36.839958 / 119.776264	DATE:	April 10, 2018 9:06 am

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GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

1
West
1/4 - 1/2 Mile
Higher

CA WELLS **CADW60000027124**

Objectid:	27124
Latitude:	36.8393
Longitude:	-119.781
Site code:	368393N1197810W001
State well numbe:	12S20E34N002M
Local well name:	''
Well use id:	6
Well use descrip:	Unknown
County id:	10
County name:	Fresno
Basin code:	'5-22.08'
Basin desc:	Kings
Dwr region id:	80237
Dwr region:	South Central Region Office
Site id:	CADW60000027124

2
NNE
1/4 - 1/2 Mile
Higher

CA WELLS **11144**

Water System Information:

Prime Station Code:	12S/20E-34K01 M	User ID:	AGE
FRDS Number:	1010007226	County:	Fresno
District Number:	11	Station Type:	WELL/AMBNT/MUN/INTAKE
Water Type:	Well/Groundwater	Well Status:	Active Untreated
Source Lat/Long:	365038.0 1194624.0	Precision:	100 Feet (one Second)
Source Name:	WELL 092		
System Number:	1010007		
System Name:	FRESNO, CITY OF		
Organization That Operates System:			
	2326 FRESNO STREET		
	FRESNO, CA 93721-2988		
Pop Served:	390350	Connections:	99005
Area Served:	CITY OF FRESNO		
Sample Collected:	18-JUN-12	Findings:	1.04 PCI/L
Chemical:	GROSS ALPHA COUNTING ERROR		
Sample Collected:	18-JUN-12	Findings:	0.427 PCI/L
Chemical:	RADIUM 228 COUNTING ERROR		
Sample Collected:	18-JUN-12	Findings:	170. US
Chemical:	SPECIFIC CONDUCTANCE		
Sample Collected:	18-JUN-12	Findings:	7.9
Chemical:	PH, LABORATORY		

Sample Collected:	18-JUN-12	Findings:	62. MG/L
Chemical:	ALKALINITY (TOTAL) AS CACO3		
Sample Collected:	18-JUN-12	Findings:	76. MG/L
Chemical:	BICARBONATE ALKALINITY		
Sample Collected:	18-JUN-12	Findings:	57. MG/L
Chemical:	HARDNESS (TOTAL) AS CACO3		
Sample Collected:	18-JUN-12	Findings:	13. MG/L
Chemical:	CALCIUM		
Sample Collected:	18-JUN-12	Findings:	6. MG/L
Chemical:	MAGNESIUM		
Sample Collected:	18-JUN-12	Findings:	9.8 MG/L
Chemical:	SODIUM		
Sample Collected:	18-JUN-12	Findings:	2.3 MG/L
Chemical:	POTASSIUM		
Sample Collected:	18-JUN-12	Findings:	7.4 MG/L
Chemical:	CHLORIDE		
Sample Collected:	18-JUN-12	Findings:	5.3 MG/L
Chemical:	SULFATE		
Sample Collected:	18-JUN-12	Findings:	0.12 MG/L
Chemical:	FLUORIDE (F) (NATURAL-SOURCE)		
Sample Collected:	18-JUN-12	Findings:	11. UG/L
Chemical:	CHROMIUM (TOTAL)		
Sample Collected:	18-JUN-12	Findings:	150. UG/L
Chemical:	IRON		
Sample Collected:	18-JUN-12	Findings:	1.5 UG/L
Chemical:	CHLOROFORM (THM)		
Sample Collected:	18-JUN-12	Findings:	130. MG/L
Chemical:	TOTAL DISSOLVED SOLIDS		
Sample Collected:	18-JUN-12	Findings:	- 0.7
Chemical:	LANGELIER INDEX @ 60 C		
Sample Collected:	18-JUN-12	Findings:	7.2 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	18-JUN-12	Findings:	1.5 UG/L
Chemical:	TOTAL TRIHALOMETHANES		
Sample Collected:	18-JUN-12	Findings:	11.
Chemical:	AGGRSSIVE INDEX (CORROSIVITY)		
Sample Collected:	25-SEP-12	Findings:	7.3 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	30-MAY-13	Findings:	6.5 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	27-MAR-14	Findings:	7.4 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	03-APR-14	Findings:	190. US
Chemical:	SPECIFIC CONDUCTANCE		

Sample Collected:	03-APR-14	Findings:	7.8
Chemical:	PH, LABORATORY		
Sample Collected:	03-APR-14	Findings:	77. MG/L
Chemical:	ALKALINITY (TOTAL) AS CACO3		
Sample Collected:	03-APR-14	Findings:	93. MG/L
Chemical:	BICARBONATE ALKALINITY		
Sample Collected:	03-APR-14	Findings:	74. MG/L
Chemical:	HARDNESS (TOTAL) AS CACO3		
Sample Collected:	03-APR-14	Findings:	17. MG/L
Chemical:	CALCIUM		
Sample Collected:	03-APR-14	Findings:	7.7 MG/L
Chemical:	MAGNESIUM		
Sample Collected:	03-APR-14	Findings:	10. MG/L
Chemical:	SODIUM		
Sample Collected:	03-APR-14	Findings:	2.8 MG/L
Chemical:	POTASSIUM		
Sample Collected:	03-APR-14	Findings:	8.1 MG/L
Chemical:	CHLORIDE		
Sample Collected:	03-APR-14	Findings:	6.1 MG/L
Chemical:	SULFATE		
Sample Collected:	03-APR-14	Findings:	160. MG/L
Chemical:	TOTAL DISSOLVED SOLIDS		
Sample Collected:	03-APR-14	Findings:	- 0.59
Chemical:	LANGELIER INDEX @ 60 C		
Sample Collected:	03-APR-14	Findings:	7.3 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	03-APR-14	Findings:	0.25 NTU
Chemical:	TURBIDITY, LABORATORY		
Sample Collected:	03-APR-14	Findings:	11.
Chemical:	AGGRSSIVE INDEX (CORROSIVITY)		
Sample Collected:	14-NOV-14	Findings:	1.7 UG/L
Chemical:	CHROMIUM, HEXAVALENT		
Sample Collected:	27-MAR-15	Findings:	5.1 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	02-MAR-16	Findings:	1. MG/L
Chemical:	NITRATE (AS N)		
Sample Collected:	09-FEB-17	Findings:	220. US
Chemical:	SPECIFIC CONDUCTANCE		
Sample Collected:	09-FEB-17	Findings:	21.9
Chemical:	PH, LABORATORY		
Sample Collected:	09-FEB-17	Findings:	110. MG/L
Chemical:	ALKALINITY (TOTAL) AS CACO3		
Sample Collected:	09-FEB-17	Findings:	130. MG/L
Chemical:	BICARBONATE ALKALINITY		

Sample Collected:	09-FEB-17	Findings:	0.84 MG/L
Chemical:	NITRATE (AS N)		
Sample Collected:	09-FEB-17	Findings:	68. MG/L
Chemical:	HARDNESS (TOTAL) AS CACO3		
Sample Collected:	09-FEB-17	Findings:	17. MG/L
Chemical:	CALCIUM		
Sample Collected:	09-FEB-17	Findings:	6.4 MG/L
Chemical:	MAGNESIUM		
Sample Collected:	09-FEB-17	Findings:	22. MG/L
Chemical:	SODIUM		
Sample Collected:	09-FEB-17	Findings:	2.3 MG/L
Chemical:	POTASSIUM		
Sample Collected:	09-FEB-17	Findings:	6.6 MG/L
Chemical:	CHLORIDE		
Sample Collected:	09-FEB-17	Findings:	4.7 MG/L
Chemical:	SULFATE		
Sample Collected:	09-FEB-17	Findings:	0.11 MG/L
Chemical:	FLUORIDE (F) (NATURAL-SOURCE)		
Sample Collected:	09-FEB-17	Findings:	5.1 UG/L
Chemical:	ARSENIC		
Sample Collected:	09-FEB-17	Findings:	1.9 UG/L
Chemical:	CHROMIUM, HEXAVALENT		
Sample Collected:	09-FEB-17	Findings:	170. MG/L
Chemical:	TOTAL DISSOLVED SOLIDS		
Sample Collected:	09-FEB-17	Findings:	0.15 NTU
Chemical:	TURBIDITY, LABORATORY		
Sample Collected:	09-FEB-17	Findings:	11.
Chemical:	AGGRSSIVE INDEX (CORROSIVITY)		
Sample Collected:	09-FEB-17	Findings:	0.84 MG/L
Chemical:	NITRATE + NITRITE (AS N)		

A3
NNE
1/4 - 1/2 Mile
Higher

FED USGS **USGS40000178535**

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-365045119461501		
Monloc name:	012S020E34G001M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18030012	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	36.8457826
Longitude:	-119.7743125	Sourcemap scale:	24000

Horiz Acc measure:	1	Horiz Acc measure units:	minutes
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	353.00
Vert measure units:	feet	Vertacc measure val:	1
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Central Valley aquifer system		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19600107	Welldepth:	136
Welldepth units:	ft	Wellholedepth:	145
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1963-10-15	86.30	

4
SW
1/4 - 1/2 Mile
Lower

FED USGS **USGS40000178347**

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-365008119465001		
Monloc name:	013S020E03C001M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18030012	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	36.8355048
Longitude:	-119.7815349	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	minutes
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	338.00
Vert measure units:	feet	Vertacc measure val:	52
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Central Valley aquifer system		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	168
Welldepth units:	ft	Wellholedepth:	200
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 0

A5
NNE
1/4 - 1/2 Mile
Higher

CA WELLS **CADW60000002505**

Objectid:	2505
Latitude:	36.846
Longitude:	-119.7741
Site code:	368460N1197741W001
State well numbe:	12S20E34G001M
Local well name:	''
Well use id:	6
Well use descrip:	Unknown
County id:	10
County name:	Fresno
Basin code:	'5-22.08'
Basin desc:	Kings
Dwr region id:	80237
Dwr region:	South Central Region Office
Site id:	CADW60000002505

6
WSW **CA WELLS** **11608**
1/2 - 1 Mile
Lower

Water System Information:

Prime Station Code:	13S/20E-03C02 M	User ID:	AGE
FRDS Number:	1010026009	County:	Fresno
District Number:	11	Station Type:	WELL/AMBNT/MUN/INTAKE
Water Type:	Well/Groundwater	Well Status:	Active Untreated
Source Lat/Long:	365012.0 1194705.0	Precision:	1,000 Feet (10 Seconds)
Source Name:	WELL 09		
System Number:	1010026		
System Name:	PINEDALE CWD		
Organization That Operates System:			
	480 W BIRCH STREET		
	PINEDALE 93650		
Pop Served:	8490	Connections:	1899
Area Served:	PINEDALE		
Sample Collected:	27-NOV-12	Findings:	9.5 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	22-OCT-13	Findings:	9.1 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	09-DEC-14	Findings:	8.6 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	05-MAR-15	Findings:	220. US
Chemical:	SPECIFIC CONDUCTANCE		
Sample Collected:	05-MAR-15	Findings:	8.
Chemical:	PH, LABORATORY		
Sample Collected:	05-MAR-15	Findings:	89. MG/L
Chemical:	ALKALINITY (TOTAL) AS CACO3		
Sample Collected:	05-MAR-15	Findings:	110. MG/L
Chemical:	BICARBONATE ALKALINITY		

Sample Collected:	05-MAR-15	Findings:	78. MG/L
Chemical:	HARDNESS (TOTAL) AS CACO3		
Sample Collected:	05-MAR-15	Findings:	17. MG/L
Chemical:	CALCIUM		
Sample Collected:	05-MAR-15	Findings:	8.4 MG/L
Chemical:	MAGNESIUM		
Sample Collected:	05-MAR-15	Findings:	14. MG/L
Chemical:	SODIUM		
Sample Collected:	05-MAR-15	Findings:	5.3 MG/L
Chemical:	CHLORIDE		
Sample Collected:	05-MAR-15	Findings:	5.7 MG/L
Chemical:	SULFATE		
Sample Collected:	05-MAR-15	Findings:	2.1 UG/L
Chemical:	ARSENIC		
Sample Collected:	05-MAR-15	Findings:	200. MG/L
Chemical:	TOTAL DISSOLVED SOLIDS		
Sample Collected:	05-MAR-15	Findings:	7.8 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	05-AUG-15	Findings:	8.1 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	07-DEC-16	Findings:	1.7 MG/L
Chemical:	NITRATE (AS N)		

7
North
1/2 - 1 Mile
Higher

CA WELLS **CADW60000030036**

Objectid:	30036
Latitude:	36.8482
Longitude:	-119.7749
Site code:	368482N1197749W001
State well numbe:	12S20E34C001M
Local well name:	''
Well use id:	6
Well use descrip:	Unknown
County id:	10
County name:	Fresno
Basin code:	'5-22.08'
Basin desc:	Kings
Dwr region id:	80237
Dwr region:	South Central Region Office
Site id:	CADW60000030036

8
NW
1/2 - 1 Mile
Higher

CA WELLS **11143**

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Water System Information:

Prime Station Code:	12S/20E-34E01 M	User ID:	AGE
FRDS Number:	1010026006	County:	Fresno
District Number:	11	Station Type:	WELL/AMBNT/MUN/INTAKE
Water Type:	Well/Groundwater	Well Status:	Active Untreated
Source Lat/Long:	365046.0 1194657.0	Precision:	100 Feet (one Second)
Source Name:	WELL 06		
System Number:	1010026		
System Name:	PINEDALE CWD		
Organization That Operates System:			
	480 W BIRCH STREET PINEDALE 93650		
Pop Served:	8490	Connections:	1899
Area Served:	PINEDALE		
Sample Collected:	27-NOV-12	Findings:	6.5 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	22-OCT-13	Findings:	5.8 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	05-AUG-15	Findings:	6.3 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	13-SEP-16	Findings:	190. US
Chemical:	SPECIFIC CONDUCTANCE		
Sample Collected:	13-SEP-16	Findings:	7.2
Chemical:	PH, LABORATORY		
Sample Collected:	13-SEP-16	Findings:	72. MG/L
Chemical:	ALKALINITY (TOTAL) AS CACO3		
Sample Collected:	13-SEP-16	Findings:	88. MG/L
Chemical:	BICARBONATE ALKALINITY		
Sample Collected:	13-SEP-16	Findings:	1.5 MG/L
Chemical:	NITRATE (AS N)		
Sample Collected:	13-SEP-16	Findings:	16. MG/L
Chemical:	CALCIUM		
Sample Collected:	13-SEP-16	Findings:	6.9 MG/L
Chemical:	MAGNESIUM		
Sample Collected:	13-SEP-16	Findings:	12. MG/L
Chemical:	SODIUM		
Sample Collected:	13-SEP-16	Findings:	4.8 MG/L
Chemical:	CHLORIDE		
Sample Collected:	13-SEP-16	Findings:	4.3 MG/L
Chemical:	SULFATE		
Sample Collected:	13-SEP-16	Findings:	3.2 UG/L
Chemical:	ARSENIC		
Sample Collected:	13-SEP-16	Findings:	170. MG/L
Chemical:	TOTAL DISSOLVED SOLIDS		
Sample Collected:	13-SEP-16	Findings:	0.26 NTU
Chemical:	TURBIDITY, LABORATORY		

Sample Collected:	07-DEC-16	Findings:	1.5 MG/L
Chemical:	NITRATE (AS N)		

9
WNW **CA WELLS** **11140**
1/2 - 1 Mile
Higher

Water System Information:

Prime Station Code:	12S/20E-33J01 M	User ID:	AGE
FRDS Number:	1010007278	County:	Fresno
District Number:	11	Station Type:	WELL/AMBNT/MUN/INTAKE
Water Type:	Well/Groundwater	Well Status:	Active Untreated
Source Lat/Long:	365035.0 1194710.0	Precision:	1,000 Feet (10 Seconds)
Source Name:	WELL 144		
System Number:	1010007		
System Name:	FRESNO, CITY OF		
Organization That Operates System:			
	2326 FRESNO STREET FRESNO, CA 93721-2988		
Pop Served:	390350	Connections:	99005
Area Served:	CITY OF FRESNO		
Sample Collected:	16-MAR-12	Findings:	5.4 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	30-MAY-13	Findings:	5.5 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	27-MAR-14	Findings:	5.8 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	03-APR-14	Findings:	190. US
Chemical:	SPECIFIC CONDUCTANCE		
Sample Collected:	03-APR-14	Findings:	7.9
Chemical:	PH, LABORATORY		
Sample Collected:	03-APR-14	Findings:	91. MG/L
Chemical:	ALKALINITY (TOTAL) AS CACO3		
Sample Collected:	03-APR-14	Findings:	110. MG/L
Chemical:	BICARBONATE ALKALINITY		
Sample Collected:	03-APR-14	Findings:	72. MG/L
Chemical:	HARDNESS (TOTAL) AS CACO3		
Sample Collected:	03-APR-14	Findings:	17. MG/L
Chemical:	CALCIUM		
Sample Collected:	03-APR-14	Findings:	7.4 MG/L
Chemical:	MAGNESIUM		
Sample Collected:	03-APR-14	Findings:	13. MG/L
Chemical:	SODIUM		
Sample Collected:	03-APR-14	Findings:	3. MG/L
Chemical:	POTASSIUM		
Sample Collected:	03-APR-14	Findings:	4.4 MG/L
Chemical:	CHLORIDE		

Sample Collected:	03-APR-14	Findings:	4.8 MG/L
Chemical:	SULFATE		
Sample Collected:	03-APR-14	Findings:	2.1 UG/L
Chemical:	ARSENIC		
Sample Collected:	03-APR-14	Findings:	170. MG/L
Chemical:	TOTAL DISSOLVED SOLIDS		
Sample Collected:	03-APR-14	Findings:	- 0.42
Chemical:	LANGELIER INDEX @ 60 C		
Sample Collected:	03-APR-14	Findings:	5.7 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	03-APR-14	Findings:	11.
Chemical:	AGGRSSIVE INDEX (CORROSIVITY)		
Sample Collected:	13-NOV-14	Findings:	3.1 UG/L
Chemical:	CHROMIUM, HEXAVALENT		
Sample Collected:	27-MAR-15	Findings:	5.3 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	02-MAR-16	Findings:	1.2 MG/L
Chemical:	NITRATE (AS N)		
Sample Collected:	09-FEB-17	Findings:	200. US
Chemical:	SPECIFIC CONDUCTANCE		
Sample Collected:	09-FEB-17	Findings:	22.
Chemical:	PH, LABORATORY		
Sample Collected:	09-FEB-17	Findings:	100. MG/L
Chemical:	ALKALINITY (TOTAL) AS CACO3		
Sample Collected:	09-FEB-17	Findings:	120. MG/L
Chemical:	BICARBONATE ALKALINITY		
Sample Collected:	09-FEB-17	Findings:	1.2 MG/L
Chemical:	NITRATE (AS N)		
Sample Collected:	09-FEB-17	Findings:	72. MG/L
Chemical:	HARDNESS (TOTAL) AS CACO3		
Sample Collected:	09-FEB-17	Findings:	16. MG/L
Chemical:	CALCIUM		
Sample Collected:	09-FEB-17	Findings:	7.7 MG/L
Chemical:	MAGNESIUM		
Sample Collected:	09-FEB-17	Findings:	14. MG/L
Chemical:	SODIUM		
Sample Collected:	09-FEB-17	Findings:	3. MG/L
Chemical:	POTASSIUM		
Sample Collected:	09-FEB-17	Findings:	4.4 MG/L
Chemical:	CHLORIDE		
Sample Collected:	09-FEB-17	Findings:	4.2 MG/L
Chemical:	SULFATE		
Sample Collected:	09-FEB-17	Findings:	0.12 MG/L
Chemical:	FLUORIDE (F) (NATURAL-SOURCE)		

Sample Collected:	09-FEB-17	Findings:	3.6 UG/L
Chemical:	CHROMIUM, HEXAVALENT		
Sample Collected:	09-FEB-17	Findings:	180. MG/L
Chemical:	TOTAL DISSOLVED SOLIDS		
Sample Collected:	09-FEB-17	Findings:	0.19 NTU
Chemical:	TURBIDITY, LABORATORY		
Sample Collected:	09-FEB-17	Findings:	11.
Chemical:	AGGRSSIVE INDEX (CORROSIVITY)		
Sample Collected:	09-FEB-17	Findings:	1.2 MG/L
Chemical:	NITRATE + NITRITE (AS N)		

B10
SW **CA WELLS** **11607**
1/2 - 1 Mile
Lower

Water System Information:

Prime Station Code:	13S/20E-03C01 M	User ID:	AGE
FRDS Number:	1010026004	County:	Fresno
District Number:	11	Station Type:	WELL/AMBNT/MUN/INTAKE/SUPPLY
Water Type:	Well/Groundwater	Well Status:	Destroyed
Source Lat/Long:	365000.0 1194700.0	Precision:	Undefined
Source Name:	WELL 04 - DESTROYED		
System Number:	1010026		
System Name:	PINEDALE CWD		
Organization That Operates System:			
	480 W BIRCH STREET		
	PINEDALE 93650		
Pop Served:	8490	Connections:	1899
Area Served:	PINEDALE		

B11
SW **CA WELLS** **11610**
1/2 - 1 Mile
Lower

Water System Information:

Prime Station Code:	13S/20E-03H02 M	User ID:	AGE
FRDS Number:	1010007209	County:	Fresno
District Number:	11	Station Type:	WELL/AMBNT/MUN/INTAKE/SUPPLY
Water Type:	Well/Groundwater	Well Status:	Active Untreated
Source Lat/Long:	365000.0 1194700.0	Precision:	Undefined
Source Name:	WELL 075		
System Number:	1010007		
System Name:	FRESNO, CITY OF		
Organization That Operates System:			
	2326 FRESNO STREET		
	FRESNO, CA 93721-2988		
Pop Served:	390350	Connections:	99005
Area Served:	CITY OF FRESNO		

Sample Collected:	15-MAR-12	Findings:	8.1 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	23-MAY-13	Findings:	13. MG/L
Chemical:	NITRATE (AS NO3)		

12
SE
1/2 - 1 Mile
Higher

CA WELLS **11606**

Water System Information:

Prime Station Code:	13S/20E-02G01 M	User ID:	AGE
FRDS Number:	1010007210	County:	Fresno
District Number:	11	Station Type:	WELL/AMBNT/MUN/INTAKE/SUPPLY
Water Type:	Well/Groundwater	Well Status:	Active Untreated
Source Lat/Long:	365000.0 1194600.0	Precision:	Undefined
Source Name:	WELL 076		
System Number:	1010007		
System Name:	FRESNO, CITY OF		
Organization That Operates System:			
	2326 FRESNO STREET		
	FRESNO, CA 93721-2988		
Pop Served:	390350	Connections:	99005
Area Served:	CITY OF FRESNO		
Sample Collected:	15-MAR-12	Findings:	11. MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	23-MAY-13	Findings:	3.31 PCI/L
Chemical:	GROSS ALPHA		
Sample Collected:	23-MAY-13	Findings:	0.311 PCI/L
Chemical:	GROSS ALPHA COUNTING ERROR		
Sample Collected:	23-MAY-13	Findings:	12. MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	23-MAY-13	Findings:	1.64 PCI/L
Chemical:	GROSS ALPHA MDA95		
Sample Collected:	10-JUL-13	Findings:	0.191 PCI/L
Chemical:	GROSS ALPHA COUNTING ERROR		
Sample Collected:	10-JUL-13	Findings:	1.16 PCI/L
Chemical:	GROSS ALPHA MDA95		
Sample Collected:	18-AUG-15	Findings:	0.359 PCI/L
Chemical:	RADIUM 228 COUNTING ERROR		
Sample Collected:	18-AUG-15	Findings:	380. US
Chemical:	SPECIFIC CONDUCTANCE		
Sample Collected:	18-AUG-15	Findings:	7.8
Chemical:	PH, LABORATORY		
Sample Collected:	18-AUG-15	Findings:	160. MG/L
Chemical:	ALKALINITY (TOTAL) AS CACO3		
Sample Collected:	18-AUG-15	Findings:	200. MG/L
Chemical:	BICARBONATE ALKALINITY		

Sample Collected:	18-AUG-15	Findings:	2.8 MG/L
Chemical:	NITRATE (AS N)		
Sample Collected:	18-AUG-15	Findings:	150. MG/L
Chemical:	HARDNESS (TOTAL) AS CACO3		
Sample Collected:	18-AUG-15	Findings:	34. MG/L
Chemical:	CALCIUM		
Sample Collected:	18-AUG-15	Findings:	16. MG/L
Chemical:	MAGNESIUM		
Sample Collected:	18-AUG-15	Findings:	17. MG/L
Chemical:	SODIUM		
Sample Collected:	18-AUG-15	Findings:	3.2 MG/L
Chemical:	POTASSIUM		
Sample Collected:	18-AUG-15	Findings:	9.7 MG/L
Chemical:	CHLORIDE		
Sample Collected:	18-AUG-15	Findings:	10. MG/L
Chemical:	SULFATE		
Sample Collected:	18-AUG-15	Findings:	3.7 UG/L
Chemical:	CHROMIUM, HEXAVALENT		
Sample Collected:	18-AUG-15	Findings:	0.269 PCI/L
Chemical:	GROSS ALPHA COUNTING ERROR		
Sample Collected:	18-AUG-15	Findings:	1.2e-002 UG/L
Chemical:	DIBROMOCHLOROPROPANE (DBCP)		
Sample Collected:	18-AUG-15	Findings:	270. MG/L
Chemical:	TOTAL DISSOLVED SOLIDS		
Sample Collected:	18-AUG-15	Findings:	2.e-003
Chemical:	LANGELIER INDEX @ 60 C		
Sample Collected:	18-AUG-15	Findings:	0.12 NTU
Chemical:	TURBIDITY, LABORATORY		
Sample Collected:	18-AUG-15	Findings:	12.
Chemical:	AGGRSSIVE INDEX (CORROSIVITY)		
Sample Collected:	18-AUG-15	Findings:	0.758 PCI/L
Chemical:	GROSS ALPHA MDA95		
Sample Collected:	02-MAR-16	Findings:	3.2 MG/L
Chemical:	NITRATE (AS N)		
Sample Collected:	09-FEB-17	Findings:	320. US
Chemical:	SPECIFIC CONDUCTANCE		
Sample Collected:	09-FEB-17	Findings:	21.8
Chemical:	PH, LABORATORY		
Sample Collected:	09-FEB-17	Findings:	150. MG/L
Chemical:	ALKALINITY (TOTAL) AS CACO3		
Sample Collected:	09-FEB-17	Findings:	180. MG/L
Chemical:	BICARBONATE ALKALINITY		
Sample Collected:	09-FEB-17	Findings:	2.6 MG/L
Chemical:	NITRATE (AS N)		

Sample Collected:	09-FEB-17	Findings:	140. MG/L
Chemical:	HARDNESS (TOTAL) AS CACO3		
Sample Collected:	09-FEB-17	Findings:	30. MG/L
Chemical:	CALCIUM		
Sample Collected:	09-FEB-17	Findings:	15. MG/L
Chemical:	MAGNESIUM		
Sample Collected:	09-FEB-17	Findings:	16. MG/L
Chemical:	SODIUM		
Sample Collected:	09-FEB-17	Findings:	3. MG/L
Chemical:	POTASSIUM		
Sample Collected:	09-FEB-17	Findings:	7.7 MG/L
Chemical:	CHLORIDE		
Sample Collected:	09-FEB-17	Findings:	10. MG/L
Chemical:	SULFATE		
Sample Collected:	09-FEB-17	Findings:	2.8 UG/L
Chemical:	CHROMIUM, HEXAVALENT		
Sample Collected:	09-FEB-17	Findings:	5.3e-002 UG/L
Chemical:	DIBROMOCHLOROPROPANE (DBCP)		
Sample Collected:	09-FEB-17	Findings:	240. MG/L
Chemical:	TOTAL DISSOLVED SOLIDS		
Sample Collected:	09-FEB-17	Findings:	0.16 NTU
Chemical:	TURBIDITY, LABORATORY		
Sample Collected:	09-FEB-17	Findings:	12.
Chemical:	AGGRSSIVE INDEX (CORROSIVITY)		
Sample Collected:	09-FEB-17	Findings:	2.6 MG/L
Chemical:	NITRATE + NITRITE (AS N)		

13
NNE
1/2 - 1 Mile
Higher

CA WELLS **CADW60000030035**

Objectid:	30035
Latitude:	36.8499
Longitude:	-119.7738
Site code:	368499N1197738W001
State well numbe:	12S20E34B001M
Local well name:	''
Well use id:	6
Well use descrip:	Unknown
County id:	10
County name:	Fresno
Basin code:	'5-22.08'
Basin desc:	Kings
Dwr region id:	80237
Dwr region:	South Central Region Office
Site id:	CADW60000030035

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

14
WSW
1/2 - 1 Mile
Lower

FED USGS **USGS40000178341**

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-365005119471101		
Monloc name:	013S020E04A001M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18030012	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	36.8346713
Longitude:	-119.7873685	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	minutes
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	342.00
Vert measure units:	feet	Vertacc measure val:	52
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Central Valley aquifer system		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	1949	Welldepth:	110
Welldepth units:	ft	Wellholedepth:	116
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 0

15
NE
1/2 - 1 Mile
Higher

FED USGS **USGS40000178533**

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-365044119454101		
Monloc name:	012S020E35E001M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18030012	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	36.8463383
Longitude:	-119.765701	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	minutes
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	356.00
Vert measure units:	feet	Vertacc measure val:	1
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Central Valley aquifer system		
Formation type:	Not Reported		

Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	110
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1963-10-15	85.48	

16
WNW
1/2 - 1 Mile
Higher

FRDS PWS **CA1010026**

Epa region:	09	State:	CA
Pwsid:	CA1010026		
Pwsname:	PINEDALE COUNTY WATER DISTRICT		
City served:	Not Reported	State served:	CA
Zip served:	Not Reported	Fips county:	06019
Status:	Active	Pop srvd:	8495
Pwssvcconn:	3371	Source:	Groundwater
Pws type:	CWS	Owner:	Local_Govt
Contact:	FRANKLIN, JASON		
Contactor gname:	FRANKLIN, JASON		
Contact phone:	559-439-2362	Contact address1:	480 W. Birch Avenue
Contact address2:	Not Reported	Contact city:	PINEDALE
Contact state:	CA	Contact zip:	93650
Activity code:	A		

Facid:	54762		
Facname:	WELL 05 - TRT CL		
Facility type:	Treatment_plant	Activity code:	A
Treatment obj:	disinfection	Treatment process:	hypochlorination, post

Facid:	54763		
Facname:	WELL 06 - TRT CL		
Facility type:	Treatment_plant	Activity code:	A
Treatment obj:	disinfection	Treatment process:	hypochlorination, post

Facid:	54764		
Facname:	WELL 07 - TRT CL		
Facility type:	Treatment_plant	Activity code:	A
Treatment obj:	disinfection	Treatment process:	hypochlorination, post

Facid:	54765		
Facname:	WELL 08 - TRT CL		
Facility type:	Treatment_plant	Activity code:	A
Treatment obj:	disinfection	Treatment process:	hypochlorination, post

Facid:	54766		
Facname:	WELL 09 - TRT CL		
Facility type:	Treatment_plant	Activity code:	A
Treatment obj:	disinfection	Treatment process:	hypochlorination, post

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Location Information:

Name:	PINEDALE COUNTY WATER DISTRICT		
Pwstypcd:	CWS	Primsrccd:	GW
Popserved:	8495		
Add1:	480 W. BIRCH AVENUE		
Add2:	Not Reported		
City:	PINEDALE	State:	CA
Zip:	93650	Phone:	559-439-2362
Cityserv:	Not Reported	Cntyserv:	Fresno
Stateserv:	CA	Zipserv:	Not Reported

Enforcement Information:

Violation id:	9611006	Orig cd:	S
Enf fy:	2002	Enf act date:	05/31/2002
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	9611006	Orig cd:	S
Enf fy:	2002	Enf act date:	06/26/2002
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	9611006	Orig cd:	S
Enf fy:	2002	Enf act date:	05/31/2002
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	911015	Orig cd:	S
Enf fy:	2010	Enf act date:	02/05/2010
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	911015	Orig cd:	S
Enf fy:	2010	Enf act date:	02/04/2010
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	811012	Orig cd:	S
Enf fy:	2008	Enf act date:	01/14/2008
Enf act detail:	St AO (w/o penalty) issued	Enf act cat:	Formal

Enforcement Information:

Violation id:	611011	Orig cd:	S
Enf fy:	2006	Enf act date:	02/06/2006
Enf act detail:	St AO (w/o penalty) issued	Enf act cat:	Formal

Enforcement Information:

Violation id:	511010	Orig cd:	S
Enf fy:	2005	Enf act date:	08/19/2005
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	511009	Orig cd:	S
Enf fy:	2005	Enf act date:	04/11/2005
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	511008	Orig cd:	S
Enf fy:	2005	Enf act date:	04/22/2005
Enf act detail:	St AO (w/o penalty) issued	Enf act cat:	Formal

Enforcement Information:

Violation id:	211002	Orig cd:	S
Enf fy:	2002	Enf act date:	04/10/2002
Enf act detail:	St AO (w/o penalty) issued	Enf act cat:	Formal

Enforcement Information:

Violation id:	1111018	Orig cd:	S
Enf fy:	2012	Enf act date:	10/06/2011
Enf act detail:	St AO (w/o penalty) issued	Enf act cat:	Formal

Enforcement Information:

Violation id:	1111017	Orig cd:	S
Enf fy:	2011	Enf act date:	08/05/2011
Enf act detail:	St AO (w/o penalty) issued	Enf act cat:	Formal

Enforcement Information:

Violation id:	1111016	Orig cd:	S
Enf fy:	2011	Enf act date:	08/05/2011
Enf act detail:	St AO (w/o penalty) issued	Enf act cat:	Formal

Enforcement Information:

Violation id:	111014	Orig cd:	S
Enf fy:	2008	Enf act date:	06/17/2008
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Enforcement Information:

Violation id:	111014	Orig cd:	S
Enf fy:	2008	Enf act date:	06/17/2008
Enf act detail:	St AO (w/o penalty) issued	Enf act cat:	Formal

Enforcement Information:

Violation id:	111003	Orig cd:	S
Enf fy:	2002	Enf act date:	05/31/2002
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	111003	Orig cd:	S
Enf fy:	2002	Enf act date:	05/31/2002
Enf act detail:	St Violation/Reminder Notice	Enf act cat:	Informal

Enforcement Information:

Violation id:	111003	Orig cd:	S
Enf fy:	2002	Enf act date:	05/31/2002
Enf act detail:	St Compliance achieved	Enf act cat:	Resolving

Violations Information:

Violation id:	9611006	Orig cd:	S
State:	CA	Viol fy:	1996
Contamcd:	5000		
Contamnm:	Lead and Copper Rule		
Viol code:	52		
Viol name:	Follow-up Or Routine LCR Tap M/R		
Rule code:	350		
Rule name:	LCR		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported

State mcl:	Not Reported	Cmpbdt:	01/02/1996
Cmpedt:	Not Reported		

Violations Information:

Violation id:	911015	Orig cd:	S
State:	CA	Viol fy:	2009
Contamcd:	1040		
Contamnm:	Nitrate		
Viol code:	03		
Viol name:	Monitoring, Regular		
Rule code:	331		
Rule name:	Nitrates		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2009
Cmpedt:	12/31/2009		

Violations Information:

Violation id:	811012	Orig cd:	S
State:	CA	Viol fy:	2007
Contamcd:	3100		
Contamnm:	Coliform (TCR)		
Viol code:	22		
Viol name:	MCL, Monthly (TCR)		
Rule code:	110		
Rule name:	TCR		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	11/01/2007
Cmpedt:	11/30/2007		

Violations Information:

Violation id:	611011	Orig cd:	S
State:	CA	Viol fy:	2005
Contamcd:	3100		
Contamnm:	Coliform (TCR)		
Viol code:	22		
Viol name:	MCL, Monthly (TCR)		
Rule code:	110		
Rule name:	TCR		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	10/01/2005
Cmpedt:	10/31/2005		

Violations Information:

Violation id:	511010	Orig cd:	S
State:	CA	Viol fy:	2005
Contamcd:	3100		
Contamnm:	Coliform (TCR)		
Viol code:	24		
Viol name:	Monitoring, Routine Minor (TCR)		
Rule code:	110		
Rule name:	TCR		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	06/01/2005
Cmpedt:	06/30/2005		

Violations Information:

Violation id:	511009	Orig cd:	S
State:	CA	Viol fy:	2004
Contamcd:	3100		
Contamnm:	Coliform (TCR)		
Viol code:	26		
Viol name:	Monitoring, Repeat Minor (TCR)		
Rule code:	110		
Rule name:	TCR		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	12/01/2004
Cmpedt:	12/31/2004		

Violations Information:

Violation id:	511008	Orig cd:	S
State:	CA	Viol fy:	2005
Contamcd:	3100		
Contamnm:	Coliform (TCR)		
Viol code:	22		
Viol name:	MCL, Monthly (TCR)		
Rule code:	110		
Rule name:	TCR		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	02/01/2005
Cmpedt:	02/28/2005		

Violations Information:

Violation id:	211002	Orig cd:	S
State:	CA	Viol fy:	2002
Contamcd:	3100		
Contamnm:	Coliform (TCR)		
Viol code:	26		
Viol name:	Monitoring, Repeat Minor (TCR)		
Rule code:	110		
Rule name:	TCR		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	03/01/2002
Cmpedt:	04/30/2002		

Violations Information:

Violation id:	1111018	Orig cd:	S
State:	CA	Viol fy:	2011
Contamcd:	3100		
Contamnm:	Coliform (TCR)		
Viol code:	22		
Viol name:	MCL, Monthly (TCR)		
Rule code:	110		
Rule name:	TCR		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	09/01/2011
Cmpedt:	09/30/2011		

Violations Information:

Violation id:	1111017	Orig cd:	S
State:	CA	Viol fy:	2011
Contamcd:	3100		
Contamnm:	Coliform (TCR)		
Viol code:	22		
Viol name:	MCL, Monthly (TCR)		
Rule code:	110		
Rule name:	TCR		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported

State mcl:	Not Reported	Cmpbdt:	07/01/2011
Cmpedt:	07/31/2011		

Violations Information:

Violation id:	1111016	Orig cd:	S
State:	CA	Viol fy:	2011
Contamcd:	3100		
Contamnm:	Coliform (TCR)		
Viol code:	22		
Viol name:	MCL, Monthly (TCR)		
Rule code:	110		
Rule name:	TCR		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	06/01/2011
Cmpedt:	06/30/2011		

Violations Information:

Violation id:	111014	Orig cd:	S
State:	CA	Viol fy:	2001
Contamcd:	4030		
Contamnm:	Radium-228		
Viol code:	03		
Viol name:	Monitoring, Regular		
Rule code:	340		
Rule name:	Rads		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2001
Cmpedt:	12/31/2007		

Violations Information:

Violation id:	111003	Orig cd:	S
State:	CA	Viol fy:	2001
Contamcd:	1040		
Contamnm:	Nitrate		
Viol code:	03		
Viol name:	Monitoring, Regular		
Rule code:	331		
Rule name:	Nitrates		
Violmeasur:	Not Reported	Unitmeasur:	Not Reported
State mcl:	Not Reported	Cmpbdt:	01/01/2001
Cmpedt:	01/01/2002		

PWS ID:	CA1010026		
Date Initiated:	Not Reported	Date Deactivated:	Not Reported
PWS Name:	PINEDALE COUNTY WATER DISTRICT PINEDALE, CA 93650		

Addressee / Facility:	Not Reported		
Facility Latitude:	36 50 34	Facility Longitude:	119 47 20
City Served:	PINEDALE		
Treatment Class:	Treated	Population:	8490

Violations information not reported.

ENFORCEMENT INFORMATION:

Truedate:	03/31/2009	Pwsid:	CA1010026
Pwsname:	PINEDALE COUNTY WATER DISTRICT		
Retpopsrvd:	8495	Pwstypecod:	C
Vioid:	0111003	Contaminant:	NITRATE
Viol. Type:	3		
Complperbe:	1/1/2001 0:00:00		
Complperen:	1/1/2002 0:00:00	Enfdate:	5/31/2002 0:00:00
Enf action:	State Violation/Reminder Notice		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	CA1010026
Pwsname:	PINEDALE COUNTY WATER DISTRICT		
Retpopsrvd:	8495	Pwstypecod:	C
Vioid:	0111003	Contaminant:	NITRATE
Viol. Type:	3		
Complperbe:	1/1/2001 0:00:00		
Complperen:	1/1/2002 0:00:00	Enfdate:	5/31/2002 0:00:00
Enf action:	State Compliance Achieved		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	CA1010026
Pwsname:	PINEDALE COUNTY WATER DISTRICT		
Retpopsrvd:	8495	Pwstypecod:	C
Vioid:	0111014	Contaminant:	RADIUM-228
Viol. Type:	3		
Complperbe:	1/1/2001 0:00:00		
Complperen:	12/31/2007 0:00:00	Enfdate:	6/17/2008 0:00:00
Enf action:	State AO (w/o Penalty) Issued		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	CA1010026
Pwsname:	PINEDALE COUNTY WATER DISTRICT		
Retpopsrvd:	8495	Pwstypecod:	C
Vioid:	0111014	Contaminant:	RADIUM-228
Viol. Type:	3		
Complperbe:	1/1/2001 0:00:00		
Complperen:	12/31/2007 0:00:00	Enfdate:	6/17/2008 0:00:00
Enf action:	State Compliance Achieved		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	CA1010026
Pwsname:	PINEDALE COUNTY WATER DISTRICT		
Retpopsrvd:	8495	Pwstypecod:	C
Vioid:	0211002	Contaminant:	COLIFORM (TCR)
Viol. Type:	Monitoring, Repeat Minor (TCR)		
Complperbe:	3/1/2002 0:00:00		
Complperen:	4/1/2002 0:00:00	Enfdate:	4/10/2002 0:00:00
Enf action:	State AO (w/o Penalty) Issued		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	CA1010026
Pwsname:	PINEDALE COUNTY WATER DISTRICT		
Retpopsrvd:	8495	Pwstypecod:	C
Vioid:	0511008	Contaminant:	COLIFORM (TCR)
Viol. Type:	MCL, Monthly (TCR)		
Complperbe:	2/1/2005 0:00:00		
Complperen:	2/28/2005 0:00:00	Enfdate:	4/22/2005 0:00:00
Enf action:	State AO (w/o Penalty) Issued		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	CA1010026
Pwsname:	PINEDALE COUNTY WATER DISTRICT		
Retpopsrvd:	8495	Pwstypecod:	C
Vioid:	0511009	Contaminant:	COLIFORM (TCR)
Viol. Type:	Monitoring, Repeat Minor (TCR)		
Complperbe:	12/1/2004 0:00:00		
Complperen:	12/31/2004 0:00:00	Enfdate:	4/11/2005 0:00:00
Enf action:	State Violation/Reminder Notice		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	CA1010026
Pwsname:	PINEDALE COUNTY WATER DISTRICT		
Retpopsrvd:	8495	Pwstypecod:	C
Vioid:	0511010	Contaminant:	COLIFORM (TCR)
Viol. Type:	Monitoring, Routine Minor (TCR)		
Complperbe:	6/1/2005 0:00:00		
Complperen:	6/30/2005 0:00:00	Enfdate:	8/19/2005 0:00:00
Enf action:	State Violation/Reminder Notice		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	CA1010026
Pwsname:	PINEDALE COUNTY WATER DISTRICT		
Retpopsrvd:	8495	Pwstypecod:	C
Vioid:	0611011	Contaminant:	COLIFORM (TCR)
Viol. Type:	MCL, Monthly (TCR)		
Complperbe:	10/1/2005 0:00:00		
Complperen:	10/31/2005 0:00:00	Enfdate:	2/6/2006 0:00:00
Enf action:	State AO (w/o Penalty) Issued		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	CA1010026
Pwsname:	PINEDALE COUNTY WATER DISTRICT		
Retpopsrvd:	8495	Pwstypecod:	C
Vioid:	0811012	Contaminant:	COLIFORM (TCR)
Viol. Type:	MCL, Monthly (TCR)		
Complperbe:	11/1/2007 0:00:00		
Complperen:	11/30/2007 0:00:00	Enfdate:	1/14/2008 0:00:00
Enf action:	State AO (w/o Penalty) Issued		
Violmeasur:	Not Reported		

Truedate:	03/31/2009	Pwsid:	CA1010026
Pwsname:	PINEDALE COUNTY WATER DISTRICT		
Retpopsrvd:	8495	Pwstypecod:	C
Vioid:	9611006	Contaminant:	LEAD & COPPER RULE
Viol. Type:	Follow-up and Routine Tap Sampling		
Complperbe:	1/2/1996 0:00:00		
Complperen:	12/31/2025 0:00:00	Enfdate:	5/31/2002 0:00:00
Enf action:	State Violation/Reminder Notice		
Violmeasur:	Not Reported		

System Name:	PINEDALE COUNTY WATER DISTRICT		
Violation Type:	Monitoring, Repeat Minor (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	03/01/02 - 04/30/02		
Violation ID:	0211002		
Enforcement Date:	04/10/02	Enf. Action:	State Compliance Achieved

ENFORCEMENT INFORMATION:

System Name:	PINEDALE COUNTY WATER DISTRICT		
Violation Type:	Monitoring, Repeat Minor (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	3/1/2002 0:00:00 - 4/30/2002 0:00:00		
Violation ID:	0211002		
Enforcement Date:	4/10/2002 0:00:00	Enf. Action:	State Compliance Achieved
System Name:	PINEDALE COUNTY WATER DISTRICT		
Violation Type:	MCL, Monthly (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	02/01/05 - 02/28/05		
Violation ID:	0511008		
Enforcement Date:	04/22/05	Enf. Action:	State AO (w/o Penalty) Issued
System Name:	PINEDALE COUNTY WATER DISTRICT		
Violation Type:	MCL, Monthly (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	2/1/2005 0:00:00 - 2/28/2005 0:00:00		
Violation ID:	0511008		
Enforcement Date:	4/22/2005 0:00:00	Enf. Action:	State AO (w/o Penalty) Issued
System Name:	PINEDALE COUNTY WATER DISTRICT		
Violation Type:	Monitoring, Repeat Minor (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	12/01/04 - 12/31/04		
Violation ID:	0511009		
Enforcement Date:	04/11/05	Enf. Action:	State Violation/Reminder Notice
System Name:	PINEDALE COUNTY WATER DISTRICT		
Violation Type:	Monitoring, Repeat Minor (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	12/1/2004 0:00:00 - 12/31/2004 0:00:00		
Violation ID:	0511009		
Enforcement Date:	4/11/2005 0:00:00	Enf. Action:	State Violation/Reminder Notice
System Name:	PINEDALE COUNTY WATER DISTRICT		
Violation Type:	Monitoring, Routine Minor (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	06/01/05 - 06/30/05		
Violation ID:	0511010		
Enforcement Date:	08/19/05	Enf. Action:	State Violation/Reminder Notice
System Name:	PINEDALE COUNTY WATER DISTRICT		
Violation Type:	Monitoring, Routine Minor (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	6/1/2005 0:00:00 - 6/30/2005 0:00:00		
Violation ID:	0511010		
Enforcement Date:	8/19/2005 0:00:00	Enf. Action:	State Violation/Reminder Notice
System Name:	PINEDALE COUNTY WATER DISTRICT		
Violation Type:	MCL, Monthly (TCR)		
Contaminant:	COLIFORM (TCR)		
Compliance Period:	10/01/05 - 10/31/05		
Violation ID:	0611011		
Enforcement Date:	02/06/06	Enf. Action:	State AO (w/o Penalty) Issued

CONTACT INFORMATION:

Name:	PINEDALE COUNTY WATER DISTRICT	Population:	8495
Contact:	Larry DeSantos	Phone:	Not Reported
Address:	480 W. Birch Street		
Address 2:	Pinedale		
	CA, 93 55943		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

C17
SSW
1/2 - 1 Mile
Lower

FED USGS **USGS40000178271**

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-364948119470201		
Monloc name:	013S020E03F001M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	Not Reported	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	36.8304167
Longitude:	-119.7840278	Sourcemap scale:	24000
Horiz Acc measure:	.5	Horiz Acc measure units:	seconds
Horiz Collection method:	Global positioning system (GPS), uncorrected		
Horiz coord refsys:	NAD83	Vert measure val:	335
Vert measure units:	feet	Vertacc measure val:	2.5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Central Valley aquifer system		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19961015	Welldepth:	270
Welldepth units:	ft	Wellholedepth:	280
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 0

C18
SSW
1/2 - 1 Mile
Lower

CA WELLS **11609**

Water System Information:

Prime Station Code:	13S/20E-03F01 M	User ID:	AGE
FRDS Number:	1010007315	County:	Fresno
District Number:	11	Station Type:	WELL/AMBNT/MUN/INTAKE
Water Type:	Well/Groundwater	Well Status:	Active Raw
Source Lat/Long:	364948.0 1194658.0	Precision:	1,000 Feet (10 Seconds)
Source Name:	WELL 163		
System Number:	1010007		
System Name:	FRESNO, CITY OF		
Organization That Operates System:			
	2326 FRESNO STREET		
	FRESNO, CA 93721-2988		
Pop Served:	390350	Connections:	99005
Area Served:	CITY OF FRESNO		
Sample Collected:	16-APR-14	Findings:	150. MG/L
Chemical:	TOTAL DISSOLVED SOLIDS		

Sample Collected:	16-APR-14	Findings:	- 0.59
Chemical:	LANGELIER INDEX @ 60 C		
Sample Collected:	16-APR-14	Findings:	6.7 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	16-APR-14	Findings:	0.28 NTU
Chemical:	TURBIDITY, LABORATORY		
Sample Collected:	16-APR-14	Findings:	11.
Chemical:	AGGRSSIVE INDEX (CORROSIVITY)		
Sample Collected:	14-NOV-14	Findings:	1.3 UG/L
Chemical:	CHROMIUM, HEXAVALENT		
Sample Collected:	27-MAR-15	Findings:	7.4 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	02-MAR-16	Findings:	2.2 MG/L
Chemical:	NITRATE (AS N)		
Sample Collected:	03-FEB-17	Findings:	180. US
Chemical:	SPECIFIC CONDUCTANCE		
Sample Collected:	03-FEB-17	Findings:	23.4
Chemical:	PH, LABORATORY		
Sample Collected:	03-FEB-17	Findings:	71. MG/L
Chemical:	ALKALINITY (TOTAL) AS CACO3		
Sample Collected:	03-FEB-17	Findings:	87. MG/L
Chemical:	BICARBONATE ALKALINITY		
Sample Collected:	03-FEB-17	Findings:	1.9 MG/L
Chemical:	NITRATE (AS N)		
Sample Collected:	03-FEB-17	Findings:	68. MG/L
Chemical:	HARDNESS (TOTAL) AS CACO3		
Sample Collected:	03-FEB-17	Findings:	15. MG/L
Chemical:	CALCIUM		
Sample Collected:	03-FEB-17	Findings:	7.4 MG/L
Chemical:	MAGNESIUM		
Sample Collected:	03-FEB-17	Findings:	11. MG/L
Chemical:	SODIUM		
Sample Collected:	03-FEB-17	Findings:	2.2 MG/L
Chemical:	POTASSIUM		
Sample Collected:	03-FEB-17	Findings:	4.8 MG/L
Chemical:	CHLORIDE		
Sample Collected:	03-FEB-17	Findings:	5.6 MG/L
Chemical:	SULFATE		
Sample Collected:	03-FEB-17	Findings:	0.14 MG/L
Chemical:	FLUORIDE (F) (NATURAL-SOURCE)		
Sample Collected:	03-FEB-17	Findings:	2.1 UG/L
Chemical:	ARSENIC		
Sample Collected:	03-FEB-17	Findings:	1.4 UG/L
Chemical:	CHROMIUM, HEXAVALENT		

Sample Collected:	03-FEB-17	Findings:	0.62 UG/L
Chemical:	TETRACHLOROETHYLENE		
Sample Collected:	03-FEB-17	Findings:	150. MG/L
Chemical:	TOTAL DISSOLVED SOLIDS		
Sample Collected:	03-FEB-17	Findings:	0.31 NTU
Chemical:	TURBIDITY, LABORATORY		
Sample Collected:	03-FEB-17	Findings:	11.
Chemical:	AGGRSSIVE INDEX (CORROSIVITY)		
Sample Collected:	03-FEB-17	Findings:	1.9 MG/L
Chemical:	NITRATE + NITRITE (AS N)		
Sample Collected:	15-MAR-12	Findings:	8.7 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	23-MAY-13	Findings:	10. MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	16-APR-14	Findings:	160. US
Chemical:	SPECIFIC CONDUCTANCE		
Sample Collected:	16-APR-14	Findings:	8.
Chemical:	PH, LABORATORY		
Sample Collected:	16-APR-14	Findings:	69. MG/L
Chemical:	ALKALINITY (TOTAL) AS CACO3		
Sample Collected:	16-APR-14	Findings:	84. MG/L
Chemical:	BICARBONATE ALKALINITY		
Sample Collected:	16-APR-14	Findings:	57. MG/L
Chemical:	HARDNESS (TOTAL) AS CACO3		
Sample Collected:	16-APR-14	Findings:	12. MG/L
Chemical:	CALCIUM		
Sample Collected:	16-APR-14	Findings:	6.4 MG/L
Chemical:	MAGNESIUM		
Sample Collected:	16-APR-14	Findings:	10. MG/L
Chemical:	SODIUM		
Sample Collected:	16-APR-14	Findings:	2.2 MG/L
Chemical:	POTASSIUM		
Sample Collected:	16-APR-14	Findings:	4.3 MG/L
Chemical:	CHLORIDE		
Sample Collected:	16-APR-14	Findings:	5.6 MG/L
Chemical:	SULFATE		
Sample Collected:	16-APR-14	Findings:	0.16 MG/L
Chemical:	FLUORIDE (F) (NATURAL-SOURCE)		
Sample Collected:	16-APR-14	Findings:	2.2 UG/L
Chemical:	ARSENIC		

19
North
1/2 - 1 Mile
Higher

CA WELLS **CADW60000015213**

Objectid:	15213
Latitude:	36.8527
Longitude:	-119.7757
Site code:	368527N1197757W001
State well numbe:	12S20E27P001M
Local well name:	''
Well use id:	6
Well use descrip:	Unknown
County id:	10
County name:	Fresno
Basin code:	'5-22.08'
Basin desc:	Kings
Dwr region id:	80237
Dwr region:	South Central Region Office
Site id:	CADW60000015213

20
ESE **FED USGS** **USGS40000178357**
1/2 - 1 Mile
Higher

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-365010119453601		
Monloc name:	013S020E02C001M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18030012	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	36.8360607
Longitude:	-119.7609783	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	minutes
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	349.00
Vert measure units:	feet	Vertacc measure val:	52
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Central Valley aquifer system		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19500808	Welldepth:	120
Welldepth units:	ft	Wellholedepth:	158
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1963-10-15	85.37	

21
SE **CA WELLS** **CADW60000030001**
1/2 - 1 Mile
Higher

Objectid:	30001
Latitude:	36.8299
Longitude:	-119.7657
Site code:	368299N1197657W001
State well numbe:	13S20E02L001M
Local well name:	''
Well use id:	6
Well use descrip:	Unknown
County id:	10
County name:	Fresno
Basin code:	'5-22.08'
Basin desc:	Kings
Dwr region id:	80237
Dwr region:	South Central Region Office
Site id:	CADW60000030001

22
North **FED USGS** **USGS40000178687**
1/2 - 1 Mile
Higher

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-365110119461201		
Monloc name:	012S020E27Q002M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18030012	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	36.8535604
Longitude:	-119.7745904	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	minutes
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	360.00
Vert measure units:	feet	Vertacc measure val:	1
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Central Valley aquifer system		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	Not Reported
Welldepth units:	Not Reported	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

23
East **CA WELLS** **11147**
1/2 - 1 Mile
Higher

Water System Information:

Prime Station Code:	12S/20E-35L01 M	User ID:	AGE
FRDS Number:	1010007296	County:	Fresno
District Number:	11	Station Type:	WELL/AMBNT/MUN/INTAKE
Water Type:	Well/Groundwater	Well Status:	Active Raw
Source Lat/Long:	365030.0 1194530.0	Precision:	1,000 Feet (10 Seconds)
Source Name:	WELL 178		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

System Number: 1010007
System Name: FRESNO, CITY OF
Organization That Operates System:
2326 FRESNO STREET
FRESNO, CA 93721-2988
Pop Served: 390350 Connections: 99005
Area Served: CITY OF FRESNO

Sample Collected:	16-MAR-12	Findings:	3.1 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	18-OCT-13	Findings:	6.4 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	27-MAR-14	Findings:	7. MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	15-APR-14	Findings:	5. UNITS
Chemical:	COLOR		
Sample Collected:	15-APR-14	Findings:	250. US
Chemical:	SPECIFIC CONDUCTANCE		
Sample Collected:	15-APR-14	Findings:	8.
Chemical:	PH, LABORATORY		
Sample Collected:	15-APR-14	Findings:	120. MG/L
Chemical:	ALKALINITY (TOTAL) AS CACO3		
Sample Collected:	15-APR-14	Findings:	140. MG/L
Chemical:	BICARBONATE ALKALINITY		
Sample Collected:	15-APR-14	Findings:	94. MG/L
Chemical:	HARDNESS (TOTAL) AS CACO3		
Sample Collected:	15-APR-14	Findings:	22. MG/L
Chemical:	CALCIUM		
Sample Collected:	15-APR-14	Findings:	9.4 MG/L
Chemical:	MAGNESIUM		
Sample Collected:	15-APR-14	Findings:	17. MG/L
Chemical:	SODIUM		
Sample Collected:	15-APR-14	Findings:	2.3 MG/L
Chemical:	POTASSIUM		
Sample Collected:	15-APR-14	Findings:	5.5 MG/L
Chemical:	CHLORIDE		
Sample Collected:	15-APR-14	Findings:	6. MG/L
Chemical:	SULFATE		
Sample Collected:	15-APR-14	Findings:	2.1 UG/L
Chemical:	ARSENIC		
Sample Collected:	15-APR-14	Findings:	110. UG/L
Chemical:	BARIUM		
Sample Collected:	15-APR-14	Findings:	140. UG/L
Chemical:	IRON		
Sample Collected:	15-APR-14	Findings:	190. MG/L
Chemical:	TOTAL DISSOLVED SOLIDS		

Sample Collected:	15-APR-14	Findings:	6.9 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	15-APR-14	Findings:	1.1 NTU
Chemical:	TURBIDITY, LABORATORY		
Sample Collected:	15-APR-14	Findings:	12.
Chemical:	AGGRSSIVE INDEX (CORROSIVITY)		
Sample Collected:	14-NOV-14	Findings:	2.3 UG/L
Chemical:	CHROMIUM, HEXAVALENT		
Sample Collected:	26-MAR-15	Findings:	6.9 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	01-MAR-16	Findings:	1.5 MG/L
Chemical:	NITRATE (AS N)		
Sample Collected:	03-FEB-17	Findings:	260. US
Chemical:	SPECIFIC CONDUCTANCE		
Sample Collected:	03-FEB-17	Findings:	23.2
Chemical:	PH, LABORATORY		
Sample Collected:	03-FEB-17	Findings:	120. MG/L
Chemical:	ALKALINITY (TOTAL) AS CACO3		
Sample Collected:	03-FEB-17	Findings:	140. MG/L
Chemical:	BICARBONATE ALKALINITY		
Sample Collected:	03-FEB-17	Findings:	1.5 MG/L
Chemical:	NITRATE (AS N)		
Sample Collected:	03-FEB-17	Findings:	100. MG/L
Chemical:	HARDNESS (TOTAL) AS CACO3		
Sample Collected:	03-FEB-17	Findings:	23. MG/L
Chemical:	CALCIUM		
Sample Collected:	03-FEB-17	Findings:	10. MG/L
Chemical:	MAGNESIUM		
Sample Collected:	03-FEB-17	Findings:	17. MG/L
Chemical:	SODIUM		
Sample Collected:	03-FEB-17	Findings:	2.4 MG/L
Chemical:	POTASSIUM		
Sample Collected:	03-FEB-17	Findings:	6.4 MG/L
Chemical:	CHLORIDE		
Sample Collected:	03-FEB-17	Findings:	5.5 MG/L
Chemical:	SULFATE		
Sample Collected:	03-FEB-17	Findings:	0.13 MG/L
Chemical:	FLUORIDE (F) (NATURAL-SOURCE)		
Sample Collected:	03-FEB-17	Findings:	2.2 UG/L
Chemical:	ARSENIC		
Sample Collected:	03-FEB-17	Findings:	2.4 UG/L
Chemical:	CHROMIUM, HEXAVALENT		
Sample Collected:	03-FEB-17	Findings:	7.2 UG/L
Chemical:	DI(2-ETHYLHEXYL)PHTHALATE		

Sample Collected:	03-FEB-17	Findings:	180. MG/L
Chemical:	TOTAL DISSOLVED SOLIDS		
Sample Collected:	03-FEB-17	Findings:	0.14 NTU
Chemical:	TURBIDITY, LABORATORY		
Sample Collected:	03-FEB-17	Findings:	12.
Chemical:	AGGRSSIVE INDEX (CORROSIVITY)		
Sample Collected:	03-FEB-17	Findings:	1.5 MG/L
Chemical:	NITRATE + NITRITE (AS N)		

24
NE **CA WELLS** **11146**
1/2 - 1 Mile
Higher

Water System Information:

Prime Station Code:	12S/20E-35D01 M	User ID:	AGE
FRDS Number:	1010007261	County:	Fresno
District Number:	11	Station Type:	WELL/AMBNT
Water Type:	Well/Groundwater	Well Status:	Active Untreated
Source Lat/Long:	365101.0 1194550.0	Precision:	1,000 Feet (10 Seconds)
Source Name:	WELL 131		
System Number:	1010007		
System Name:	FRESNO, CITY OF		
Organization That Operates System:			
	2326 FRESNO STREET		
	FRESNO, CA 93721-2988		
Pop Served:	390350	Connections:	99005
Area Served:	CITY OF FRESNO		
Sample Collected:	08-MAY-17	Findings:	11.
Chemical:	AGGRSSIVE INDEX (CORROSIVITY)		
Sample Collected:	08-MAY-17	Findings:	1.2 MG/L
Chemical:	NITRATE + NITRITE (AS N)		
Sample Collected:	16-MAR-12	Findings:	4.3 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	29-MAY-13	Findings:	5.9 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	26-MAR-14	Findings:	6.2 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	17-APR-14	Findings:	230. US
Chemical:	SPECIFIC CONDUCTANCE		
Sample Collected:	17-APR-14	Findings:	7.9
Chemical:	PH, LABORATORY		
Sample Collected:	17-APR-14	Findings:	110. MG/L
Chemical:	ALKALINITY (TOTAL) AS CACO3		
Sample Collected:	17-APR-14	Findings:	130. MG/L
Chemical:	BICARBONATE ALKALINITY		
Sample Collected:	17-APR-14	Findings:	81. MG/L
Chemical:	HARDNESS (TOTAL) AS CACO3		

Sample Collected:	17-APR-14	Findings:	20. MG/L
Chemical:	CALCIUM		
Sample Collected:	17-APR-14	Findings:	7.7 MG/L
Chemical:	MAGNESIUM		
Sample Collected:	17-APR-14	Findings:	17. MG/L
Chemical:	SODIUM		
Sample Collected:	17-APR-14	Findings:	2.8 MG/L
Chemical:	POTASSIUM		
Sample Collected:	17-APR-14	Findings:	5.2 MG/L
Chemical:	CHLORIDE		
Sample Collected:	17-APR-14	Findings:	5. MG/L
Chemical:	SULFATE		
Sample Collected:	17-APR-14	Findings:	0.14 MG/L
Chemical:	FLUORIDE (F) (NATURAL-SOURCE)		
Sample Collected:	17-APR-14	Findings:	180. MG/L
Chemical:	TOTAL DISSOLVED SOLIDS		
Sample Collected:	17-APR-14	Findings:	- 0.27
Chemical:	LANGELIER INDEX @ 60 C		
Sample Collected:	17-APR-14	Findings:	4.7 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	17-APR-14	Findings:	12.
Chemical:	AGGRSSIVE INDEX (CORROSIVITY)		
Sample Collected:	13-NOV-14	Findings:	1.9 UG/L
Chemical:	CHROMIUM, HEXAVALENT		
Sample Collected:	26-MAR-15	Findings:	6.6 MG/L
Chemical:	NITRATE (AS NO3)		
Sample Collected:	02-MAR-16	Findings:	1.4 MG/L
Chemical:	NITRATE (AS N)		
Sample Collected:	13-FEB-17	Findings:	230. US
Chemical:	SPECIFIC CONDUCTANCE		
Sample Collected:	13-FEB-17	Findings:	7.8
Chemical:	PH, LABORATORY		
Sample Collected:	13-FEB-17	Findings:	100. MG/L
Chemical:	ALKALINITY (TOTAL) AS CACO3		
Sample Collected:	13-FEB-17	Findings:	120. MG/L
Chemical:	BICARBONATE ALKALINITY		
Sample Collected:	13-FEB-17	Findings:	0.67 MG/L
Chemical:	NITRATE (AS N)		
Sample Collected:	13-FEB-17	Findings:	77. MG/L
Chemical:	HARDNESS (TOTAL) AS CACO3		
Sample Collected:	13-FEB-17	Findings:	18. MG/L
Chemical:	CALCIUM		
Sample Collected:	13-FEB-17	Findings:	7.8 MG/L
Chemical:	MAGNESIUM		

Sample Collected:	13-FEB-17	Findings:	18. MG/L
Chemical:	SODIUM		
Sample Collected:	13-FEB-17	Findings:	2.7 MG/L
Chemical:	POTASSIUM		
Sample Collected:	13-FEB-17	Findings:	5.1 MG/L
Chemical:	CHLORIDE		
Sample Collected:	13-FEB-17	Findings:	3.9 MG/L
Chemical:	SULFATE		
Sample Collected:	13-FEB-17	Findings:	0.14 MG/L
Chemical:	FLUORIDE (F) (NATURAL-SOURCE)		
Sample Collected:	13-FEB-17	Findings:	2.1 UG/L
Chemical:	CHROMIUM, HEXAVALENT		
Sample Collected:	13-FEB-17	Findings:	160. MG/L
Chemical:	TOTAL DISSOLVED SOLIDS		
Sample Collected:	13-FEB-17	Findings:	0.11 NTU
Chemical:	TURBIDITY, LABORATORY		
Sample Collected:	13-FEB-17	Findings:	11.
Chemical:	AGGRSSIVE INDEX (CORROSIVITY)		
Sample Collected:	13-FEB-17	Findings:	0.67 MG/L
Chemical:	NITRATE + NITRITE (AS N)		
Sample Collected:	08-MAY-17	Findings:	240. US
Chemical:	SPECIFIC CONDUCTANCE		
Sample Collected:	08-MAY-17	Findings:	22.4
Chemical:	PH, LABORATORY		
Sample Collected:	08-MAY-17	Findings:	110. MG/L
Chemical:	ALKALINITY (TOTAL) AS CACO3		
Sample Collected:	08-MAY-17	Findings:	130. MG/L
Chemical:	BICARBONATE ALKALINITY		
Sample Collected:	08-MAY-17	Findings:	1.2 MG/L
Chemical:	NITRATE (AS N)		
Sample Collected:	08-MAY-17	Findings:	85. MG/L
Chemical:	HARDNESS (TOTAL) AS CACO3		
Sample Collected:	08-MAY-17	Findings:	20. MG/L
Chemical:	CALCIUM		
Sample Collected:	08-MAY-17	Findings:	8.3 MG/L
Chemical:	MAGNESIUM		
Sample Collected:	08-MAY-17	Findings:	18. MG/L
Chemical:	SODIUM		
Sample Collected:	08-MAY-17	Findings:	2.7 MG/L
Chemical:	POTASSIUM		
Sample Collected:	08-MAY-17	Findings:	4.9 MG/L
Chemical:	CHLORIDE		
Sample Collected:	08-MAY-17	Findings:	3.7 MG/L
Chemical:	SULFATE		

Sample Collected:	08-MAY-17	Findings:	0.14 MG/L
Chemical:	FLUORIDE (F) (NATURAL-SOURCE)		
Sample Collected:	08-MAY-17	Findings:	2.7 UG/L
Chemical:	CHROMIUM, HEXAVALENT		
Sample Collected:	08-MAY-17	Findings:	180. MG/L
Chemical:	TOTAL DISSOLVED SOLIDS		
Sample Collected:	08-MAY-17	Findings:	0.15 NTU
Chemical:	TURBIDITY, LABORATORY		

25
NE
1/2 - 1 Mile
Higher

CA WELLS **CADW60000002504**

Objectid:	2504
Latitude:	36.8516
Longitude:	-119.766
Site code:	368516N1197660W001
State well numbe:	12S20E34A001M
Local well name:	'12S20E34A001M'
Well use id:	6
Well use descrip:	Unknown
County id:	10
County name:	Fresno
Basin code:	'5-22.08'
Basin desc:	Kings
Dwr region id:	80237
Dwr region:	South Central Region Office
Site id:	CADW60000002504

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: CA Radon

Radon Test Results

Zipcode	Num Tests	> 4 pCi/L
93720	33	2

Federal EPA Radon Zone for FRESNO County: 2

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for FRESNO COUNTY, CA

Number of sites tested: 100

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	1.251 pCi/L	98%	2%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	1.433 pCi/L	100%	0%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

HYDROLOGIC INFORMATION

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory
Source: Department of Fish & Game
Telephone: 916-445-0411

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Service, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Water Well Database
Source: Department of Water Resources
Telephone: 916-651-9648

California Drinking Water Quality Database
Source: Department of Public Health
Telephone: 916-324-2319
The database includes all drinking water compliance and special studies monitoring for the state of California since 1984. It consists of over 3,200,000 individual analyses along with well and water system information.

OTHER STATE DATABASE INFORMATION

California Oil and Gas Well Locations
Source: Department of Conservation
Telephone: 916-323-1779
Oil and Gas well locations in the state.

RADON

State Database: CA Radon
Source: Department of Health Services
Telephone: 916-324-2208
Radon Database for California

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

California Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary fault lines, prepared in 1975 by the United State Geological Survey. Additional information (also from 1975) regarding activity at specific fault lines comes from California's Preliminary Fault Activity Map prepared by the California Division of Mines and Geology.

STREET AND ADDRESS INFORMATION

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Fax To: Terracon
Contact: Megan Davey
Fax : 916-928-4690
Date: 04/10/2018

Fax From: Kim Gagnon
EDR
Phone: 1-800-352-0050

EDR PUR-IQ® Report

"the intelligent way to conduct historical research"

for
Proposed Kaiser Facility
576 East Locust Avenue
Fresno, CA 93720
Lat./Long. 36.839958 / 119.776264
EDR Inquiry # 5252546.1s

The EDR PUR-IQ report facilitates historical research planning required to complete the Phase I ESA process. The report identifies the *likelihood* of prior use coverage by searching proprietary EDR-Prior Use Reports® comprising nationwide information on: city directories, fire insurance maps, aerial photographs, historical topographic maps, flood maps and National Wetland Inventory maps.

Potential for EDR Historical (Prior Use) Coverage - Coverage in the following historical information sources may be used as a guide to develop your historical research strategy:

1. Building Permits: Building Permits are available for 'FRESNO', CA (1982 - 2017).

2. City Directory: Coverage exists for portions of FRESNO, CA for 1922-2002

3. Fire Insurance Map: When you order online any EDR Package or the EDR Radius Map with EDR Sanborn Map Search/Print, you receive site specific Sanborn Map coverage information at no charge.

4. Aerial Photograph: Aerial photography coverage may exist for portions of Fresno County. Please contact your EDR Account Executive for information about USGS photos available through EDR.

5. Topographic Map: The USGS 7.5 min. quad topo sheet(s) associated with this site:

Historical: Coverage exists for FRESNO County

Current: Target Property: TP | 2012 | 5603170 Fresno North, CA

6. Flood Insurance Rate Maps (FEMA) : Coverage is available for FRESNO county.

EDR's network of professional researchers, located throughout the United States, accesses the most extensive national collections of city directory, fire insurance maps, aerial photographs, flood maps and historical topographic map resources available for Fresno, CA. These collections may be located in multiple libraries throughout the country. To ensure maximum coverage, EDR will often assign researchers at these multiple locations on your behalf. Please call or fax your EDR representative to authorize a search.

EDR - HISTORICAL SOURCE(S) ORDER FORM

Terracon
Megan Davey
Account # 9151249

Proposed Kaiser Facility
576 East Locust Avenue
Fresno, CA 93720
FRESNO County
Lat./Long. 36.839958 / 119.776264
EDR Inquiry # 5252546.1s

Should you wish to change or add to your order, fax this form to your EDR account executive:

Kim Gagnon
Ph: 1-800-352-0050 Fax: 1-800-231-6802

Reports

___ EDR Sanborn Map® Search/Print

___ EDR Fire Insurance Map Abstract

___ EDR Multi-Tenant Retail Facility® Report

___ EDR City Directory Abstract

___ EDR Aerial Photo Decade Package

___ USGS Aerial 5 Package

___ USGS Aerial 3 Package

___ EDR Historical Topographic Maps

___ Paper Current USGS Topo (7.5 min.)

___ Environmental Lien Search

___ Chain of Title Search

___ NJ MacRaes Industrial Directory Report

___ EDR Telephone Interview

Shipping:

___ Email
___ Express, Next Day Delivery — RUSH SERVICE IS AVAILABLE
___ Express, Second Day Delivery
___ Express, Next day Delivery — Customer Account — Acct # _____
___ Express, Second Day Delivery — Customer Account — Acct # _____
___ U.S. Mail

Thank you

APPENDIX E
CREDENTIALS

MEGAN DAVEY
FIELD SCIENTIST

PROFESSIONAL EXPERIENCE
Ms. Davey is a Field Scientist in Terracon's Sacramento, California office. Megan assists in the collection and analysis of data sampling, reports, maps, drawing, tests, and aerial photographs to complete Phase I Environmental Site Assessment projects.

PROJECT EXPERIENCE

Phase I Environmental Site Assessments
Assistance in collecting documents, photos, and data for preparation of Phase I ESA Reports. Property sites include undeveloped or vacant land, automotive maintenance facilities, industrial buildings, and retail/commercial buildings.

Soil Sample Evaluation Reports
Evaluation of soil sample laboratory results for preparation of report summaries.

EDUCATION
Bachelor of Arts, Geology, California State University Sacramento, 2017

WORK HISTORY
Terracon Consultants, Inc., Field Scientist, 2018-Present

California Air Resources Board, Air Resources Technician II, 2015-2018

California Air Resources Board, Air Resources Technician I, 2012-2015

University Enterprises, Inc., Student Assistant, May-Sept 2012

Mazza Catering, Server, 2007-2011

Kristin Stout

SENIOR SCIENTIST/DUE DILIGENCE LEAD, ENVIRONMENTAL

PROFESSIONAL EXPERIENCE

Kristin Stout has over 22 years of experience in environmental consulting. She currently serves as a Due Diligence lead in the Sacramento office, responsible for the execution of Phase I Environmental Site Assessments (ESAs), regulatory agency coordination, and the review of environmental documents. Ms. Stout is a primary resource and project manager of all aspects of Phase I ESAs and Initial Site Assessments (ISAs), including site inspection, photographic documentation, background, and historical research to determine the potential for impact from hazardous materials on soil and groundwater at the property sites. In addition, she serves as liaison and environmental coordinator for a number of public agencies, as well as many Caltrans projects and numerous school districts. These relationships also require Ms. Stout to work closely with the regulatory agencies involved in the projects. Ms. Stout is also very experienced in Phase II ESAs, asbestos and lead-based paint surveys, Aerially Deposited Lead (ADL) Surveys, groundwater monitoring reports, and underground storage tank (UST) removals and closures.

PROJECT EXPERIENCE

Lower Sunrise, Phase I ESA and Limited Phase II ESA, Rancho Cordova, CA

A Phase I ESA was prepared for the proposed purchase of the property. Based on the findings of a Phase I ESA, a Limited Phase II ESA was proposed. The Phase II ESA found lead in concentrations in excess of regulatory screening numbers. ENERCON revisited the subject property with a Thermo NitonTM XL2 GOLOO X-ray Fluorescence (XRF) Analyzer and was able to determine the vertical extent of lead impacts on the subject property.

Florin Road ADL Survey

Project Manager for an AOL Survey associated with the Florin Road Improvement Project. Obtained an encroachment permit for sampling in the shoulder of the road and used a traffic control services. The 17 soil borings were completed in one day and the results indicated that the project area was not impacted by lead in excess of regulatory guidelines and can be reused onsite.

Confidential Client, Nationwide

Managed a nationwide client expanding its operations throughout the United States. Services included Phase I ESAs, Limited Site Investigations (LSIs), ALTA Surveys, Zoning Reports, Wetlands Desktop Reviews and Delineations, Hazardous Materials Surveys, and Geotechnical Investigations.

Phase I ESAs, California, Residential Developers

As a Project Manager and Field Inspector, Ms. Stout has conducted Phase I ESA's on over 1,000 properties. She performs the necessary tasks to determine past and/or present land use and to locate possible sources of hazardous materials/wastes. Tasks include reviews of aerial photographs, site reconnaissance, personnel interviews, and client file review. Typical sources identified include oil/gas wells, sumps, above- and underground storage tanks, reservoirs, laboratories, transformers, pipelines, facilities with chemical storage, refineries, hazardous material distribution facilities, industrial processes, natural gas plants, pesticides, and dispersion ponds. Agency contact and file review was performed to identify any known problems on the properties and any problems from nearby sites that may have impacted the properties. Information was obtained from the US EPA, California EPA, California Integrated Waste Management Board, California Regional Water Quality Control Boards, various counties Departments of Health, and other appropriate local agencies (fire departments, building departments, etc.).

EDUCATION

Bachelor of Arts, Environmental Studies, California Lutheran University, 1995

CERTIFICATIONS

Environmental Professional, ASTM E1527-13

CFR 1910.120 OSHA 40-Hour Training

CFR 1910.120 OSHA 8-Hour Supervisor Training

PSMJ Associates Resources, Project Manager Bootcamp

CONTINUING EDUCATION

Annual Continuing Education Policy by Terracon Consultants, Inc. includes 6 hours of continuing education yearly related to ASTM E1527-13.

WORK HISTORY

Terracon Consultants, Inc., Senior Scientist/Due Diligence Lead-Environmental, August 2017-Present

Enercon Services, Inc., Due Diligence Department Lead, 2015-August 2017

Leighton Consulting, Inc.,Senior Project Manager/Project Manager, 2001-2015

Gradient Engineers, Inc. (a Leighton company), Senior Staff Environmental Scientist, 2000-2001

Phase One, Inc., Report Writer/ Environmental Assessor, 1995-2000

Kristin Stout (Cont.)

Project Experience (Cont.)

1-15 Corridor Improvement Project, Murrieta to Riverside/San Bernardino County Line, Phase I ESA, Riverside County, CA
Project Manager for the ISA and ADL Study for the Initial Study/Environmental Assessment (IS/EA). The Hazardous Waste ISA reviewed potential hazardous material/waste impacts associated with the proposed project. Information developed during the ISA will be used to evaluate human health risk during construction and possible legal or logistical implications associated with contaminated sites and potential right-of-way acquisitions along the alignment. The ADL study required 1,703 borings and collection of 6,443 samples within medians, shoulders and ramps. Leighton analyzed the data and conducted statistical analysis to determine if the soil would be suitable for reuse under the DTSC's ADL Variance. Ms. Stout co-authored a proprietary database for sample documentation integrating field input with GPS coordinates to locate, field verify, and collect data. The GPS data was downloaded daily and integrated using GIS. The I-15 CIP project was re-scoped in 2011/2012 to a "right-sized" project which extends from the SR-74 in south Corona to the SR-60 in Ontario. Ms. Stout revised the ISA and ADL Surveys to address the new alignment and conducted asbestos and lead based paint studies on the bridges which will be impacted.

Riverside County Economic Development Agency, Phase I and II ESA, Romoland, CA
Project Manager overseeing a Phase I ESA of the property which identified a potential underground storage tank (UST) and former autobody operating illegally at the property. A Phase II ESA identify a pit in the former shop area. Groundwater monitoring wells were installed at the property which identified methyl tertiary butyl either (MTBE) in the groundwater. Due to the issues with redevelopment at the facility, further investigation was put on hold.

Riverside County Transportation Commission (RCTC) On-Call Right-of-Way Phase I and Phase II Environmental Assessment Services, Riverside County, CA
Task Manager for on-call environmental services agreement with RCTC. The initial three-year contract was extended an additional two years. In 2014, another three-year contract was executed. Ms. Stout is responsible for conducting Phase I and Phase II ESAs on properties which require right-of-way acquisition to widen, construct, or modify highways, roadways, or freeways. Many of these projects involve sensitive property owners. Ms. Stout is aware of the parties involved and can obtain all the information necessary for the Phase I ESA and successful acquisition. If recognized environmental conditions are identified in the Phase I ESA, Leighton conducts a Phase II ESA so that RCTC can negotiate purchase price based on property conditions, cleanup costs, and fair market value.

Phase I & IIs Environmental Site Assessments and Asbestos Surveys for Redevelopment Properties, Industry Urban Development Agency, City of Industry, CA. Project Manager for Phase I ESAs, Limited Phase II ESAs, Asbestos Surveys, and Lead Based Paint Surveys for multiple redevelopment properties within the City of Industry. These properties have included single family residences, commercial, and industrial facilities.

Phase I Environmental Site Assessment, La Habra, CA
Project Manager responsible for completion of Phase I and Phase II ESA for real estate transaction. The 11-acre site was graded for residential development, with industrial and residential historical site use. A soil-gas survey was performed to characterize the extent of used to evaluate volatile organic compounds (VOCs) soil vapors on the subject site. Following the soil vapor survey a Human Health Risk Assessment was completed. The concentration of VOCs in the soil vapor were determined not to be a risk to future residents. The project has since been constructed.

Rancho Mirage High School, Rancho Mirage, CA
Project Scientist for completion of Phase I ESA for new school. The 80-acre vacant, undeveloped property was located within the Agua Caliente Indian Reservation. Ms. Stout was able to provide a determination that no recognized environmental conditions merited further investigation for the purposes of the transaction for which this assessment was prepared. The Phase I ESA was submitted to DTSC, with concurrence of these findings.

G & M Oil Company
Managed numerous gas station properties owned by G & M Oil Company. These stations are active facilities that range from limited contamination to facilities warranting remedial solutions. Many of the stations have ongoing quarterly groundwater monitoring activities. Conducted numerous Geoprobe® soil investigations, hollow-stem auger drilling, injection of oxygen release compounds into the groundwater, and installation of a monitoring wells. Some stations are anticipated to require remedial action within the next year.

CARL A. PARTEN
OFFICE MANAGER

PROFESSIONAL EXPERIENCE

Mr. Parten has over twenty-two years of experience in environmental site investigations and remediation studies for Industrial and Hazardous Waste sites, municipal solid waste landfill sites and underground storage tank (UST) facilities. He was the Risk Assessment and Corrective Action Manager for Terracon's Dallas office before taking over the Orange County location as Office Manager.

He has successfully managed and obtained regulatory closure of over 30 Voluntary Cleanup Program (VCP) sites and leaking underground storage tank (LUST) facilities, and coordinated UST removal and closure for numerous facilities in multiple states throughout the United States. Mr. Parten possesses extensive experience in the installation of monitor wells, aquifer characterization, sensitive receptor surveys, and risk-based assessments. Additionally, he has extensive experience in comprehensive soil and groundwater investigations on industrial facilities and municipal solid waste (MSW) landfill facilities, including evaluation of landfill gas/methane impacts. He has prepared and implemented corrective action work plans for remediation of chlorinated hydrocarbons at dry cleaner facilities and petroleum hydrocarbons at LUST facilities, MSW landfill facilities, and managed and implemented groundwater pump and treat, non-aqueous phase liquid (NAPL) recovery, and duel-phase vapor extraction systems for the recovery of petroleum hydrocarbons. Additionally, Mr. Parten developed work plans and implemented the remediation of heavy metals and poly-nuclear aromatic hydrocarbons (PAHs).

PROJECT EXPERIENCE

Municipal Landfill – VCP Site

Successfully oversaw and managed the engineering design and construction quality assurance for the closure and restoration of a high-profile MSW landfill in accordance with regulatory standards, subsequent to significant investigation activities. The remedy consisted of removal and consolidation of wastes and construction of LFG recovery trenches to prevent migration of landfill gas. The remedy utilized engineering controls and removal of impacted media. Project management responsibilities included coordination with Local, State and Federal officials, public/neighborhood communications, and interaction with attorneys, and management of project budgets that exceeded $4.5 million over seven years. Terracon continues to provide post closure care monitoring and O&M for the site.

Department of Transportation Contract

Successfully managed a two-year environmental services contract with the Texas Department of Transportation (TxDOT) and coordinated multiple Terracon offices to provide geographic coverage of environmental consulting service throughout Texas. Mr. Parten was the liaison to TxDOT for the performance of environmental consulting services, and provided senior technical review of environmental investigations, Phase I ESAs,

Education

Bachelor of Science, Geology, Sul Ross State University, Alpine, Texas, 1994

Additional Courses:
University of Houston TCEQ Texas Risk Reduction Program (TRRP) Training Program I, II, and III

Roadmap to Remediation

CAPM Refresher Course, Texas A&M University

TNRCC Hazardous Waste Seminar

TNRCC PST Risk Assessments Seminar

TNRCC Pollution Prevention Training Workshop

API Risk/Exposure Assessment

Contaminant Fate and Transport Modeling in Risk Assessment

Environmental Hydrology and Soil Science

Certifications

Licensed Professional Geoscientist (P.G.), I.D. # 221, Texas Board of Professional Geoscientists, March 2003 (current)

Registered Professional Geologist (P.G.), I.D. # 004037; State of Tennessee, May 1996 (current)

TCEQ Corrective Action Project Manager, CAPM #01091 (current)

40 Hour OSHA Hazardous Waste Site & Waste Management Training

Affiliations

BDA/Orange County
CMAA
Groundwater Resource Assoc.
Geological Society of America

Work History

Terracon Consultants, Inc. (Irvine), Principal, Office Manager, August 1998 to Present

ATC (formerly ATEC) Associates, Inc. - Dallas, Texas, Senior Project Manager April 1990 to August 1998

Terratech, Inc. - San Jose, California, Environmental and Geotechnical Technician February 1989 to March 1990

Woodward-Clyde Consultants - San Jose, California, Environmental and Geotechnical Technician March 1987 to February 1989

removal of underground storage tanks, remediation of affected media and waste management, asbestos and lead-based paint investigations, and management of financial metrics and budgets in strict conformance with negotiated fees and procedures under a $2,000,000 contract.

City-Operated LUST Facilities

Provided senior project management of 14 City operated LUST facilities through coordination of investigation, regulatory reporting and response actions in the pursuit of closure. Mr. Parten was responsible for managing all site activities, evaluation of data, reporting, communicating with local and state officials, and management of budget and schedule requirements.

Municipal Property

Provided senior project management and technical review of several properties, including the remediation of metals and PAH-impacted soils, using a combination of excavation and removal and in-place stabilization. Work was performed under the EPA Brownfields Program and the Voluntary Cleanup Program. The $1.2 million dollar remediation project was part of a high-profile downtown parks and recreation redevelopment project that successfully established LEED Certified public parks in areas once occupied by commercial and industrial property. Mr. Parten was responsible for managing all site activities, evaluation of data, reporting, communicating with local and state officials, and management of budget and schedule requirements.

3.023-Acre Tract – VCP Site

Successfully managed a Phase I ESA and subsequent comprehensive site investigation to evaluate historical site activities and non-native fill material. Chemicals of concern included VOCs, TPH, metals and PAHs in on-site soil and groundwater. Subsequent to completion of a risk-based assessment, response actions including remediation of approximately 1,500 cubic yards of impacted soils was performed to obtain a voluntary cleanup program Certificate of Completion. Mr. Parten was responsible for managing all site activities, evaluation of data, reporting, and communication with state officials.

Retail Shopping Center – VCP Site

Conducted extensive site investigation activities to evaluate the magnitude and extent of chlorinated solvents identified in the vicinity of a former dry cleaners facility. The chlorinated solvent plume was defined to drinking water standards and was delineated to a creek channel nearly 1,200 feet from the source property. Based on site investigation results, assisted the property owner in entering the site into the VCP, and managed and implemented response actions and treatment of affected media utilizing a combination of source-removal/excavation (750 cubic yards) within the building interiors, hydrogen-releasing compound (HRC®) treatment of backfill, and HRC injection into the underlying soil and groundwater across the site. Treatment technology effectively remediated affected soils and significantly reduced contaminant levels within the on-site source areas. Additional response actions were conducted to reduce on-site groundwater contamination levels through HRC injection at over 250 locations. Monitored natural attenuation and groundwater monitoring was performed for a period of approximately four years. Mr. Parten assisted the client in the establishment of a deed restriction (Municipal Setting Designation) that restricted the use of groundwater on the site. Mr. Parten interacted with City and State officials and prepared and submitted multiple reports documenting site activities, and managed a project budget totaling $1,200,000.

Additional Project Experience

Under the direction and senior technical review by Mr. Parten, final site closure has been obtained for over thirty VCP, Innocent Owner/Operator Program, LUST, and Industrial and Hazardous Waste facilities in multiple states across the United States. Additionally, Mr. Parten has coordinated and managed the removal of dozens of underground storage tank (UST) systems and remediation of contaminated soil and groundwater. Mr. Parten has provided expert testimony on multiple projects, and is a primary point of contact interacting with environmental attorneys and regulatory agencies.

APPENDIX F
DESCRIPTION OF TERMS AND ACRONYMS

Description of Selected General Terms and Acronyms

Term/Acronym	*Description*
ACM	Asbestos Containing Material. Asbestos is a naturally occurring mineral, three varieties of which (chrysotile, amosite, crocidolite) have been commonly used as fireproofing or binding agents in construction materials. Exposure to asbestos, as well as ACM, has been documented to cause lung diseases including asbestosis (scarring of the lung), lung cancer and mesothelioma (a cancer of the lung lining). Regulatory agencies have generally defined ACM as a material containing greater that one (1) percent asbestos, however some states (e.g. California) define ACM as materials having 0.1% asbestos. In order to define a homogenous material as non-ACM, a minimum number of samples must be collected from the material dependent upon its type and quantity. Homogenous materials defined as non-ACM must either have 1) no asbestos identified in all of its samples or 2) an identified asbestos concentration below the appropriate regulatory threshold. Asbestos concentrations are generally determined using polarized light microscopy or transmission electron microscopy. Point counting is an analytical method to statistically quantify the percentage of asbestos in a sample. The asbestos component of ACM may either be friable or non-friable. Friable materials, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure and have a higher potential for a fiber release than non-friable ACM. Non-friable ACM are materials that are firmly bound in a matrix by plastic, cement, etc. and, if handled carefully, will not become friable. Federal and state regulations require that either all suspect building materials be presumed ACM or that an asbestos survey be performed prior to renovation, dismantling, demolition, or other activities that may disturb potential ACM. Notifications are required prior to demolition and/or renovation activities that may impact the condition of ACM in a building. ACM removal may be required if the ACM is likely to be disturbed or damaged during the demolition or renovation. Abatement of friable or potentially friable ACM must be performed by a licensed abatement contractor in accordance with state rules and NESHAP. Additionally, OSHA regulations for work classification, worker training and worker protection will apply.
AHERA	Asbestos Hazard Emergency Response Act
AST	Aboveground Storage Tanks. ASTs are generally described as storage tanks less than 10% of which are below ground (i.e., buried). Tanks located in a basement, but not buried, are also considered ASTs. Whether, and the extent to which, an AST is regulated, is determined on a case-by-case basis and depends upon tank size, its contents and the jurisdiction of its location.
BGS	Below Ground Surface
Brownfields	State and/or tribal listing of Brownfield properties addressed by Cooperative Agreement Recipients or Targeted Brownfields Assessments.
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes. BTEX are VOC components found in gasoline and commonly used as analytical indicators of a petroleum hydrocarbon release.
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act (a.k.a. Superfund). CERCLA is the federal act that regulates abandoned or uncontrolled hazardous waste sites. Under this Act, joint and several liability may be imposed on potentially responsible parties for cleanup-related costs.
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System. An EPA compilation of sites having suspected or actual releases of hazardous substances to the environment. CERCLIS also contains information on site inspections, preliminary assessments and remediation of hazardous waste sites. These sites are typically reported to EPA by states and municipalities or by third parties pursuant to CERCLA Section 103.
CESQG	Conditionally exempt small quantity generators.
CFR	Code of Federal Regulations

Description of Selected General Terms and Acronyms (cont.)

Term/Acronym	*Description*
CREC	Controlled Recognized Environmental Condition is defined in ASTM E1527-13 as "a recognized environmental condition resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority (for example, as evidenced by the issuance of a no further action letter or equivalent, or meeting risk-based criteria established by regulatory authority) , with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls (for example, property use restrictions, activity and use limitations, institutional controls, or engineering controls). A condition considered by the environmental professional to be a controlled recognized environmental condition shall be listed in the findings section of the Phase I Environmental Site Assessment report, and as a recognized environmental condition in the conclusions section of the Phase I Environmental Site Assessment report."
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
ERNS	Emergency Response Notification System. An EPA-maintained federal database which stores information on notifications of oil discharges and hazardous substance releases in quantities greater than the applicable reportable quantity under CERCLA. ERNS is a cooperative data-sharing effort between EPA, DOT, and the National Response Center.
ESA	Environmental Site Assessment
FRP	Fiberglass Reinforced Plastic
Hazardous Substance	As defined under CERCLA, this is (A) any substance designated pursuant to section 1321(b)(2)(A) of Title 33, (B) any element, compound, mixture, solution, or substance designated pursuant to section 9602 of this title; (C) any hazardous waste having characteristics identified under or listed pursuant to section 3001 of the Solid Waste Disposal Act (with some exclusions); (D) any toxic pollutant listed under section 1317(a) of Title 33; (E) any hazardous air pollutant listed under section 112 of the Clean Air Act; and (F) any imminently hazardous chemical substance or mixture with respect to which the EPA Administrator has taken action under section 2606 of Title 15. This term does not include petroleum, including crude oil or any fraction thereof which is not otherwise listed as a hazardous substance under subparagraphs (A) through (F) above, and the term include natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).
Hazardous Waste	This is defined as having characteristics identified or listed under section 3001 of the Solid Waste Disposal Act (with some exceptions). RCRA, as amended by the Solid Waste Disposal Act of 1980, defines this term as a "solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed."
HREC	Historical Recognized Environmental Condition is defined in ASTM E1527-13 as "a past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted residential use criteria established by a regulatory authority, without subjecting the property to any required controls (for example, property use restrictions, activity and use limitations, institutional controls, or engineering controls). Before calling the past release a historical recognized environmental condition, the environmental professional must determine whether the past release is a recognized environmental condition at the time of the Phase I Environmental Site Assessment is conducted (for example, if there has been a change in the regulatory criteria). If the EP considers the past release to be a recognized environmental condition at the time the Phase I ESA is conducted, the condition shall be included in the conclusions section of the report as a recognized environmental condition."

IC/EC	A listing of sites with institutional and/or engineering controls in place. IC include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls. EC include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.
ILP	Innocent Landowner/Operator Program
LQG	Large quantity generators.
LUST	Leaking Underground Storage Tank. This is a federal term set forth under RCRA for leaking USTs. Some states also utilize this term.
MCL	Maximum Contaminant Level. This Safe Drinking Water concept (and also used by many states as a ground water cleanup criteria) refers to the limit on drinking water contamination that determines whether a supplier can deliver water from a specific source without treatment.
MSDS	Material Safety Data Sheets. Written/printed forms prepared by chemical manufacturers, importers and employers which identify the physical and chemical traits of hazardous chemicals under OSHA's Hazard Communication Standard.
NESHAP	National Emissions Standard for Hazardous Air Pollutants (Federal Clean Air Act). This part of the Clean Air Act regulates emissions of hazardous air pollutants.
NFRAP	Facilities where there is "No Further Remedial Action Planned," as more particularly described under the Records Review section of this report.
NOV	Notice of Violation. A notice of violation or similar citation issued to an entity, company or individual by a state or federal regulatory body indicating a violation of applicable rule or regulations has been identified.
NPDES	National Pollutant Discharge Elimination System (Clean Water Act). The federal permit system for discharges of polluted water.
NPL	The NPL is the EPA's database of uncontrolled or abandoned hazardous waste facilities that have been listed for priority remedial actions under the Superfund Program.
OSHA	Occupational Safety and Health Administration or Occupational Safety and Health Act
PACM	Presumed Asbestos-Containing Material. A material that is suspected of containing or presumed to contain asbestos but which has not been analyzed to confirm the presence or absence of asbestos.

Description of Selected General Terms and Acronyms (cont.)

Term/Acronym	*Description*
PCB	Polychlorinated Biphenyl. A halogenated organic compound commonly in the form of a viscous liquid or resin, a flowing yellow oil, or a waxy solid. This compound was historically used as dielectric fluid in electrical equipment (such as electrical transformers and capacitors, electrical ballasts, hydraulic and heat transfer fluids), and for numerous heat and fire sensitive applications. PCB was preferred due to its durability, stability (even at high temperatures), good chemical resistance, low volatility, flammability, and conductivity. PCBs, however, do not break down in the environment and are classified by the EPA as a suspected carcinogen. 1978 regulations, under the Toxic Substances Control Act, prohibit manufacturing of PCB-containing equipment; however, some of this equipment may still be in use today.
pCi/L	Pico Curies per Liter of Air. Unit of measurement for Radon and similar radioactive materials.
PLM	Polarized Light Microscopy (see ACM section of the report, if included in the scope of services)
PST	Petroleum Storage Tank. An AST or UST that contains a petroleum product.
Radon	A radioactive gas resulting from radioactive decay of naturally-occurring radioactive materials in rocks and soils containing uranium, granite, shale, phosphate, and pitchblende. Radon concentrations are measured in Pico Curies per Liter of Air. Exposure to elevated levels of radon creates a risk of lung cancer; this risk generally increases as the level of radon and the duration of exposure increases. Outdoors, radon is diluted to such low concentrations that it usually does not present a health concern. However, radon can accumulate in building basements or similar enclosed spaces to levels that can pose a risk to human health. Indoor radon concentrations depend primarily upon the building's construction, design and the concentration of radon in the underlying soil and ground water. The EPA recommended annual average indoor "action level" concentration for residential structures is 4.0 pCi/l.
RCRA	Resource Conservation and Recovery Act. Federal act regulating solid and hazardous wastes from point of generation to time of disposal ('cradle to grave"). 42 U.S.C. 6901 et seq.
RCRA Generators	The RCRA Generators database, maintained by the EPA, lists facilities that generate hazardous waste as part of their normal business practices. Generators are listed as either large (LQG), small (SQG), or conditionally exempt (CESQG). LQG produce at least 1000 kg/month of non-acutely hazardous waste or 1 kg/month of acutely hazardous waste. SQG produce 100-1000 kg/month of non-acutely hazardous waste. CESQG are those that generate less than 100 kg/month of non-acutely hazardous waste.
RCRA CORRACTS/TSDs	The USEPA maintains a database of RCRA facilities associated with treatment, storage, and disposal (TSD) of hazardous materials which are undergoing "corrective action". A "corrective action" order is issued when there is a release of hazardous waste or constituents into the environment from a RCRA facility.
RCRA Non-CORRACTS/TSDs	The RCRA Non-CORRACTS/TSD Database is a compilation by the USEPA of facilities which report storage, transportation, treatment, or disposal of hazardous waste. Unlike the RCRA CORRACTS/TSD database, the RCRA Non-CORRACTS/TSD database does not include RCRA facilities where corrective action is required.
RCRA Violators List	RAATS. RCRA Administrative Actions Taken. RAATS information is now contained in the RCRIS database and includes records of administrative enforcement actions against facilities for noncompliance.
RCRIS	Resource Conservation and Recovery Information System, as defined in the Records Review section of this report.
REC	Recognized Environmental Conditions are defined by ASTM E1527-13 as "the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: 1)due to any release to the environment; 2) under conditions indicative of a release to the environment. *De minimis* conditions are not recognized environmental conditions."
SCL	State "CERCLIS" List (see SPL /State Priority List, below).

Description of Selected General Terms and Acronyms (cont.)

Term/Acronym	*Description*
SPCC	Spill Prevention, Control and Countermeasures. SPCC plans are required under federal law (Clean Water Act and Oil Pollution Act) for any facility storing petroleum in tanks and/or containers of 55-gallons or more that when taken in aggregate exceed 1,320 gallons. SPCC plans are also required for facilities with underground petroleum storage tanks with capacities of over 42,000 gallons. Many states have similar spill prevention programs, which may have additional requirements.
SPL	State Priority List. State list of confirmed sites having contamination in which the state is actively involved in clean up activities or is actively pursuing potentially responsible parties for clean up. Sometimes referred to as a State "CERCLIS" List.
SQG	Small quantity generator.
SWF/LF	State and/or Tribal database of solid waste/Landfill facilities. The database information may include the facility name, class, operation type, area, estimated operational life, and owner.
TPH	Total Petroleum Hydrocarbons
TRI	Toxic Release Inventory. Routine EPA report on releases of toxic chemicals to the environment based upon information submitted by entities subject to reporting under the Emergency Planning and Community Right to Know Act.
TSCA	Toxic Substances Control Act. A federal law regulating manufacture, import, processing and distribution of chemical substances not specifically regulated by other federal laws (such as asbestos, PCBs, lead-based paint and radon). 15 U.S.C 2601 et seq.
USACE	United States Army Corps of Engineers
USC	United States Code
USGS	United States Geological Survey
USNRCS	United States Department of Agriculture-Natural Resource Conservation Service
UST	Underground Storage Tank. Most federal and state regulations, as well as ASTM E1527-13, define this as any tank, incl., underground piping connected to the tank, that is or has been used to contain hazardous substances or petroleum products and the volume of which is 10% or more beneath the surface of the ground (i.e., buried).
VCP	State and/or Tribal facilities included as Voluntary Cleanup Program sites.
VOC	Volatile Organic Compound
Wetlands	Areas that are typically saturated with surface or ground water that creates an environment supportive of wetland vegetation (i.e., swamps, marshes, bogs). The Corps of Engineers Wetlands Delineation Manual (Technical Report Y-87-1) defines wetlands as areas inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. For an area to be considered a jurisdictional wetland, it must meet the following criteria: more than 50 percent of the dominant plant species must be categorized as Obligate, Facultative Wetland, or Facultative on lists of plant species that occur in wetlands; the soil must be hydric; and, wetland hydrology must be present. The federal Clean Water Act which regulates "waters of the US," also regulates wetlands, a program jointly administered by the USACE and the EPA. Waters of the U.S. are defined as: (1) waters used in interstate or foreign commerce, including all waters subject to the ebb and flow of tides; (2) all interstate waters including interstate wetlands; (3) all other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, etc., which the use, degradation, or destruction could affect interstate/ foreign commerce; (4) all impoundments of waters otherwise defined as waters of the U. S., (5) tributaries of waters identified in 1 through 4 above; (6) the territorial seas; and (7) wetlands adjacent to waters identified in 1 through 6 above. Only the USACE has the authority to make a final wetlands jurisdictional determination.

Appendix F
Noise Study Report

Kaiser Permanente - Fresno Medical Office Building

Noise Study Report
May 2020

Prepared by:
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Kaiser Permanente - Fresno Medical Office Building
Noise Study Report

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Table of Contents

Section	Description	Page
	Executive Summary	E-1
1.0	Introduction	1
1.1	Description of the Region/Project	2
1.2	Sound and the Human Ear	2
1.2.1	A-Weighted Decibels	5
1.2.2	Sound Pressure Levels and Decibels	5
1.2.3	Sound, Noise, and Acoustics	6
1.2.4	Frequency and Hertz	6
1.2.5	Addition of Decibels	8
1.3	Characteristics of Sound Propagation and Attenuation	8
1.3.1	Noise Descriptors	8
1.3.2	Sound Propagation	9
1.4	Ground-borne Vibration	10
1.5	Methodology	10
1.5.1	California Environmental Quality Act	11
1.5.2	City of Fresno	11
1.5.3	Study Methods and Procedures	13
2.0	Existing Conditions	14
2.1	Traffic Noise	14
2.2	Railroad Noise	16
2.3	Airport Noise	16
2.4	Roadway Network	17
2.5	Stationary Noise	18
2.6	Ground-borne Vibration	19
3.0	Short-Term Impacts	20
3.1	Construction Noise Impacts	20
3.2	Ground-borne Vibration	21
4.0	Long-Term Impacts	23
4.1	Traffic Noise Impacts	23
4.2	Stationary Noise Impacts	25

5.0 Impact Determinations and Recommended Mitigation 27
5.1 Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies 27
5.1.1 Short-Term Impacts 27
5.1.2 Long-Term Impacts 28
5.2 Generation of excessive groundborne vibration or groundborne noise levels 29
5.3 For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project are to excessive noise levels 30

Appendices

Appendix A – Acoustical terminology
Appendix B – TNM 2.5 Sound Level Worksheets
Appendix C – Caltrans' Technical Noise Supplement
Appendix D – Noise Study Data from Spectator Projects
Appendix E – City of Fresno General Plan – Noise and Safety

List of Tables

1 Transportation (Non-Aircraft) Noise Sources 12
2 Stationary Noise Sources 13
3 Existing Noise Levels 17
4 Typical Levels of Ground-Borne Vibration 19
5 Construction Equipment Noise 21
6 Vibration Source Levels for Construction Equipment 22
7 Existing Plus Project Noise Levels 24
8 Cumulative Year 2042 Noise Levels 25

List of Figures

1 Regional Location 4
2 Project Location 5
3 Common Environmental Sound Levels 7
4 Noise Receiver Locations 15

Executive Summary

This Noise Study Report (NSR) has been prepared for the purpose of identifying potential noise impacts related to the proposed Kaiser Permanente Fresno Medical Office Building ("MOB Project") in the City of Fresno. The MOB Project consists of the development of an approximately 145,000 square feet medical office building to be located west of the Locust Avenue and First Street intersection (APN: 303-201-11 and 303-201-17).

The proposed MOB Project lies within the central portion of the San Joaquin Valley in the City of Fresno. The MOB Project area is located in the northeastern portion of the City of Fresno. The MOB Project is located on the Valley floor at an elevation of approximately 308 feet above sea level with the surrounding area mostly flat.

IMPACTS

Exterior Noise Analysis

Traffic Noise

Existing Plus Project traffic noise levels were established based on previously collected traffic data and using the Traffic Noise Model (TNM) Version 2.5. Existing Plus Project levels, which are based on expected MOB Project trip distribution, are calculated and compared to both the existing noise level and the maximum allowable noise exposure for transportation noise sources as described in the City of Fresno's General Plan.

Traffic volumes associated with the MOB Project in addition to existing traffic along First Street, Locust Avenue, and Herndon Avenue were entered into the model to estimate noise levels at various receivers that would be affected by the MOB Project. Tables E-1 and E-2 show the predicted noise levels at sensitive receivers in the proposed MOB Project area that could potentially be exposed to high noise levels due to the MOB Project's proximity to existing street traffic. Results of the analysis show that none of the sensitive receivers will exceed the City of Fresno's Transportation Noise Source criteria for the Existing Plus Project and Cumulative Year 2042 Plus Project scenarios. As a result, the MOB Project will not create a significant impact at sensitive receptors in the study area.

Typical construction methods allow for a noise reduction of 25–30 dBA for building facades as noted in Caltrans' Technical Noise Supplement to the Traffic Noise Analysis Protocol (September 2013). As a result, the MOB Project will not significantly impact interior noise levels at receivers 1, 2, and 4.

Table E-1
Existing Plus Project Noise Levels

Receiver ID No.	Location	Distance from Noise Source-Roadway Centerline (feet)	Existing Noise Level Ldn dB	Existing Plus Project Noise Level Ldn dB	Noise Increase or Decrease (-) [a]	City of Fresno's Transportation Noise Source Criterion (Outdoor Activity Areas) [b]	Impact
1	Office Developments along First Street, south of Alluvial Avenue	45	67.0	67.0	0.0	--	None
2	Office Development along Locust Avenue, west of First Street	125	56.0	58.0	2.0	--	None
3	Outdoor Activity Area of single-family residence along First Street, east of First Street	150	58.0	58.0	0.0	65.0	None
4	Office Developments along First Street, south of Alluvial Avenue	60	65.0	66.0	1.0	--	None

Source: VRPA Technologies, 2020
a - City of Fresno Policy NS-1-j from the Noise and Safety Element of the General Plan establishes that a significant increase in ambient noise levels is assumed if the project would increase noise levels in the immediate vicinity by 3 dB Ldn or CNEL or more above the ambient noise limits.
b - Table 1 shows the City of Fresno maximum allowable noise exposure from Transportation Noise Sources. The table identifies 45 dB (Leq) for interior spaces of office buildings

Table E-2
Cumulative Year 2042 Noise Levels

Receiver ID No.	Location	Distance from Noise Source-Roadway Centerline (feet)	Cumulative Year 2042 Without Project Noise Level Ldn dB	Cumulative Year 2042 Plus Project Noise Level Ldn dB	Noise Increase or Decrease (-) [a]	City of Fresno's Transportation Noise Source Criterion (Outdoor Activity Areas) [b]	Impact
1	Office Developments along First Street, south of Alluvial Avenue	45	70.0	70.0	0.0	--	None
2	Office Development along Locust Avenue, west of First Street	125	59.0	60.0	1.0	--	None
3	Outdoor Activity Area of single-family residence along First Street, east of First Street	150	61.0	62.0	1.0	65.0	None
4	Office Developments along First Street, south of Alluvial Avenue	60	69.0	69.0	0.0	--	None

Source: VRPA Technologies, 2020
a - City of Fresno Policy NS-1-j from the Noise and Safety Element of the General Plan establishes that a significant increase in ambient noise levels is assumed if the project would increase noise levels in the immediate vicinity by 3 dB Ldn or CNEL or more above the ambient noise limits.
b - Table 1 shows the City of Fresno maximum allowable noise exposure from Transportation Noise Sources. The table identifies 45 dB (Leq) for interior spaces of office buildings

Stationary Noise

The City of Fresno's maximum allowable noise exposure from Stationary Noise Sources is reflected in Table 2. The hourly and maximum sound level allowed at sensitive receivers (residential, transient lodging) during daytime (7:00am to 10:00pm) hours is 50 dBA and 70 dBA, respectively. The MOB Project does not include an outdoor activity area that could be impacted by near-by stationary noise sources. However, Kaiser Permanente Neighborhood Park is located approximately 500 feet northwest of the proposed location for the Medical Office Building.

Though the MOB Project doesn't include an outdoor activity area, an assessment of stationary noise impacts from the park was identified. Considering the change in noise level due to distance for point sources, the Kaiser Permanente Medical Office Building would experience outdoor noise levels of approximately 50 dBA hourly Leq/61 dBA max which meets the City of Fresno's Stationary Noise Source criteria.

CEQA ENVIRONMENTAL CHECKLIST

In accordance with the California Environmental Quality Act (CEQA), the effects of the MOB Project were evaluated to determine if they will result in Project-Specific significant adverse impacts on the environment that are peculiar to the MOB Project or its site that differ from those impacts already analyzed and disclosed in the City's General Plan EIR. The criteria used to determine the significance of a noise impact are based on the following thresholds of significance, which come from Appendix G of the CEQA Guidelines. Accordingly, noise impacts resulting from the MOB Project are considered significant if the MOB Project would result in:

a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Short-Term Impacts

Consistent with the analysis included in the General Plan EIR, during construction of the MOB Project, noise from construction activities will add to the noise environment in the immediate area. Activities involved in building construction would generate maximum noise levels, as indicated in Table 5, ranging from 77 to 85 dBA at a distance of 50 feet. Construction activities will be temporary in nature and are expected to occur during normal daytime working hours. Construction noise impacts could result in annoyance or sleep disruption for nearby residences if nighttime operations occurred, or if unusually noisy equipment was used. It is not anticipated that any portion of the construction phase will take place during nighttime hours. Based on information provided in Table 5 and the noise attenuation formula provided in Section 2.5, the nearest single-family residence to the east of the MOB Project site (575 feet) may be subject to short-term noise reaching 56 to 64 dBA Lmax generated by construction activities. Considering the maximum sound level of 70 dBA Lmax from the City of Fresno Stationary Noise Sources (Table 2), construction of the MOB Project will not impact neighboring residences. Construction activities associated with the MOB Project will be subject to Chapter 10 of the City of Fresno Municipal Code, which will ensure that the MOB Project will not result in Project-specific or site-specific significant adverse impacts from construction noise levels within the MOB Project study area. Therefore, no mitigation measures are needed.

Long-Term Impacts

Traffic Noise

The General Plan EIR concluded that long-term noise levels from stationary sources, motor vehicles, and aircraft would result in significant and unavoidable impacts related to substantial permanent increases in ambient noise levels. Tables E-1 and E-2 show the predicted noise levels at sensitive receivers in the study area as a result of adding traffic associated with the MOB Project. Results of the analysis show that none of the sensitive receivers will exceed the City of Fresno's Transportation Noise Source criteria for the Existing Plus Project and Cumulative Year 2042 scenarios. As a result, MOB Project traffic will not create a significant impact at sensitive receptors in the study area considering significance criteria discussed in Section 1.5.2. The MOB Project generates an increase of 2 dB or less with the addition of MOB Project traffic to the surrounding roadway network. The resulting permanent noise increases related to MOB Project traffic would be within the noise increases analyzed in the General Plan EIR, so there would be no increase in severity to the previously-identified significant and unavoidable noise impacts, and implementation of the MOB Project will not result in Project-specific or site-specific significant adverse impacts from traffic noise levels within the MOB Project study area. Therefore, no mitigation measures are needed.

Stationary Noise

Section 4.2 indicates that none of the sensitive receivers will be impacted by off-site noise sources. The estimated maximum noise levels anticipated for the MOB Project will not exceed the City of Fresno's Stationary Noise Source criteria.

b) Generation of excessive groundborne vibration or groundborne noise levels?

Construction activities associated with the MOB Project would likely require the use of various types of equipment including bulldozers and dump trucks. Based on the vibration levels provided in Table 6, ground vibration generated by common construction equipment would be 75 VdB or less at a distance of 100 feet or more. The MOB Project site is relatively flat and wouldn't generally require the use of a large bulldozer or caisson drilling. Considering the planned location of the Kaiser Permanente Medical Office building and the nearest office building to the northeast (140 feet), it is not anticipated that construction of the MOB Project would impact adjacent office buildings. As a result, the anticipated vibration levels at the nearest off-site structures will not exceed vibration levels greater than 75 VdB. Therefore, there would be no increase in severity to the previously identified significant and unavoidable vibration impacts, and construction of the MOB Project will not result in Project-specific or site-specific significant adverse impacts from vibration within the MOB Project study area. Accordingly, no mitigation measures are needed.

c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

The MOB Project is not located within the vicinity of a private airstrip or public use airport. The Fresno Yosemite International Airport and Sierra Sky Park Airport are located nearly 5 miles southeast and west of the MOB Project, respectively. Therefore, the MOB Project will not result in the stated impact. No mitigation is needed.

As summarized above, this Report shows that noise impacts resulting from the MOB Project would be within the impacts analyzed in the General Plan EIR. Moreover, the Report demonstrates that with adherence to the noise-reducing policies included in General Plan Policies NS-1-a through NS-1-p and Chapter 10 of the Fresno Municipal Code, there would be no short-term or long-term Project- or site-specific noise impacts with respect to construction or operation of the MOB Project.

1.0 Introduction

The City of Fresno ("City") adopted its current General Plan on December 18, 2014 and certified a Master Environmental Impact Report ("EIR") for the General Plan (State Clearinghouse Number 2012111015) (the "General Plan EIR"). The proposed Kaiser Permanente Medical Office Building ("MOB Project") would be located within the "Office" use designation under the General Plan, which permits professional and medical offices up to a maximum floor area ratio of 2.0. The MOB Project is a permitted use and proposes a floor area ratio of approximately 0.47 (assuming 145,000 square feet of development on the 7.1-acre site), so it is consistent with the General Plan's use and density regulations.

Public Resources Code Section 21083.3 and California Environmental Quality Act ("CEQA") Guidelines Section 15183 provide that proposed projects that are consistent with a "community plan" (including the General Plan) for which an EIR was certified is exempt from CEQA, "except as might be necessary to examine whether there are project-specific significant effects which are peculiar to the Project or its site." CEQA Guidelines Section 15183(c) specifies that "if an impact is not peculiar to the parcel or to the proposed Project, has been addressed as a significant effect in the prior EIR, or can be substantially mitigated by the imposition of uniformly applied development policies or standards…, then an EIR need not be prepared for the project solely on the basis of that impact."

In other words, projects consistent with the General Plan are exempt from subsequent CEQA review unless they would result in project-specific impacts. If a project's impacts are within the universe of effects previously covered in the General Plan EIR, or if they can be reduced to a less than significant level through the imposition of uniformly applied development standards (such as General Plan policies, zoning requirements, General Plan EIR mitigation measures, or standards from other plans), no new CEQA document (e.g., a Mitigated Negative Declaration or and EIR) is required.

Pursuant to CEQA Guidelines Section 15183, the analysis included in this report can be used by the City of Fresno to determine if the MOB Project would result in project-specific effects peculiar to the MOB Project or its site that differ from those impacts already analyzed and disclosed in the General Plan EIR. As discussed within this report, the analysis provides substantial evidence in support of the conclusion that the MOB Project would not result in any significant impacts that: (1) are peculiar to the MOB Project or its site; (2) were not identified as significant in the General Plan EIR; or (3) were previously identified significant effects but that would have a substantial increase in severity as compared to the General Plan EIR.

The General Plan EIR stated that General Plan implementation would result in temporary and long-term increases in noise levels. The General Plan EIR concluded that compliance with the City's noise ordinance would reduce construction noise to less than significant levels. However, even with implementation of General Plan Policies NS-1-a through NS-1-p, long-term noise levels from stationary sources, motor vehicles, and aircraft would result in significant and unavoidable impacts related to substantial permanent increases in ambient noise levels.

As discussed in this report, MOB Project construction would comply with the City's noise ordinance, and there are no project- or site-specific impacts with respect to temporary construction noise that would be peculiar to the MOB Project. Likewise, the MOB Project would be subject to the noise-reducing policies included in General Plan Policies NS-1-a through NS-1-p. The resulting permanent noise increases related to MOB Project traffic would be within the noise increases analyzed in the General Plan EIR, so there would be no increase in severity to the previously-identified significant and unavoidable noise impacts.

1.1 Description of the Region/Project

This Noise Study Report (NSR) has been prepared for the purpose of identifying potential noise impacts related to the proposed MOB Project in the City of Fresno. The MOB Project consists of the development of an approximately 145,000 square feet medical office building to be located west of the Locust Avenue and First Street intersection (APN: 303-201-11 and 303-201-17).

The proposed MOB Project lies within the central portion of the San Joaquin Valley in the City of Fresno. The MOB Project area is located in the northeastern portion of the City of Fresno. Figures 1 and 2 show the location of the MOB Project along with major roadways and highways. The proposed MOB Project is located on the Valley floor at an elevation of approximately 308 feet above sea level with the surrounding area mostly flat.

When preparing an NSR, guidelines set by the City of Fresno must be followed. In analyzing noise levels, guidelines and policies in the Noise and Safety Chapter of the City of Fresno General Plan were utilized. Unless otherwise stated, all sound levels reported are in A-weighted decibels (dBA). A-weighting de-emphasizes the very low and very high frequencies of sound in a manner similar to the human ear. Most community noise standards use A-weighting, as it provides a high degree of correlation with human annoyance and health effects.

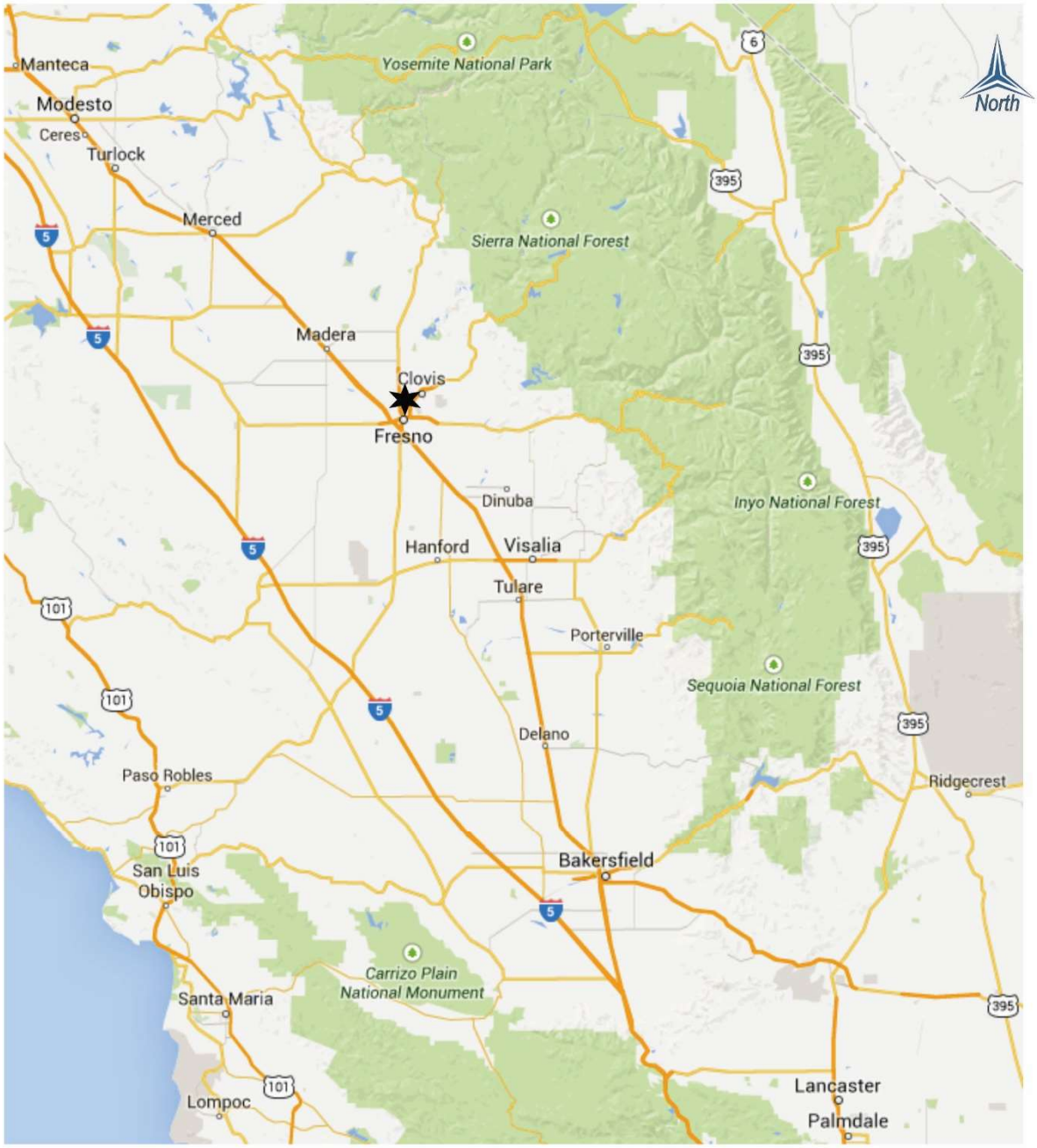
1.2 Sound and the Human Ear

Sound levels are presented on a logarithmic scale to account for the large range of acoustic pressures that the human ear is exposed to and is expressed in units of decibels (dB). A decibel is defined as the ratio between a measured value and a reference value usually corresponding to the lower threshold of human hearing defined as 20 micro pascals (µPa). Noise can generally be described as unwanted sound and has been cited as being a health problem, not just in terms of actual physiological damages such as hearing impairment, but also in terms of inhibiting general wellbeing and contributing to stress and annoyance. Long or repeated exposure to sounds at or above 85 dB can cause hearing loss. The louder the sound, the shorter the time period before hearing loss can occur. Sounds of less than 75 dB are unlikely to cause hearing loss even after long exposure.[1]

1 Source: National Institute on Deafness and Other Hearing Disorders

Kaiser Permanente - Fresno Medical Office Building
Regional Location

Figure 1

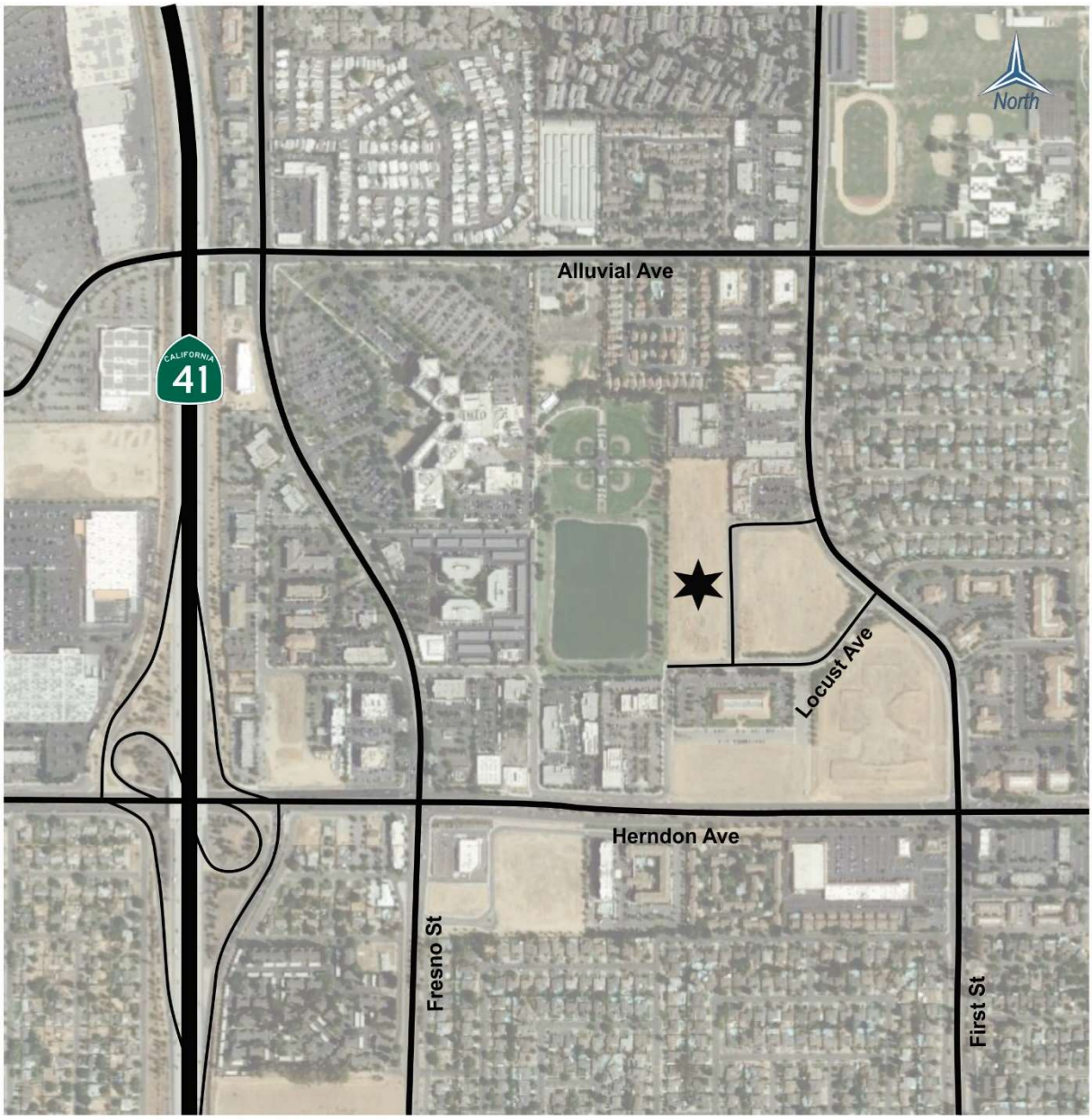


LEGEND

★ Project Location

VRPA TECHNOLOGIES, INC.

Kaiser Permanente - Fresno Medical Office Building **Figure 2**
Project Location



1.2.1 *A-Weighted Decibels*

Sound pressure level alone is not a reliable indicator of loudness. The frequency, or pitch, of a sound also has a substantial effect on how humans will respond. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear. Human hearing is limited not only in the range of audible frequencies but also in the way it perceives the SPL in that range. In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz, and it perceives a sound within that range as being more intense than a sound of higher or lower frequency with the same magnitude. To approximate the frequency response of the human ear, a series of SPL adjustments is usually applied to the sound measured by a sound level meter. The adjustments (referred to as a weighting network) are frequency dependent. The A-scale weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. When people make judgments of the relative loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. Other weighting networks have been devised to address high noise levels or other special problems (e.g., B-scale, C-scale, D-scale), but these scales are rarely, if ever, used in conjunction with highway traffic noise. Noise levels for traffic noise reports are typically reported in terms of A-weighted dBAs. In environmental noise studies, A-weighted SPLs are commonly referred to as noise levels.

Unfortunately, there is no completely satisfactory way to measure the subjective effects of noise, or of the corresponding reactions of annoyance and dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance, and habituation to noise over differing individual experiences with noise. Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment, referred to as the "ambient" environment. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by the hearers. Regarding increases in A-weighted noise level, knowledge of the following relationships will be helpful in understanding this report:

1. Except in carefully controlled laboratory experiments, a change of 1 dB cannot be perceived by humans.
2. Outside of the laboratory, a 3 dB change is considered a just-perceivable difference.
3. A change in level of at least 5 dB is required before any noticeable change in community response would be expected.
4. A 10 dB change is subjectively heard as approximately a doubling in loudness.

1.2.2 *Sound Pressure Levels and Decibels*

Because of the ability of the human ear to detect a wide range of sound pressure fluctuations, sound pressure levels are expressed in logarithmic units called decibels. The sound pressure level in decibels is calculated by taking the log of the ratio between the actual sound pressure

and the reference sound pressure squared. The reference sound pressure is considered the absolute hearing threshold. In addition, because the human ear is not equally sensitive to all sound frequencies, a specific frequency-dependent rating scale was devised to relate noise to human sensitivity. A dBA scale performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear. The basis for comparison is the faintest sound audible to the average ear at the frequency of maximum sensitivity. This dBA scale has been chosen by most authorities for purposes of environmental noise regulation. Typical indoor and outdoor noise levels are presented in Figure 3 (Common Environmental Sound Levels).

1.2.3 *Sound, Noise, and Acoustics*

Sound is a disturbance created by a moving or vibrating source in a gaseous or liquid medium or the elastic stage of a solid and is capable of being detected by the hearing organs. Sound may be thought of as the mechanical energy of a vibrating object transmitted by pressure waves through a medium to a hearing organ, such as a human ear. For traffic sound, the medium of concern is air. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired. Sound is actually a process that consists of three components: the sound source, the sound path, and the sound receiver. All three components must be present for sound to exist. Without a source to produce sound, there is no sound. Likewise, without a medium to transmit sound pressure waves, there is also no sound. Finally, sound must be received; a hearing organ, sensor, or object must be present to perceive, register, or be affected by sound or noise. In most situations, there are many different sound sources, paths, and receivers rather than just one of each. Acoustics is the field of science that deals with the production, propagation, reception, effects, and control of sound.

1.2.4 *Frequency and Hertz*

A continuous sound can be described by its frequency (pitch) and its amplitude (loudness). Frequency relates to the number of pressure oscillations per second. Low-frequency sounds are low in pitch, like the low notes on a piano, whereas high-frequency sounds are high in pitch, like the high notes on a piano. Frequency is expressed in terms of oscillations, or cycles, per second. Cycles per second are commonly referred to as Hertz (Hz). A frequency of 250 cycles per second is referred to as 250 Hz. High frequencies are sometimes more conveniently expressed in units of kilo-Hertz (kHz), or thousands of Hertz. The extreme range of frequencies that can be heard by the healthiest human ear spans from 16–20 Hz on the low end to about 20,000 Hz (or 20 kHz) on the high end.

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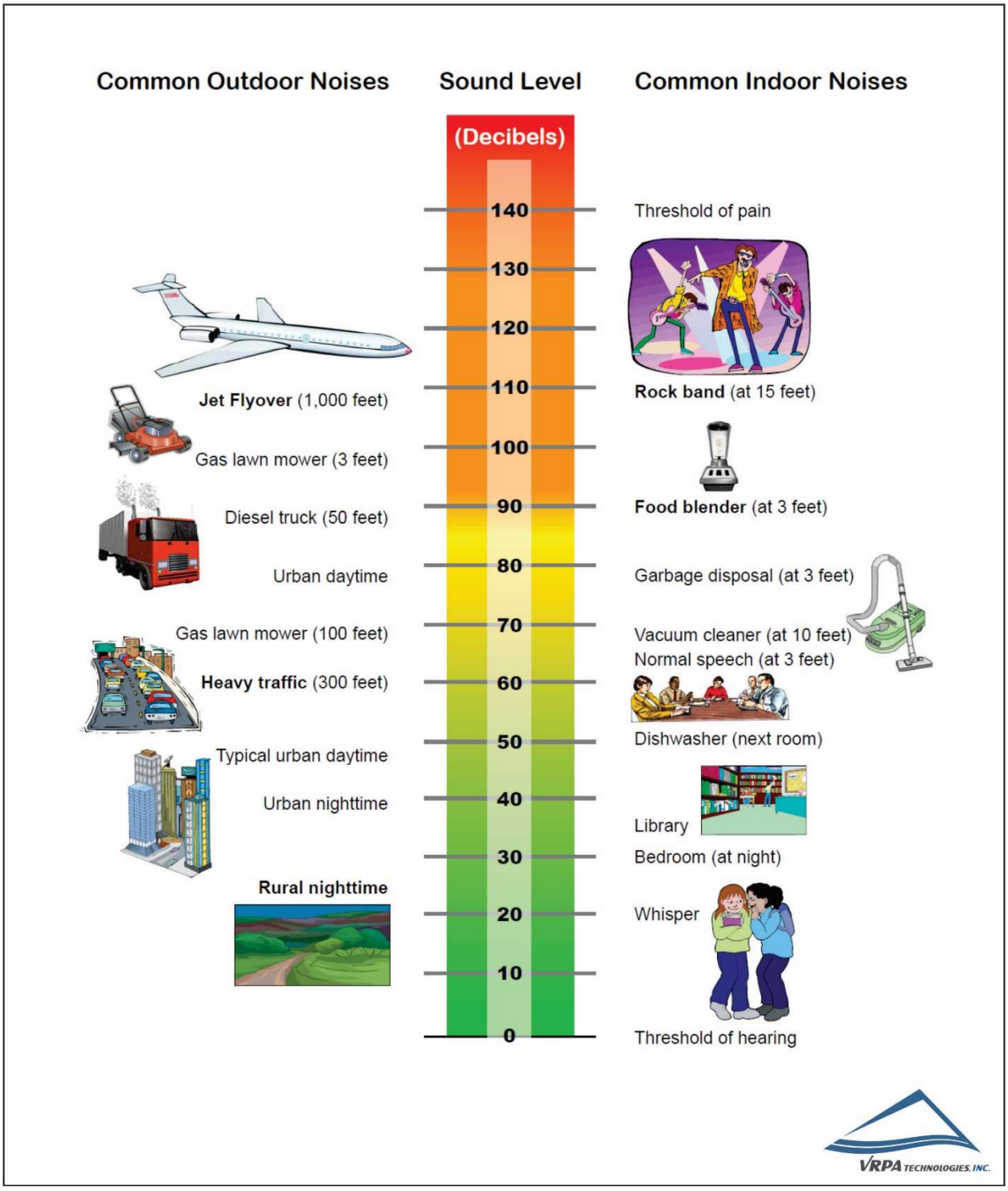
Common Environmental Sound Levels

Figure 3



1.2.5 *Addition of Decibels*

Because decibels are logarithmic units, sound pressure levels cannot be added or subtracted by ordinary arithmetic means. For example, if one automobile produces an SPL of 70 dBA as it passes an observer, two cars passing simultaneously would not produce 140 dBA; they would, in fact, combine to produce 73 dBA. When two sounds of equal SPL are combined, they will produce a combined SPL 3 dBA greater than the original individual SPL. In other words, sound energy must be doubled to produce a 3 dBA increase. If two sound levels differ by 10 dBA or more, the combined SPL is equal to the higher SPL; in other words, the lower sound level does not increase the higher sound level.

1.3 Characteristics of Sound Propagation and Attenuation

Noise can be generated by a number of sources, including mobile sources such as automobiles, trucks, and airplanes, and stationary sources such as construction sites, machinery, and industrial operations.

Noise generated by mobile sources typically attenuates (is reduced) at a rate between 3.0 and 4.5 dBA per doubling of distance. The rate depends on the ground surface and the number or type of objects between the noise source and the receiver. Hard and flat surfaces, such as concrete or asphalt, have an attenuation rate of 3.0 dBA per doubling of distance. Soft surfaces, such as uneven or vegetated terrain, have an attenuation rate of about 4.5 dBA per doubling of distance.

Noise generated by stationary sources typically attenuates at a rate between 6.0 and about 7.5 dBA per doubling of distance. Sound levels can be reduced by placing barriers between the noise source and the receiver (commonly called the “receptor”). In general, barriers contribute to decreasing noise levels only when the structure breaks the “line of sight” between the source and the receiver. Buildings, concrete walls, and berms can all act as effective noise barriers. Wooden fences or broad areas of dense foliage can also reduce noise but are less effective than solid barriers.

1.3.1 *Noise Descriptors*

Noise in the daily environment fluctuates over time. Some of the fluctuations are minor; some are substantial. Some noise levels occur in regular patterns; others are random. Some noise levels fluctuate rapidly, others slowly. Some noise levels vary widely; others are relatively constant. Various noise descriptors have been developed to describe time-varying noise levels. The following is a list of the noise descriptors most commonly used in traffic noise analysis:

1. **Equivalent Sound Level (Leq) -** Leq represents an average of the sound energy occurring over a specified period. Leq is, in effect, the steady-state sound level that, in a stated period, would contain the same acoustical energy as the time-varying sound that actually

occurs during the same period. The one-hour A-weighted equivalent sound level, Leq(h), is the energy average of the A-weighted sound levels occurring during a one-hour period and is the basis for the Noise Abatement Criteria (NAC) used by the California Department of Transportation (Caltrans) and the Federal Highway Administration (FHWA).

2. **Percentile-Exceeded Sound Level (Lx) -** Lx represents the sound level exceeded for a given percentage of a specified period. For example, L10 is the sound level exceeded 10 percent of the time, and L90 is the sound level exceeded 90 percent of the time.
3. **Maximum Sound Level (Lmax) -** Lmax is the highest instantaneous sound level measured during a specified period.

1.3.2 *Sound Propagation*

When sound propagates over a distance, it changes in both level and frequency content. The manner in which noise reduces with distance depends on the following factors:

1. Geometric Spreading - Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates (or drops off) at a rate of six dBA for each doubling of distance. Highway noise is not a single, stationary point source of sound. The movement of the vehicles on a highway makes the source of the sound appear to emanate from a line (i.e., a line source) rather than a point. This line source results in cylindrical spreading rather than the spherical spreading that results from a point source. The change in sound level from a line source is 3 dBA per doubling of distance.
2. Ground Absorption - Most often, the noise path between the highway and the observer is very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is done for simplification only; for distances of less than 60 m (200 ft), prediction results based on this scheme are sufficiently accurate. For acoustically hard sites (i.e., those sites with a reflective surface, such as a parking lot or a smooth body of water, between the source and the receiver), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface, such as soft dirt, grass, or scattered bushes and trees, between the source and the receiver), an excess ground attenuation value of 1.5 dBA per doubling of distance is normally assumed. When added to the geometric spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dBA per doubling of distance for a line source and 7.5 dBA per doubling of distance for a point source.
3. Atmospheric Effects - Research by Caltrans and others has shown that atmospheric conditions can have a significant effect on noise levels within 60 m (200 ft) of a highway. Wind has been shown to be the most important meteorological factor within approximately 150 m (500 ft) of the source, whereas vertical air temperature gradients are more important for greater distances. Other factors such as air temperature, humidity, and turbulence also have significant effects. Receivers located downwind from a source can be

exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lower noise levels. Increased sound levels can also occur as a result of temperature inversion conditions (i.e., increasing temperature with elevation).

4. Shielding by Natural and Human-Made Features - A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by this shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receiver specifically to reduce noise. A barrier that breaks the line of sight between a source and a receiver will typically result in at least 5 dBA of noise reduction.

1.4 Ground-borne Vibration

Annoyance to humans and damage to buildings are the two ground-borne vibration impacts of general concern. The two measurements corresponding to human annoyance and building damage for evaluating ground-borne vibration are peak particle velocity (PPV) and root-mean square (RMS) velocity. PPV is the maximum instantaneous positive or negative peak of the vibration signal, measured as a distance per time (such as millimeters or inches per second). This measurement has been used historically to evaluate shock-wave type vibrations from actions like blasting, pile driving, and mining activities, and their relationship to building damage. RMS is an average, or smoothed, vibration amplitude, commonly measured over 1-second intervals. It is expressed on a log scale in decibels (VdB) referenced to 0.000001 x 10-6 inch per second and is not to be confused with noise decibels. It is more suitable for addressing human annoyance and characterizing background vibration conditions because it better represents the response time of humans to ground vibration signals.

1.5 Methodology

When preparing an NSR, guidelines set by affected agencies must be followed. Acoustical terminology used for this NSR is documented in Appendix A. In analyzing traffic noise levels, the FHWA Highway Traffic Noise Prediction methodology must be applied. Safety concerns must also be analyzed to determine the need for appropriate mitigation resulting from increased noise due to increased traffic and other evaluations such as the need for noise barriers and other noise abatement improvements. Stationary noise levels were evaluated using Section 2.1.4 of the California Department of Transportation's (Caltrans) Technical Noise Supplement which evaluates the decrease in noise as distance from the noise source increases. Unless otherwise stated, all sound levels reported are in A-weighted decibels (dBA). A-weighting de-emphasizes the very low and very high frequencies of sound in a manner similar to the human ear. Most community noise standards use A-weighting, as it provides a high degree of correlation with human annoyance and health effects.

1.5.1 *California Environmental Quality Act (CEQA)*

CEQA requires environmental impact reports to evaluate whether and to what extent a proposed project may result in significant effects on the environment. If a project is determined to have a significant noise impact under CEQA, then CEQA dictates that mitigation measures must be incorporated into the project unless such measures are also evaluated and determined to not be feasible. If an EIR is required, it must evaluate a reasonable range of alternatives to the proposed project that could feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project. An EIR must also evaluate a "No Project" Alternative.

When an EIR has already been prepared for a community plan or general plan, future projects that are consistent with the plan are exempt from CEQA, "except as might be necessary to examine whether there are project-specific significant effects which are peculiar to the Project or its site."

CEQA Guidelines Appendix G suggests the following as potential thresholds for determining whether a project will result in significant impacts on the environment:

a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?
b) Generation of excessive groundborne vibration or groundborne noise levels?
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

Under CEQA Guidelines Section 15183(c), the impact analysis focuses on any impacts that may be peculiar to the parcel or to the proposed Project that have not been addressed as a significant effect in a prior EIR or cannot be substantially mitigated by the imposition of uniformly applied development policies or standards.

1.5.2 *City of Fresno*

The Noise and Safety Chapter of the Fresno General Plan, adopted December 18, 2014, serves as the primary policy statement for areas within the City of Fresno sphere of influence to maintain and improve the noise environment in the City. The Noise and Safety Chapter establishes Goals and Objectives relative to planning for the noise environment throughout City areas and is consistent with other General Plan Elements. Additionally, the Noise and Safety Chapter establishes exterior and interior noise standards.

Future noise/land use incompatibilities can be avoided or reduced with implementation of City of Fresno noise criteria and standards. The City realizes that it may not always be possible to avoid constructing noise-sensitive developments in existing noisy areas and therefore provides noise reduction strategies to be implemented in situations with potential noise/land use conflicts. It should be noted that the City does not have specific zoning or general plan requirements related to vibration.

Table 1 shows the City of Fresno maximum allowable noise exposure from Transportation Noise Sources. Table 2 shows the City of Fresno maximum allowable noise exposure from Stationary Noise Sources (non-transportation noise). The information presented in Table 1 and Table 2 comes from the Noise and Safety Chapter of the City of Fresno General Plan.

City of Fresno Policy NS-1-j from the Noise and Safety Element of the General Plan establishes that a significant increase in ambient noise levels is assumed if the MOB Project would increase noise levels in the immediate vicinity by 3 dB Ldn or CNEL or more above the ambient noise limits.

Table 1
Transportation (Non-Aircraft) Noise Sources

Noise-Sensitive Land Use[1]	Outdoor Activity Areas[2]	Interior Spaces	
	Ldn/CNEL, dB	Ldn/CNEL, dB	L_{eq}, dB[2]
Residential	65	45	--
Transient lodging	65	45	--
Hospitals, Nursing Homes	65	45	--
Theaters, Auditoriums, Music Halls	--	--	35
Churches, Meeting Halls	65	--	45
Office Buildings	--	--	45
Schools, Libraries, Museums	--	--	45

Notes:
(1) Where the location of outdoor activity area is unknown or is not applicable, the exterior noise level standard shall be applied to the property line of the receiving land use.
(2) As determined for a typical worst-case hour during periods of use.
-- = not applicable
Ldn = Day-Night Average Level
CNEL = Community Noise Equivalent Level
dB = Decibles
L_{eq} = Noise Equivalent Level

Table 2
Stationary Noise Sources

	Daytime (7:00 a.m. - 10:00 p.m.)	Nighttime (10:00 p.m. - 7:00 a.m.)
Hourly Equivalent Sound Level (L_{eq}), dBA	50	45
Maximum Sound Level (L_{max}), dBA	70	60

Notes:
(1) The Department of Development and Resource Management Director, on a case-by-case basis, may designate land uses other than those shown in this table to be noise-sensitive, and may require appropriate noise mitigation measures.
(2) As determined at outdoor activity areas. Where the location of outdoor activity areas is unknown or not applicable, the noise exposure standards shall be applied at the property line of the receiving land use. When ambient noise levels exceed or equal the levels of this table, mitigation shall only be required to limit noise to the ambient plus five dB.
L_{eq} = Noise Equivalent Level
L_{max} = Maximum noise level recorded during a noise event

1.5.3 *Study Methods and Procedures*

Site Selection

The MOB Project site was assessed through land use maps, aerial photography, and site inspection to determine the most effective placement of noise monitoring devices. The MOB Project's proximity to both First Street and Herndon Avenue present the possibility of excessive noise levels at the MOB Project site. The generalized land use data and location of sensitive receptors to First Street were the basis for the selection of the noise monitoring and analysis sites.

Noise Level Measurement Program

Existing noise levels in the MOB Project vicinity were sampled during the PM peak hour because traffic counts conducted in the study area show a greater volume of traffic in the PM peak hour than the AM peak hour. All measurements were made using an Extech Type 2 sound level meter datalogger.

The following measurement procedure was utilized:

1. Calibrate sound level meter.
2. Set up sound level meter at a height of 1.5 m (5 ft).
3. Commence noise monitoring.
4. Collect site-specific data such as date, time, direction of traffic, and distance from sound level meter to the center of the roadway.
5. Stop measurement after 15 minutes.
6. Proceed to next monitoring site and repeat.

2.0 Existing Conditions

Existing noise levels in the City are principally generated by transportation noise sources. Vehicular traffic noise is the dominant source in most areas, but aircraft and rail activity are also significant sources of environmental noise in the local areas surrounding these operations. Noise is generated by either mobile or stationary sources.

- ✓ Mobile source noise is typically associated with transportation, such as cars, trains, and aircraft. The most significant sources of mobile noise in the City are SR-41, SR-99, SR-168, SR-180 and other major arterial roadways, and aircraft operations at the Fresno Yosemite International Airport.

- ✓ Stationary noise is that generated by any 'fixed' noise source. Examples of stationary sources include outdoor machinery (i.e. such as heating/air conditioning systems and power generators), farming activities, high voltage power lines, and industrial areas within the City. Noise generated from construction sites also falls into the category of stationary sources.

2.1 Traffic Noise

Highway and roadway traffic noise levels are generally dependent upon three primary factors, which include the traffic volume, the traffic speed, and the percent of heavy vehicles on the roadway. Traffic generated noise is the result of vehicle engines, exhaust, tires, and wind generated by taller vehicles. Vehicles with defective mufflers or faulty equipment have the propensity to increase traffic noise. Traffic noise levels are reduced by distance, terrain, vegetation, and natural/manmade obstacles between a noise receptor and the highway/roadway.

To assess existing noise conditions, VRPA Technologies staff conducted noise level measurements at two (2) locations (called receivers) around the perimeter of the MOB Project study area and tabulated the results. The weather during the time of noise measurements consisted of sunshine and wind speeds of less than 5 mph. The purpose of the measurements was to determine baseline existing noise levels in the MOB Project area and to calibrate the FHWA Traffic Noise model, which will be used to then predict and assess MOB Project impacts.

Existing noise levels in the MOB Project vicinity were sampled during the PM peak hour because traffic counts conducted in the study area show a greater volume of traffic in the PM peak hour than the AM peak hour. The receiver locations are shown in Figure 4. It should be noted that the receiver distance from the roadway centerline in Figure 4 represents the location of sound level meter while collecting ambient noise levels in the study area. Two additional receivers (3 and 4) were incorporated into the analysis to assess the impacts of the MOB Project in relation to the City of Fresno noise standards. Modeled Receiver 3 represents the approximate location of the outdoor activity areas of the single-family residences located to the east of First Street. The additional receivers are also reflected in Figure 4.

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Noise Receiver Locations

Figure 4

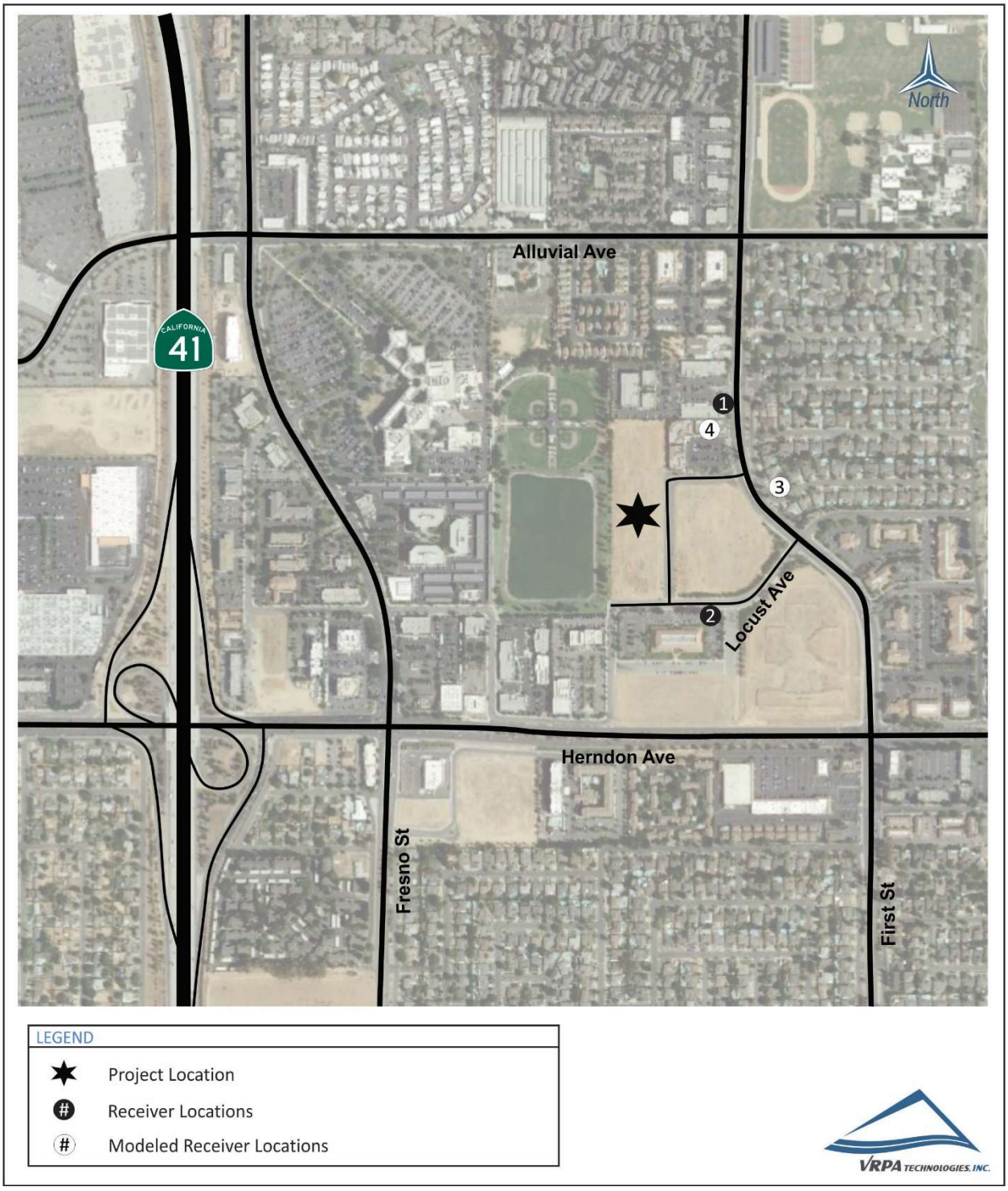


Table 3 characterizes the daily results of the existing noise conditions at the four (4) sensitive receptors evaluated in the study area. Traffic noise exposure is mainly a function of the number of vehicles on a given roadway per day, the speed of those vehicles, the percentage of medium and heavy trucks in the traffic volume, and the receiver's proximity to the roadway. Every vehicle passage on every roadway in the City radiates noise.

Existing high noise levels along major streets and highways are generally caused by traffic and congestion. Potential impacts along these facilities are generally classified as follows:

- ✓ Low - Ldn 59 dB or below
- ✓ Moderate - Ldn 60 dB to 65 dB
- ✓ High - Ldn 66 dB or greater

The potential for adverse noise impacts is generally moderate to high along most segments of State highways and is generally low to moderate along most segments of City streets and highways.

2.2 Railroad Noise

The San Joaquin Valley Railroad (SJVRR), The Burlington Northern Santa Fe Railroad, and the Union Pacific Railroad operate in the City of Fresno. Passenger and commercial rail service in Fresno County is provided on these rail lines. Railroad noise will not impact the MOB Project study area since the nearest rail line is over 2 miles away.

2.3 Airport Noise

The Fresno Yosemite International Airport and Sierra Sky Park Airport are located nearly 5 miles southeast and west of the MOB Project, respectively. The Fresno Yosemite International Airport is the largest and busiest airport in the San Joaquin Valley. During 2016, 1.44 million passengers flew in and out of the Fresno Yosemite International Airport. Total operations included approximately 98,000 in 2016 according to the Fresno Airports Master Plan. This includes air carrier, air taxi and commuter, general aviation, and military operations. The Sierra Sky Park Airport is a small public airport that averaged 39 aircraft operations per day in 2016. The Airport Influence Area (AIA) and Safety Zones and noise exposure contours for the Fresno Yosemite International Airport and Sierra Sky Park Airport do not encompass the MOB Project site. Therefore, noise generated from the airports will not impact the MOB Project study area.

Table 3
Existing Noise Levels

Receiver ID No.	Location	Distance from Noise Source-Roadway Centerline (feet)	Existing Noise Level Ldn dB
1	Office Developments along First Street, south of Alluvial Avenue	45	67.0
2	Office Development along Locust Avenue, west of First Street	125	56.0
3	Outdoor Activity Area of single-family residence along First Street, east of First Street	150	58.0
4	Office Developments along First Street, south of Alluvial Avenue	60	65.0

Source: VRPA Technologies, 2020

2.4 Roadway Network

Functional classification is the process by which streets and highways are grouped into classes, or systems, according to the type of service they are intended to provide. Fundamental to this process is the recognition that individual streets and highways do not serve travel independently in any major way. Rather, most travel involves movement through a network of roads.

The current hierarchical system of roadways consists of the following six (6) basic classifications:

- **State Route 41** – currently exists as a six-lane facility with a posted speed limit of 65 mph in the study area. According to the California Department of Transportation's website, the average annual daily traffic (AADT) along SR 41 in this area consisted of approximately 109,000 trips in 2017.

✓ **Expressways** – are high-speed, two- to six-lane divided roadways, primarily servicing through and cross-town traffic, with no direct access to abutting property and at-grade intersections located at approximately half-mile intervals. Expressways do not presently exist within the study area.

- **Herndon Avenue** – is a divided 6-lane roadway with a posted speed limit of 50 mph.

- ✓ **Super Arterials** – Four-to six-lane divided roadways with a primary purpose of moving traffic to and from major traffic generators and between community plan areas. Access will typically be limited to right-turn entrance and exit vehicular movements. Super Arterials do not presently exist within the study area.

- ✓ **Arterial** – Four- to six-lane divided roadways, with somewhat limited access to abutting properties, and with the primary purpose of moving traffic within and between community plan areas and to and from freeways and expressways.

  - **Fresno Street** – is a divided 4-lane roadway with a posted speed limit of 45. Class II bike lanes are present along the roadway north of Herndon Avenue.
  - **Alluvial Avenue** – is a divided 4-lane roadway with a posted speed limit of 40 mph. Class II bike lanes are present along the roadway.
  - **First Street** – is a divided 4-lane roadway with a posted speed limit of 40 mph. Class II bike lanes are present along the roadway.

- ✓ **Collectors** – Two to four-lane undivided roadways, with the primary function of connecting local streets and arterials and neighborhood traffic generators and providing access to abutting properties.

- ✓ **Local Streets** – Two- to three-lane public or private roadways designed to provide direct access to properties while discouraging through traffic between major streets. They are intended to carry low volumes of traffic and support unrestricted on-street parking.

2.5 Stationary Noise

There are a wide variety of industrial and other non-transportation noise sources throughout the City of Fresno, including heavy industrial or manufacturing operations, food packaging and processing facilities, lumber mills, and car washes to name a few. The change in noise level due to distance for point sources is determined by the following formula, which comes from the California Department of Transportation's (Caltrans) Technical Noise Supplement to the Traffic Noise Analysis Protocol.

$$dBA_2 = dBA_1 + 10\log_{10}[(D_1/D_2)]^2 = dBA_1 + 20\log_{10}(D_1/D_2)$$

Where:
dBA_1 = noise level at distance D_1
dBA_2 = noise level at distance D_2

Stationary noise impacts to the MOB Project will be developed considering the formula above and the closest distance between the MOB Project site and stationary noise sources in the surrounding area.

2.6 Ground-borne Vibration

Ambient vibration levels in residential areas are typically 50 VdB, which is well below human perception. The operation of heating/air conditioning systems and slamming of doors produce typical indoor vibrations that are noticeable to humans. The most common exterior sources of ground vibration that can be noticeable to humans inside residences include construction activities, train operations, and street traffic. Table 4 provides some common sources of ground vibration and the relationship to human perception. This information comes from the Federal Transit Administration's "Basic Ground-Bourne Vibration Concepts."

Table 4
Typical Levels of Ground-Borne Vibration

Human/Structural Response	Velocity Level, VdB	Typical Events (50 ft. Setback)
Threshold, minor cosmetic damage fragile buildings	100	Blasting from construction projects
		Bulldozers and other heavy tracked construction equiment
Difficulty with tasks such as reading a video or computer screen	90	
		Commuter rail, upper range
Residential annoyance, infrequent events (e.g commuter rail)	80	Rapid transit, upper range
		Commuter rail, typical
Residential annoyance, infrequent events (e.g rapid transit)		Bus or truck over bump
	70	Rapid transit, typical
Limit for vibration sensitive equipment. Approx. threshold for human perception of vibration		Bus or truck, typical
	60	
		Typical background vibration
	50	

3.0 Short-Term Impacts

3.1 Construction Noise Impacts

The MOB Project has the potential to result in short-term noise impacts to surrounding land uses due to construction activity noise (collectively referred to hereafter as just "construction" noise). Construction noise represents a short-term impact on ambient noise levels and includes activities such as site preparation, grading, and other construction-related activities. Noise generated from the transport of workers and the movement of materials to and from the construction site and the physical activities associated with any construction-related activities could potentially impact neighboring sensitive land uses. Although most of the types of exterior construction activities associated with the MOB Project will not generate continually high noise levels, occasional single-event disturbances from grading and construction activities are possible.

Table 5 depicts typical construction equipment noise levels, based upon a distance of 50 feet between the noise source and the noise receptor. Noise emitted by construction equipment is controlled by the Environmental Protection Agency's (EPS's) Noise Control Program (Part 204 of Title 40, Code of Federal Regulations).

During construction of the MOB Project, noise from construction activities will add to the noise environment in the immediate area. Activities involved in building construction would generate maximum noise levels, as indicated in Table 5, ranging from 77 to 85 dBA at a distance of 50 feet. Construction activities will be temporary in nature and are expected to occur during normal daytime working hours. Construction noise impacts could result in annoyance or sleep disruption for nearby residences if nighttime operations occurred, or if unusually noisy equipment was used. It is not anticipated that any portion of the construction phase will take place during nighttime hours. Based on information provided in Table 5 and the noise attenuation formula provided in Section 2.5, the nearest single-family residence to the east of the MOB Project site (575 feet) may be subject to short-term noise reaching 56 to 64 dBA Lmax generated by construction activities. Considering the maximum sound level of 70 dBA Lmax from the City of Fresno Stationary Noise Sources (Table 2), construction of the MOB Project will note impact neighboring residences. Construction activities associated with the MOB Project will be subject to Chapter 10 of the City of Fresno Municipal Code, which permits construction, site preparation, and grading that is conducted pursuant to a city permit to exceed the otherwise applicable noise limits provided such work occurs between 7 a.m. and 10 p.m. Monday through Saturday.

Table 5
Construction Equipment Noise

TYPE OF EQUIPMENT	Sound Levles Measured (dBA of 50 feet)
Rock Drills	85
Jack Hammers	85
Pneumatic Tools	85
Pumps	77
Dozers	85
Tractor	84
Front-End Loaders	80
Hydraulic Backhoe	80
Hydraulic Excavators	85
Graders	85
Air Compressors	80
Trucks	84

Source: Noise Control for Buildings and Manufacturing Plants (Bolt, Beranek and Newman, 1987).

3.2 Ground-borne Vibration

Construction activity can result in ground vibration, depending upon the types of equipment used. Operation of construction equipment causes ground vibrations, which spread through the ground and diminish in strength with distance from the source generating the vibration. Building structures that are founded on the soil in the vicinity of the construction site respond to these vibrations, with varied results. Ground vibrations as a result of construction activities very rarely reach vibration levels that will damage structures but can cause low rumbling sounds and detectable vibrations for buildings very close to the site.

Vibration levels from various types of construction equipment are shown in Table 6. The primary concern with construction vibration is building damage. Therefore, construction vibration is generally assessed in terms of peak particle velocity (PPV). It should be noted that there is a considerable variation in reported ground vibration levels from construction activities. The data provides a reasonable estimate for a wide range of soil conditions.

Despite the perceptibility threshold of about 65 VdB, human reaction to vibration is not significant unless the vibration exceeds 75 VdB according to the United States Department of Transportation. In order to estimate the impact of vibrations from construction activities at

distances of 100 feet, 150 feet, and 200 feet, the following formula was applied.

Lv(D) = Lv(25 ft) – 20 log (D/25)

Using the highest vibration level shown in Table 6 (Lv 87) and the formula shown above, the anticipated vibration levels at 100 feet, 150 feet, and 200 feet are 75, 71, and 69 VdB, respectively.

Construction activities associated with the MOB Project would likely require the use of various types of equipment including bulldozers and dump trucks. Based on the vibration levels provided in Table 6, ground vibration generated by common construction equipment would be 75 VdB or less at a distance of 100 feet or more. The MOB Project site is relatively flat and wouldn't generally require the use of a large bulldozer or caisson drilling. Considering the planned location of the Kaiser Permanente Medical Office building and the nearest office building to the northeast (140 feet), it is not anticipated that construction of the MOB Project would impact adjacent office buildings. As a result, the anticipated vibration levels at the nearest off-site structures will not exceed vibration levels greater than 75 VdB.

Table 6
Vibration Source Levels for Construction Equipment

Equipment	PPV at 25 ft (in/sec)	Approximate L_v* at 25 ft
Large bulldozer	0.089	87
Caisson drilling	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

* RMS velocity in decibels (VdB) re 1 minch/second

4.0 Long-Term Impacts

4.1 Traffic Noise Impacts

This section provides an assessment of the anticipated noise conditions in the future as it relates to the MOB Project and the impact of increased traffic noise generated by the MOB Project on the surrounding land uses within the study area. The noise impacts from the MOB Project were analyzed considering Existing Plus Project, Cumulative Year 2042 Without Project, and Cumulative Year 2042 Plus Project Conditions.

Existing Plus Project Conditions

Existing Plus Project traffic noise levels were established based on previously collected traffic data and using the Traffic Noise Model (TNM) Version 2.5. Existing Plus Project levels, which are based on expected MOB Project trip distribution, are calculated and compared to both the existing noise level and the maximum allowable noise exposure for transportation noise sources as described in the City of Fresno's General Plan. Referencing Table 1, the City of Fresno's Transportation Noise Source criteria shows that mitigation must be considered when the exterior noise exposure level of 65 Ldn/CNEL for residential uses has been exceeded. Levels reported in this section are in terms of A-weighted levels.

Traffic volumes associated with the MOB Project in addition to existing traffic along First Street, Locust Avenue, and Herndon Avenue were entered into the model to estimate noise levels at various receivers that would be affected by the MOB Project. In order to calibrate the TNM 2.5 model, the existing counts, lane geometry, and any other pertinent existing conditions were added to the model. The noise level measurements taken in the study area were then compared to the noise levels computed by the model. The difference between the measured and modeled noise levels, referred to as the "K constant", is then added to any additional receivers to be evaluated in the TNM 2.5 model.

Table 7 shows the predicted noise levels at sensitive receivers in the study area as a result of adding traffic associated with the MOB Project. Results of the analysis show that none of the sensitive receivers will exceed the City of Fresno's Transportation Noise Source criteria for the Existing Plus Project scenario. As a result, the MOB Project will not create a significant impact at sensitive receptors in the study area. TNM 2.5 printouts included are provided in the Appendix B. It should be noted that the noise levels presented in Table 7 do not account for noise attenuation caused by buildings or tree/shrubs that break the line of sight from the sound source to the receiver. A decibel reduction of 3 to 5 dBA is plausible when buildings or trees/shrubs break the line of sight according to FHWA.

Table 7
Existing Plus Project Noise Levels

Receiver ID No.	Location	Distance from Noise Source-Roadway Centerline (feet)	Existing Noise Level Ldn dB	Existing Plus Project Noise Level Ldn dB	Noise Increase or Decrease (-) [a]	City of Fresno's Transportation Noise Source Criterion (Outdoor Activity Areas) [b]	Impact
1	Office Developments along First Street, south of Alluvial Avenue	45	67.0	67.0	0.0	--	None
2	Office Development along Locust Avenue, west of First Street	125	56.0	58.0	2.0	--	None
3	Outdoor Activity Area of single-family residence along First Street, east of First Street	150	58.0	58.0	0.0	65.0	None
4	Office Developments along First Street, south of Alluvial Avenue	60	65.0	66.0	1.0	--	None

Source: VRPA Technologies, 2020
a - City of Fresno Policy NS-1-j from the Noise and Safety Element of the General Plan establishes that a significant increase in ambient noise levels is assumed if the project would increase noise levels in the immediate vicinity by 3 dB Ldn or CNEL or more above the ambient noise limits.
b - Table 1 shows the City of Fresno maximum allowable noise exposure from Transportation Noise Sources. The table identifies 45 dB (Leq) for interior spaces of office buildings

Typical construction methods allow for a noise reduction of 25–30 dBA for building facades as noted in Caltrans' Technical Noise Supplement to the Traffic Noise Analysis Protocol (September 2013). As a result, the MOB Project will not significantly impact interior noise levels at receivers 1, 2, and 4.

Cumulative Year 2042 Conditions

This section provides an assessment of the anticipated noise conditions in the future as it relates to the MOB Project and the impact of increased traffic noise generated by the MOB Project on the surrounding land uses within the study area. The noise impacts from the development of the MOB Project was analyzed considering Cumulative Year 2042 Conditions as a result of the City of Fresno General Plan. Future development within the planning area will result in increased traffic volumes, thus increasing noise levels in some areas. While there will be increases in some noise levels, efforts can be taken to help minimize such instances. For example, siting noise sensitive uses away from high-noise areas (e.g., major traffic routes) and buffering noise through design will help minimize future noise-related land use conflicts.

The levels of traffic expected in the Year 2042 relate to the cumulative effect of traffic increases resulting from the implementation of the general plans of local agencies and pending development projects. Traffic conditions considering the adopted general plan in the City of Fresno were estimated using the Fresno County Association of Governments (Fresno COG) regional travel model. Traffic volumes, truck mix, and vehicle speeds were used as inputs to the TNM 2.5 model for the Cumulative Year 2042 modeled scenarios consistent with generally accepted engineering principles and methods.

Table 8 shows the predicted noise levels at the modeled receivers evaluated in the study area

for the Cumulative Year 2042 With and Without Project conditions. Results of the analysis show that none of the sensitive receivers will exceed the City of Fresno's Transportation Noise Source criteria for the Cumulative Year 2042 scenario. As a result, the MOB Project will not create a significant impact at sensitive receptors in the study area. It should be noted that the noise levels presented in Table 8 do not account for noise attenuation caused by buildings or tree/shrubs that break the line of sight from the sound source to the receiver. A decibel reduction of 3 to 5 dBA is plausible when buildings or trees/shrubs break the line of sight according to FHWA.

Table 8
Cumulative Year 2042 Noise Levels

Receiver ID No.	Location	Distance from Noise Source-Roadway Centerline (feet)	Cumulative Year 2042 Without Project Noise Level Ldn dB	Cumulative Year 2042 Plus Project Noise Level Ldn dB	Noise Increase or Decrease (-) [a]	City of Fresno's Transportation Noise Source Criterion (Outdoor Activity Areas) [b]	Impact
1	Office Developments along First Street, south of Alluvial Avenue	45	70.0	70.0	0.0	--	None
2	Office Development along Locust Avenue, west of First Street	125	59.0	60.0	1.0	--	None
3	Outdoor Activity Area of single-family residence along First Street, east of First Street	150	61.0	62.0	1.0	65.0	None
4	Office Developments along First Street, south of Alluvial Avenue	60	69.0	69.0	0.0	--	None

Source: VRPA Technologies, 2020
a - City of Fresno Policy NS-1-j from the Noise and Safety Element of the General Plan establishes that a significant increase in ambient noise levels is assumed if the project would increase noise levels in the immediate vicinity by 3 dB Ldn or CNEL or more above the ambient noise limits.
b - Table 1 shows the City of Fresno maximum allowable noise exposure from Transportation Noise Sources. The table identifies 45 dB (Leq) for interior spaces of office buildings

Typical construction methods allow for a noise reduction of 25–30 dBA for building facades as noted in Caltrans' Technical Noise Supplement to the Traffic Noise Analysis Protocol (September 2013). As a result, the MOB Project will not significantly impact interior noise levels at receivers 1, 2, and 4.

4.2 Stationary Noise Impacts

The City of Fresno's maximum allowable noise exposure from Stationary Noise Sources is reflected in Table 2. The hourly and maximum sound level allowed at sensitive receivers (residential, transient lodging) during daytime (7:00am to 10:00pm) hours is 50 dBA and 70 dBA, respectively. The MOB Project does not include an outdoor activity area that could be impacted by near-by stationary noise sources. However, Kaiser Permanente Neighborhood Park is located approximately 500 feet northwest of the proposed location for the Medical Office Building. Though the MOB Project doesn't include an outdoor activity area, an assessment of stationary noise impacts from the park on the MOB Project was identified to assess compliance with the City's performance standards for new development.

Kaiser Permanente Neighborhood Park

Noise levels from the four (4) baseball fields peak during games while spectators are present. Noise is generated from cheering spectators and players, as well as referee whistles. Based upon data provided in the Noise Study Reports for the City of Citrus Heights Stock Ranch Guide for Development, the Nipomo Park Master Plan EIR, and the Salinas Regional Soccer Complex, hourly noise levels at ball fields reach approximately 65 dBA L_{eq} at a distance of 100 feet with maximum noise levels reaching 75 dBA. Considering the change in noise level due to distance for point sources, the Kaiser Permanente Medical Office Building would experience outdoor noise levels of approximately 50 dBA hourly Leq/61 dBA max which meets the City of Fresno's Stationary Noise Source criteria.

5.0 Impact Determinations and Recommended Mitigation

In accordance with CEQA, when a proposed project is consistent with a General Plan for which an EIR has been certified, the effects of that project are evaluated to determine if they will result in project-specific significant adverse impacts on the environment. Accordingly, this analysis identifies any potential environmental effects that are peculiar to the MOB Project or its site that differ from those impacts already analyzed and disclosed in the City's General Plan EIR. The criteria used to determine the significance of a noise impact are based on the following thresholds of significance, which come from Appendix G of the CEQA Guidelines and the General Plan EIR. Accordingly, noise impacts resulting from the MOB Project are considered significant if the MOB Project would result in:

a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

b) Generation of excessive groundborne vibration or groundborne noise levels?

c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

Each of these thresholds are evaluated individually below to determine whether the MOB Project will cause a significant effect on the environment peculiar to the parcel or to the proposed Project and that has not been addressed as a significant effect in the General Plan EIR. Uniformly applied development policies or standards that reduce or avoid impacts are considered, and in the event that impacts are found to be significant, mitigation measures are recommended that would avoid or reduce the impact to less than significant. As discussed below, the MOB Project does not result in significant impacts, and no mitigation measures are required.

5.1 Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

5.1.1 Short-Term Impacts

Implementation of the MOB Project has the potential to result in short-term construction noise impacts to surrounding land uses due to construction activities. Construction noise represents a short-term impact on ambient noise levels. Although most of the types of exterior construction activities associated with the MOB Project will not generate continually high noise levels, occasional single-event disturbances from grading and construction activities are possible. Table 5 depicts typical construction equipment noise. Construction equipment noise is controlled by the EPA's Noise Control Program (Part 204 of Title 40, Code of Federal Regulations).

Consistent with the analysis included in the General Plan EIR, during construction of the MOB Project, noise from construction activities will add to the noise environment in the immediate area. Activities involved in building construction would generate maximum noise levels, as indicated in Table 5, ranging from 77 to 85 dBA at a distance of 50 feet. Construction activities will be temporary in nature and are expected to occur during normal daytime working hours. Construction noise impacts could result in annoyance or sleep disruption for nearby residences if nighttime operations occurred, or if unusually noisy equipment was used. It is not anticipated that any portion of the construction phase will take place during nighttime hours. Based on information provided in Table 5 and the noise attenuation formula provided in Section 2.5, the nearest single-family residence to the east of the MOB Project site (575 feet) may be subject to short-term noise reaching 56 to 64 dBA Lmax generated by construction activities. Considering the maximum sound level of 70 dBA Lmax from the City of Fresno Stationary Noise Sources (Table 2), construction of the MOB Project will not impact neighboring residences. This is consistent with the conclusions included in the General Plan EIR, which found that compliance with the City's noise ordinance would reduce construction noise to less than significant levels. Construction activities associated with the MOB Project will be subject to Chapter 10 of the City of Fresno Municipal Code, and MOB Project construction noise would be less than significant.

5.1.2 Long-Term Impacts

Traffic Noise

The General Plan EIR concluded that long-term noise levels from stationary sources, motor vehicles, and aircraft would result in significant and unavoidable impacts related to substantial permanent increases in ambient noise levels. Tables 7 and 8 show the predicted noise levels at sensitive receivers in the study area as a result of adding traffic associated with the MOB Project. Results of the analysis show that none of the sensitive receivers will exceed the City of Fresno's Transportation Noise Source criteria for the Existing Plus Project and Cumulative Year 2042 scenarios. As a result, Project traffic will not create a significant impact at sensitive receptors in the study area considering significance criteria discussed in Section 1.5.2. The MOB Project generates an increase of 2 dB or less with the addition of MOB Project traffic to the surrounding roadway network. The resulting permanent noise increases related to MOB

Project traffic would be within the noise increases analyzed in the General Plan EIR, so there would be no increase in severity to the previously-identified significant and unavoidable noise impacts, and implementation of the MOB Project will not result in Project-specific or site-specific significant adverse impacts from traffic noise levels within the MOB Project study area. Therefore, no mitigation measures are needed.

Stationary Noise

Section 4.2 above indicates that none of the sensitive receivers will be impacted by off-site noise sources. The estimated maximum noise levels anticipated for the MOB Project will not exceed the City of Fresno's Stationary Noise Source criteria.

5.2 Generation of excessive groundborne vibration or groundborne noise levels?

Ambient vibration levels in residential areas are typically 50 VdB, which is well below human perception. The operation of heating/air conditioning systems and slamming of doors produce typical indoor vibrations that are noticeable to humans but not considered adverse or significant.

Construction activity can result in ground vibration, depending upon the types of equipment used and proximity to receptors. Operation of construction equipment causes ground vibrations, which spread through the ground and diminish in strength with distance from the source generating the vibration. Building structures that are founded on the soil in the vicinity of the construction site respond to these vibrations, with varied results. Ground vibrations as a result of typical construction activities very rarely reach vibration levels that will damage structures, but can cause low rumbling sounds and detectable vibrations for buildings very close to the site. Construction activities that generally create the most severe vibrations are blasting and impact pile driving. Neither of these activities will be needed to construct the MOB Project.

Vibration levels from various types of construction equipment are shown in Table 6. The primary concern with construction vibration is building damage. Therefore, construction vibration is generally assessed in terms of PPV. Using the highest vibration level shown in Table 6 (Lv 87), the anticipated vibration level at 100 feet, 150 feet, and 200 feet is 75, 71, and 69 VdB, respectively.

Construction activities associated with the MOB Project would likely require the use of various types of equipment including bulldozers and dump trucks. Based on the vibration levels provided in Table 6, ground vibration generated by common construction equipment would be 75 VdB or less at a distance of 100 feet or more. The MOB Project site is relatively flat and wouldn't generally require the use of a large bulldozer or caisson drilling. Considering the

planned location of the Kaiser Permanente Medical Office building and the nearest office building to the northeast (140 feet), it is not anticipated that construction of the MOB Project would impact adjacent office buildings. As a result, the anticipated vibration levels at the nearest off-site structures will not exceed vibration levels greater than 75 VdB. Therefore, there would be no increase in severity to the previously identified significant and unavoidable vibration impacts, and construction of the MOB Project will not result in Project-specific or site-specific significant adverse impacts from vibration within the MOB Project study area. Accordingly, no mitigation measures are needed.

5.3 For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

The MOB Project is not located within the vicinity of a private airstrip or public use airport. The Fresno Yosemite International Airport and Sierra Sky Park Airport are located nearly 5 miles southeast and west of the MOB Project, respectively. Therefore, the MOB Project will not result in the stated impact. No Mitigation is needed.

As summarized above, this Report shows that noise impacts resulting from the MOB Project would be within the impacts analyzed in the General Plan EIR. Moreover, the Report demonstrates that with adherence to the noise-reducing policies included in General Plan Policies NS-1-a through NS-1-p and Chapter 10 of the Fresno Municipal Code, there would be no short-term or long-term Project- or site-specific noise impacts with respect to construction or operation of the MOB Project. Therefore, the MOB Project qualifies for an exemption from further CEQA review under Public Resources Code Section 21083.3 and CEQA Guidelines Section 15183.

APPENDIX A
Acoustical Terminology

ACOUSTICAL TERMINOLOGY

The following terminology has been used for purposes of this NSR:

Ambient Noise Level:	The composite of noise from all sources near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.
CNEL:	Community Noise Equivalent Level. The average equivalent sound level during a 24-hour day, obtained after addition of approximately five decibels to sound levels in the evening from 7 p.m. to 10p.m. and ten decibels to sound levels in the night before 7 a.m. and after 10 p.m.
Decibel, dBA:	A unit for describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micro-newtons per square meter).
DNL/L_{dn}:	Day/Night Average Sound Level. The average equivalent sound level during a 24-hour day, obtained after addition often decibels to sound levels in the night after 10:00 p.m. and before 7:00 a.m.
L_{eq}:	Equivalent Sound Level. The sound level containing the same total energy as a time varying signal over a given sample period. L_{eq} is typically computed over 1, 8 and 24-hour sample periods.
L_{eq}(h):	The hourly value of L_{eq}.
L_{max}:	The maximum noise level recorded during a noise event
L_n:	The sound level exceeded "n" percent of the time during a sample interval (L_{90}, L_{50}, L_{10}, etc.). L_{10} equals the level exceeded 10 percent of the time.
L_n(h):	The hourly value of L_n.
Noise Exposure Contours:	Lines drawn about a noise source indicating constant levels

of noise exposure. CNEL and DNL contours are frequently utilized to describe community exposure to noise.

SEL or SENEL: Sound Exposure Level or Single Event Noise Exposure Level. The level of noise accumulated during a single noise event, such as an aircraft overflight, with reference to the duration of one second. More specifically, it is the time-integrated A-weighted squared sound pressure for a stated time interval or event, based on a reference pressure of 20 micropascals and the reference duration of one second

Sound Level: The sound pressure level in decibels as measured on a sound level meter using the A-weighing filter network. The A-weighing filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear and gives good correlation with subjective reactions to noise.

Note: *CNEL and DNL represent daily levels of noise exposure averaged on an annual basis,* while L_n *represents the average noise exposure for a shorter time period, typically one hour.*

APPENDIX B
TNM 2.5 Sound Level Worksheets

City of Fresno
VRPA Technologies, Inc.
RESULTS: SOUND LEVELS
PROJECT/CONTRACT: KP Fresno Medical Office Building
RUN: Existing Conditions
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

24 April 2020
TNM 2.5
Calculated with TNM 2.5

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing Ldn Calculated	No Barrier Ldn Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	With Barrier Type Impact	With Barrier Calculated Ldn	Noise Reduction Calculated	Noise Reduction Goal	Noise Reduction Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	66.6	65	66.6	10	Snd Lvl	66.6	0.0	8	-8.0
Receiver2	3	1	0.0	56.1	65	56.1	10	----	56.1	0.0	8	-8.0
Receiver3	6	1	0.0	57.8	65	57.8	10	----	57.8	0.0	8	-8.0
Receiver4	7	1	0.0	65.0	65	65.0	10	Snd Lvl	65.0	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	4	0.0	0.0	0.0
All Impacted	2	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

City of Fresno
VRPA Technologies, Inc.
RESULTS: SOUND LEVELS
PROJECT/CONTRACT: KP Fresno Medical Office Building
RUN: Existing Pus Project Conditions
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

24 April 2020
TNM 2.5
Calculated with TNM 2.5

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing Ldn Calculated	No Barrier Ldn Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	With Barrier Type Impact	With Barrier Calculated Ldn	Noise Reduction Calculated	Noise Reduction Goal	Noise Reduction Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	67.1	65	67.1	10	Snd Lvl	67.1	0.0	8	-8.0
Receiver2	3	1	0.0	57.6	65	57.6	10	----	57.6	0.0	8	-8.0
Receiver3	6	1	0.0	58.3	65	58.3	10	----	58.3	0.0	8	-8.0
Receiver4	7	1	0.0	65.5	65	65.5	10	Snd Lvl	65.5	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	4	0.0	0.0	0.0
All Impacted	2	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

City of Fresno
VRPA Technologies, Inc.
RESULTS: SOUND LEVELS
PROJECT/CONTRACT: KP Fresno Medical Office Building
RUN: CY 2042 No Project Conditions
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

24 April 2020
TNM 2.5
Calculated with TNM 2.5

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing Ldn Calculated	No Barrier Ldn Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	With Barrier Type Impact	With Barrier Calculated Ldn	Noise Reduction Calculated	Noise Reduction Goal	Noise Reduction Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	70.2	65	70.2	10	Snd Lvl	70.2	0.0	8	-8.0
Receiver2	3	1	0.0	58.5	65	58.5	10	----	58.5	0.0	8	-8.0
Receiver3	6	1	0.0	61.3	65	61.3	10	----	61.3	0.0	8	-8.0
Receiver4	7	1	0.0	68.6	65	68.6	10	Snd Lvl	68.6	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	4	0.0	0.0	0.0
All Impacted	2	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

City of Fresno
VRPA Technologies, Inc.
RESULTS: SOUND LEVELS
PROJECT/CONTRACT: KP Fresno Medical Office Building
RUN: CY 2042 Plus Project Conditions
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

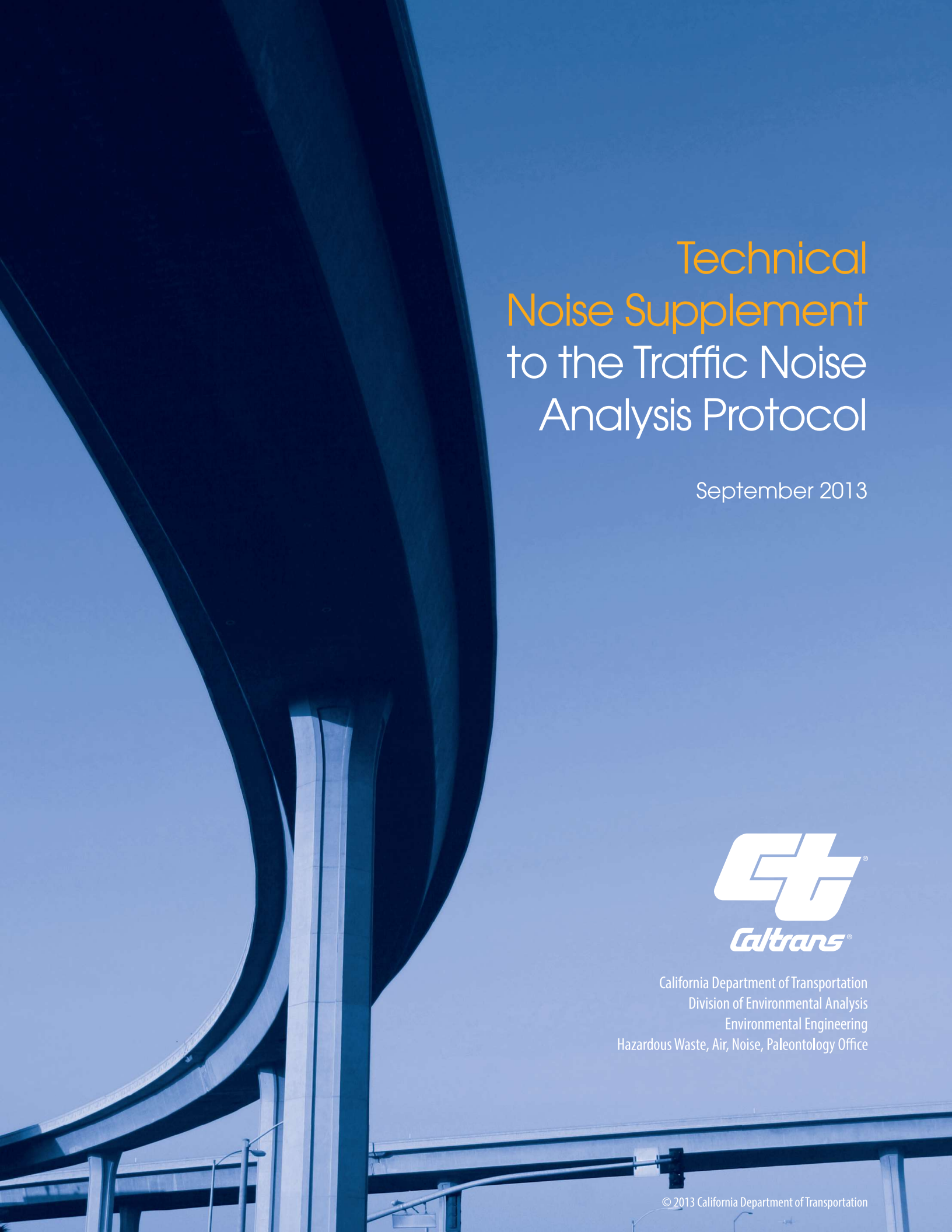
24 April 2020
TNM 2.5
Calculated with TNM 2.5

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing Ldn Calculated	No Barrier Ldn Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	With Barrier Type Impact	With Barrier Calculated Ldn	Noise Reduction Calculated	Noise Reduction Goal	Noise Reduction Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	70.4	65	70.4	10	Snd Lvl	70.4	0.0	8	-8.0
Receiver2	3	1	0.0	59.5	65	59.5	10	----	59.5	0.0	8	-8.0
Receiver3	6	1	0.0	61.5	65	61.5	10	----	61.5	0.0	8	-8.0
Receiver4	7	1	0.0	68.8	65	68.8	10	Snd Lvl	68.8	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	4	0.0	0.0	0.0
All Impacted	2	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

APPENDIX C
Caltrans' Technical Noise Supplement



Technical Noise Supplement to the Traffic Noise Analysis Protocol

September 2013

California Department of Transportation
Division of Environmental Analysis
Environmental Engineering
Hazardous Waste, Air, Noise, Paleontology Office

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2.1.3.8 White and Pink Noise

White noise is noise with a special frequency spectrum that has the same amplitude (level) for each frequency interval over the entire audible frequency spectrum. It is often generated in laboratories for calibrating sound level measuring equipment, specifically its frequency response. One might expect that the octave or one-third-octave band spectrum of white noise would be a straight line, but this is not true. Beginning with the lowest audible octave, each subsequent octave spans twice as many frequencies than the previous ones, and therefore contains twice the energy. This corresponds with a 3-dB step increase for each octave band, and 1 dB for each one-third-octave band.

Pink noise, in contrast, is defined as having the same amplitude for each octave band (or one-third-octave band), rather than for each frequency interval. Its octave or one-third-octave band spectrum is truly a straight "level" line over the entire audible spectrum. Therefore, pink noise generators are conveniently used to calibrate octave or one-third-octave band analyzers.

Both white and pink noise sound somewhat like the static heard from a radio that is not tuned to a particular station.

2.1.4 Sound Propagation

From the source to receiver, noise changes both in level and frequency spectrum. The most obvious is the decrease in noise as the distance from the source increases. The manner in which noise reduces with distance depends on the following important factors.

- Geometric spreading from point and line sources.
- Ground absorption.
- Atmospheric effects and refraction.
- Shielding by natural and manmade features, noise barriers, diffraction, and reflection.

2.1.4.1 Geometric Spreading from Point and Line Sources

Sound from a small localized source (approximating a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates or drops off at a rate of

6 dBA for each doubling of the distance (6 dBA/DD). This decrease, resulting from the geometric spreading of the energy over an ever-increasing area, is referred to as the inverse square law. Doubling the distance increases each unit area, represented by squares with sides "a" in Figure 2-7, from a^2 to $4a^2$.

Because the same amount of energy passes through both squares, the energy per unit area at 2D is reduced four times from that at distance D. Therefore, for a point source the energy per unit area is inversely proportional to the square of the distance. Taking $10\log_{10}(1/4)$ results in a 6-dBA/DD reduction. This is the point source attenuation rate for geometric spreading.

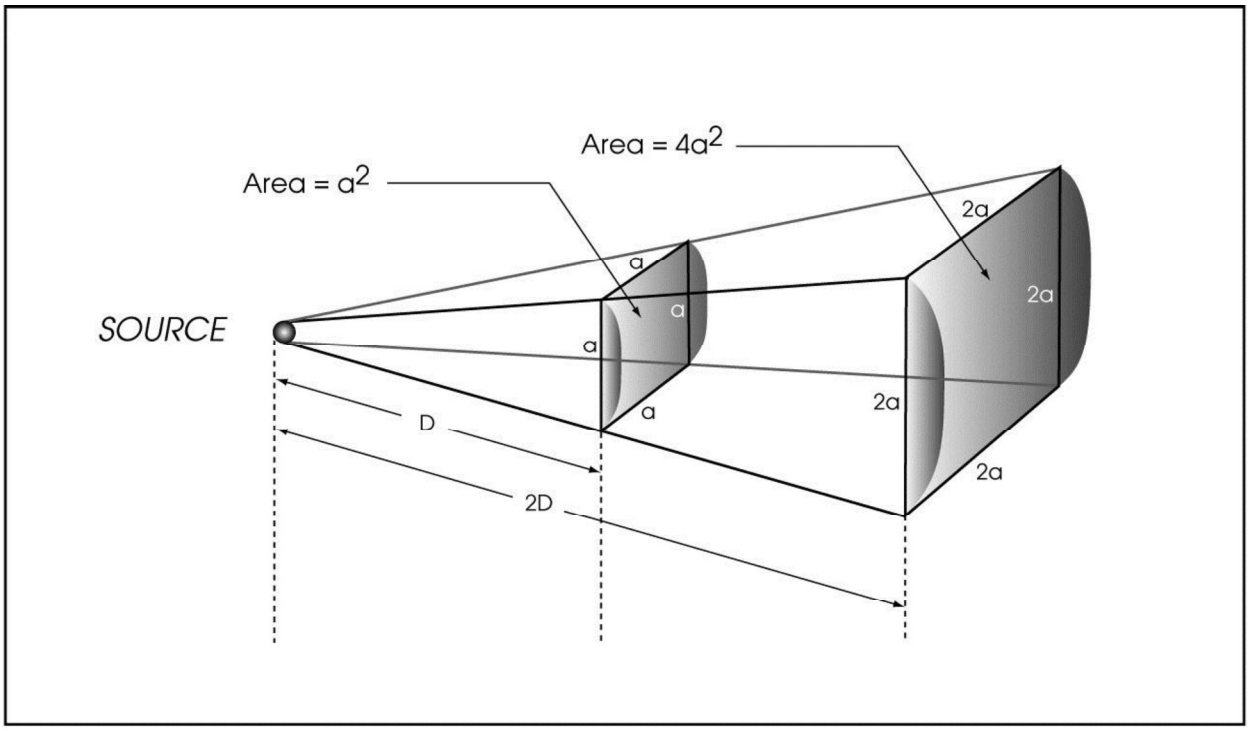

Figure 2-7. Point Source Propagation (Spherical Spreading)

As seen in Figure 2-8, based on the inverse square law the change in noise level between any two distances because of spherical spreading can be found using the following equation:

$$dBA_2 = dBA_1 + 10\log_{10}[(D_1/D_2)]^2 = dBA_1 + 20\log_{10}(D_1/D_2) \quad \textbf{(2-13)}$$

Where:

dBA_1 = noise level at distance D_1

dBA_2 = noise level at distance D_2

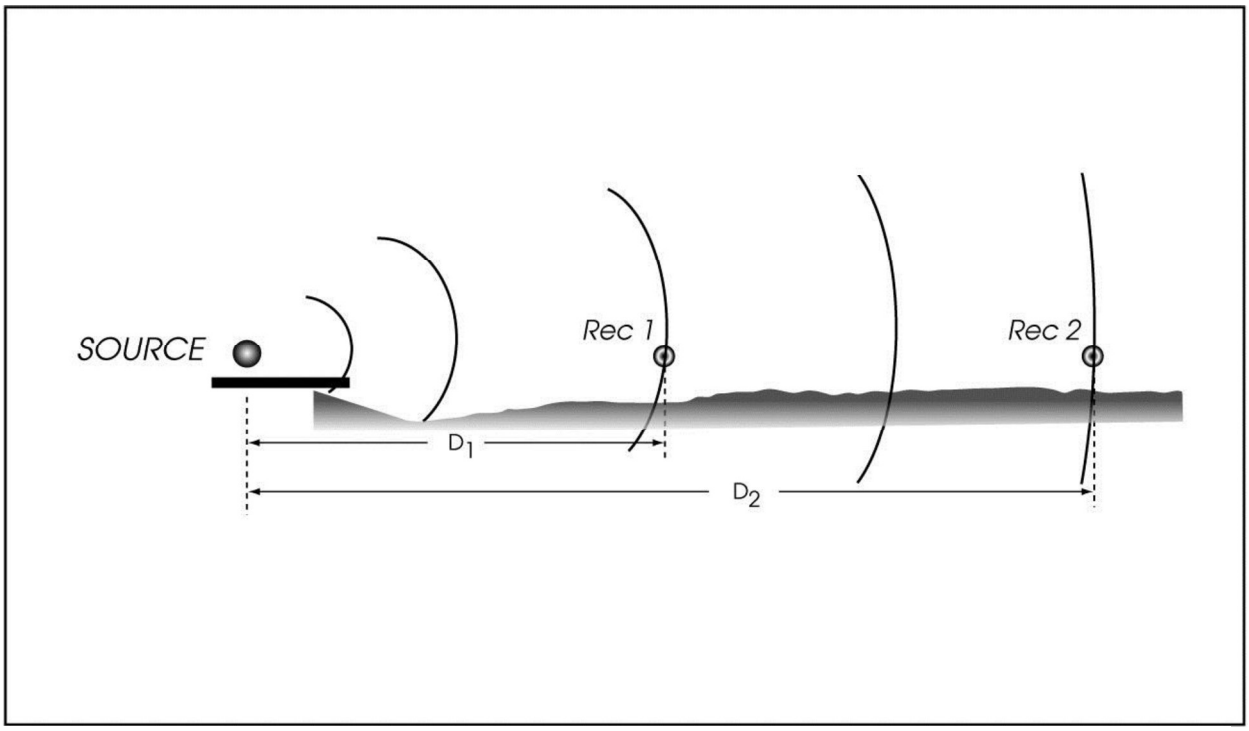

Figure 2-8. Change in Noise Level with Distance from Spherical Spreading

However, highway traffic noise is not a single, stationary point source. The movement of the vehicles makes the source of the sound appear to emanate from a line (line source) rather than a point when viewed over a time interval (Figure 2-9). This results in cylindrical spreading rather than spherical spreading. Because the change in surface area of a cylinder only increases by two times for each doubling of the radius instead of the four times associated with spheres, the change in sound level is 3 dBA/DD. The change in noise levels for a line source at any two different distances from cylindrical spreading is determined using the following equation:

$$dBA_2 = dBA_1 + 10\log_{10}(D_1/D_2) \quad \textbf{(2-14)}$$

Where:

dBA_1 = noise level at distance D_1 and conventionally the known noise level

dBA_2 = noise level at distance D_2 and conventionally the unknown noise level

Note

The expression $10\log_{10}(D_1/D_2)$ is negative when D_2 is more than D_1 and positive when D_1 is more than D_2. Therefore, the equation automatically accounts for the receiver being farther or closer with respect to the source—$\log_{10}$ of a number less than 1 gives a negative result, $\log_{10}$ of a number more than 1 is positive, and $\log_{10}(1) = 0$.

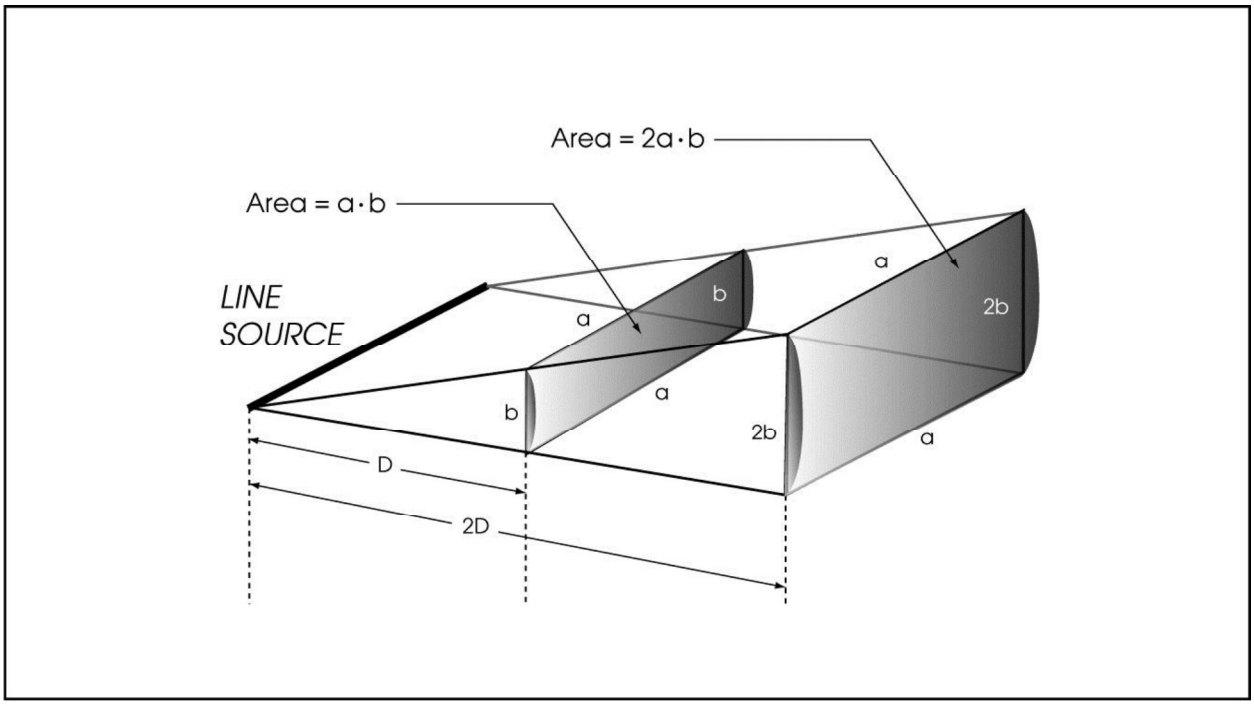

Figure 2-9. Line Source Propagation (Cylindrical Spreading)

2.1.4.2 Ground Absorption

Most often, the noise path between the highway and observer is very close to the ground. Noise attenuation from ground absorption and reflective wave cancellation adds to the attenuation from geometric spreading. Traditionally, this excess attenuation has been expressed in terms of decibels of attenuation per doubling of distance. This approximation is done for simplification only; for distances of less than 200 feet, the prediction results based on this scheme are sufficiently accurate. The sum of the geometric spreading attenuation and excess ground attenuation (if any) is referred to as the attenuation or dropoff rate. For distances of 200 feet or more, the approximation causes excessive inaccuracies in predictions. The amount of excess ground attenuation depends on the height of the noise path and characteristics of the intervening ground or site. In practice, excess ground attenuation may vary from 0 to 8–10 dBA/DD or more. In fact, it varies as the noise path height changes from the source to receiver and with vehicle type because the source heights are different. The complexity of terrain also influences the propagation of sound by potentially increasing the number of ground reflections.

The FHWA TNM is the model that is currently approved by FHWA for use in noise impact studies. The TNM has complex algorithms that directly calculate excess ground attenuation based on ground type and site geometry.

Section 5
Noise Barrier Design Considerations

The primary function of highway noise barriers is to shield receivers from excessive noise generated by highway traffic. Although there are other strategies for attenuating transportation-related noise, noise barriers are the most common noise attenuation option used by Caltrans.

Many factors need to be considered in the proper design of noise barriers. First, barriers must be acoustically adequate. They must reduce the noise as described by policies or standards. Acoustical design considerations include barrier material, locations, dimensions, shapes, and background noise levels. Acoustical considerations, however, are not the only factors leading to proper design of noise barriers.

A second set of design considerations, collectively labeled non-acoustical design considerations, is equally important. Noise barriers can have secondary effects related to security in surrounding areas, aesthetics, community continuity, and other non-acoustical factors. With appropriate planning and design these potential effects from noise barriers can be reduced or avoided.

The current edition of the *Highway Design Manual* Chapter 1100 should be consulted for specific noise barrier design criteria. Because these may change in the future, the discussion in this section will focus on general applications and consequences of the design criteria, not on the criteria themselves. The Caltrans Headquarters Division of Environmental Analysis should be consulted for the latest status.

The acoustical and non-acoustical design considerations in this section conform to the *FHWA Highway Noise Barrier Design Handbook* (Fleming et al. 2011).

5.1 Acoustical Design Considerations

The FHWA TNM described in Section 4 is used for determining proper heights and lengths of noise barriers. The models assume that the noise

barriers do not transmit any sound through the barrier. Only the noise diffracted by the barrier and any unshielded segments are considered. Therefore, the material of the barrier must be sufficiently dense or thick to ensure that the sound transmission through the barrier will not contribute to the total noise level calculated by the model at the receiver.

The material, location, dimensions, and shape of a noise barrier all affect its acoustical performance. The various effects associated with these factors are discussed in Sections 2 and 4.5.

Figure 5-1 is a simplified sketch showing what happens to vehicle noise when a noise barrier is placed between the source and receiver. The original straight path from the source to receiver is now interrupted by the barrier. Depending on the barrier material and surface treatment, a portion of the original noise energy is reflected or scattered back toward the source. Another portion is absorbed by the material of the barrier, and another is transmitted through the barrier. The reflected (scattered) and absorbed noise paths never reach the receiver.

The transmitted noise continues on to the receiver with a loss of acoustical energy (redirected and some converted into heat). The common logarithm of energy ratios of the noise in front of the barrier and behind the barrier, expressed in decibels, is the TL. The TL of a barrier depends on the barrier material, primarily its weight, and the frequency spectrum of the noise source.

The transmitted noise is not the only noise from the source reaching the receiver. The straight line noise path from the source to the top of the barrier, originally destined in the direction of “A” without the barrier, now is diffracted downward toward the receiver (Figure 5-2). This process also results in a loss of acoustical energy.

Therefore, the receiver is exposed to both the transmitted and diffracted noise. Whereas the transmitted noise only depends on barrier material properties, the diffracted noise depends on the location, shape, and dimensions of the barrier. These factors will be discussed in the following sections.

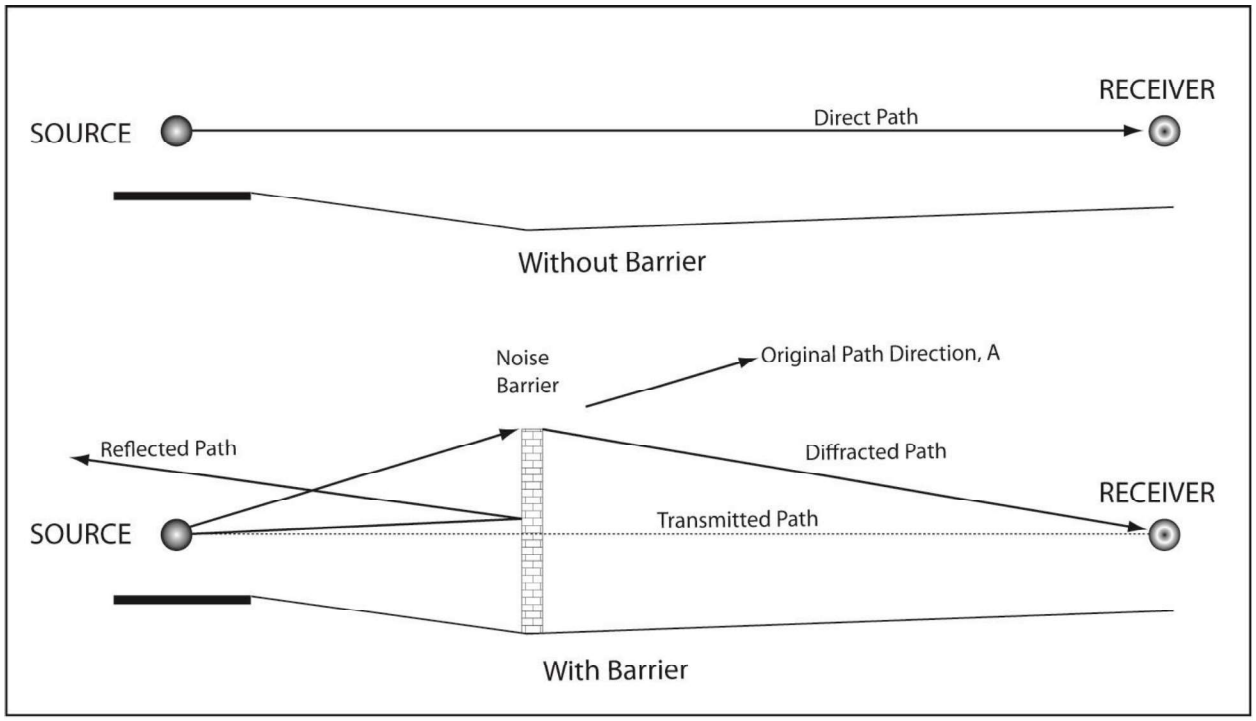

Figure 5-1. Alteration of Noise Paths by a Noise Barrier

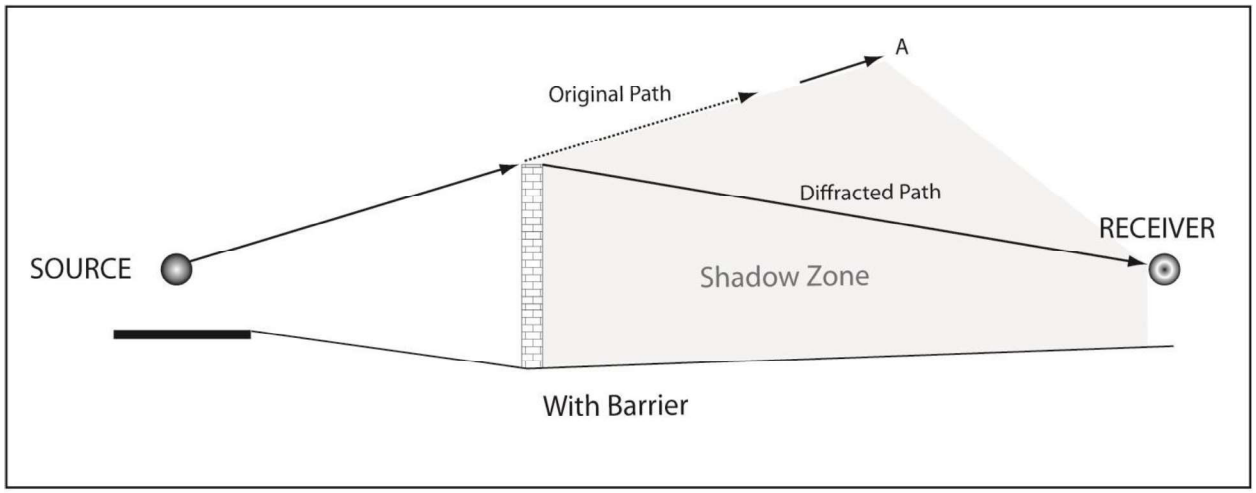

Figure 5-2. Barrier Diffraction

5.1.1 Barrier Material and Transmission Loss

For acoustical purposes, any material may be used for a barrier between a noise source and a noise receiver as long as it has a TL of at least 10 dBA more than the desired noise reduction. This ensures that the only noise path to be considered in the acoustical design of a noise barrier is the

diffracted noise path. For example, if a noise barrier is designed to reduce the noise level at a receiver by 8 dBA, the TL of the barrier must be at least 18 dBA. The transmitted noise may then be ignored because the diffracted noise is at least 10 dBA more.

As a general rule, any material weighing 4 pounds per square foot or more has a transmission loss of at least 20 dBA. Such material would be adequate for a noise reduction of at least 10 dBA due to diffraction. Please note that this weight can be attained by a variety of material types. The denser a material is, the thinner it may be. TL also depends on the stiffness of the barrier material and frequency of the source.

In general the maximum noise reduction that can be achieved from a barrier is about 20 dBA for thin screens (walls) and 23 dBA for berms. Therefore, a material that has a TL of 33 dBA (23 + 10) or more would be adequate for a noise barrier in most situations.

Table 5-1 gives approximate TL values for some common materials, tested for typical A-weighted traffic frequency spectra. They may be used as a rough guide in acoustical design of noise barriers. For accurate values, material test reports by accredited laboratories should be consulted. These product specifications can usually be provided by the manufacturer.

Table 5-1. Approximate Transmission Loss Values for Common Materials

Material	Thickness (Inches)	Weight (Pounds per Square Foot)	Transmission Loss (dBA)
Concrete block, 8 by 8 by 16 inches, light weight	8	31	34
Dense concrete	4	50	40
Light concrete	6	50	39
Light concrete	4	33	36
Steel, 18 gage	0.050	2.00	25
Steel, 20 gage	0.0375	1.50	22
Steel, 22 gage	0.0312	1.25	20
Steel, 24 gage	0.025	1.00	18
Aluminum, sheet	0.0625	0.9	23
Aluminum, sheet	0.125	1.8	25
Aluminum, sheet	0.25	3.5	27
Wood, fir	0.5	1.7	18
Wood, fir	1	3.3	21
Wood, fir	2	6.7	24

Material	Thickness (Inches)	Weight (Pounds per Square Foot)	Transmission Loss (dBA)
Plywood	0.5	1.7	20
Plywood	1	3.3	23
Glass, safety	0.125	1.6	22
Plexiglas	0.25	1.5	22

Table 5-1 assumes no openings or gaps in the barrier material. However, some materials such as wood are prone to develop openings or gaps because of shrinkage, warping, splitting, or weathering. These openings decrease the TL values. The TL of a barrier material with openings can be calculated if the ratio of area of openings to total barrier area and TL of the material are known. The following formula can be used to calculate the transmission loss with the openings (TL_o):

$$TL_o = TL - 10\log_{10}(A_o * 10^{TL/10} + A_c) \quad \textbf{(5-1)}$$

Where:

TL_o = transmission loss of material with openings

TL = transmission loss of material without openings

A_o = area of openings as a fraction of the total area of the barrier

A_c = area of closed portion as a fraction of the total area of the barrier = $1 - A_o$

This method of calculation assumes that the openings or gaps are distributed uniformly over the surface of a barrier. For example, a barrier made of 2-inch-thick fir planks has openings that make up about 5% of the total area and are about equally distributed. The transmission loss of the material with these gaps can then be determined. From Table 5-1, the TL for 2-inch fir is 24 dBA. A_o is 5%, or 0.05; A_c is $1 - 0.05 = 0.95$. Therefore:

$$TL_o = 24 - 10\log_{10}(0.05 * 10^{2.4} + 0.95) = \textbf{12.7, or about 13 dBA}$$

The reduced TL could affect the barrier's performance. For example, it is assumed that before the barrier the noise level was 75 dBA and the intention was to reduce noise levels by 10 dBA (i.e., the diffracted noise was to be 65 dBA, and the transmitted noise was to be $75 - 24 = 51$ dBA). The total noise level would have been $65 + 51 = 65$ dBA. With the gaps, however, the transmitted noise is now $75 - 13 = 62$ dBA, and the total noise level is $65 + 62 = 66.8$ dBA. The effectiveness of the barrier is reduced by almost 2 dBA. Instead of a designed noise reduction of 10 dBA, an actual noise reduction of only 8 dBA will be realized in this case.

Properly treated materials will reduce or eliminate noise leakage. For example, lumber should be treated with preservatives that provide proper penetration and do not interfere with any protective coatings (e.g., paint) to be applied later. The wood also should have a low moisture content, requiring kiln drying after waterborne preservatives have been used. Wood planks should have tongue-and-groove deep enough to allow for shrinkage without gaps to maintain a high TL. Such tongue-and-groove is usually non-standard.

Several other ratings are used to express the ability of materials in specific construction configurations to resist sound transmission. Two of these are the Sound Transmission Class (STC) and Exterior Wall Noise Rating (EWNR). Both are most often used in conjunction with indoor acoustics.

STC is universally accepted by architects and engineers. The rating uses a standard contour against which the TL values in one-third-octave bands are compared in the frequency range between 125 and 4,000 Hz. The standard contour is moved up or down relative to the test curve until the sum of the differences between them is 32 dB or less, and the maximum difference at each one-third-octave center frequency is no more than 8 dB. The STC is the TL value of the standard contour at the 500-Hz center frequency.

The disadvantage of this rating scheme is that it is designed to rate noise reductions in frequencies of normal office and speech noises, not for the lower frequencies of highway traffic noise. The STC can still be used as a rough guide, but it should be pointed out that for frequencies of average traffic conditions, the STC is 5 to 10 dBA more than the TL. For example, material with an STC rating of 35 has a TL of about 25 to 30 dBA for traffic noise.

The EWNR rating scheme is different from the STC in that it uses a standard contour developed from typical highway noise frequencies. Therefore, it agrees closely with the A-weighted TL for traffic noise. The FHWA *Highway Traffic Noise: Analysis and Abatement Guidance* (Federal Highway Administration 2011) provides further useful information for calculating outdoor to indoor traffic noise reductions.

5.1.2 Barrier Location

The previous section indicated that by selecting materials with sufficient TL, noise transmitted through a barrier may be ignored because its contribution to the total noise level is negligible. The only remaining noise of concern is diffracted noise. Sections 2 and 4 discuss the basics of diffraction and barrier attenuation. The principal factor determining barrier

APPENDIX D

Noise Study Data from Spectator Projects

Nipomo Community Park Master Plan EIR
Nipomo, California

Noise Study Report

Prepared for:

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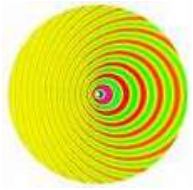


Karl Mikel, PE

November 25, 2010

TABLE OF CONTENTS

I. INTRODUCTION 1
II. APPLICABLE NOISE STANDARDS 1
A. Transportation Noise Sources 1
B. Stationary Noise Sources 4
III. STUDY METHOD 5
A. Stationary Noise Assessment 5
B. Traffic Noise Assessment 5
IV. MEASURED NOISE LEVELS 6
A. General Information 6
B. Stationary Noise Measurements At Similar Facilities 6
C. Traffic Noise Measurements Around The NCP 9
V. PROJECT IMPACTS 11
A. Stationary Sources 11
B. Traffic Sources 12

TABLES

Table 1: Maximum Allowable Noise Exposure-Transportation Noise Sources 3
Table 2: Land Use Compatibility Near transportation Sources 3
Table 3: Maximum Allowable Noise Exposure-Stationary Noise Sources 4
Table 4: Noise Summary, Damon Garcia Sports Complex 6
Table 5: Noise Summary, Templeton Skate Park 9
Table 6: Measured Traffic Noise Levels 11
Table 7: Estimated Future traffic Noise Level increase 12

FIGURES

Figure 1: Nipomo Regional Park 2
Figure 2: Damon Garcia Sports Complex 7
Figure 3: Templeton Skate Park 8
Figure 4: Traffic Measurement Location Map .....

I. INTRODUCTION

An outdoor noise assessment has been conducted for the Nipomo Park Master Plan Environmental Impact Report (EIR), in the community of Nipomo, CA (refer to Figure 1). Karl Mikel, PE, and approved County of San Luis Obispo acoustical noise consultant has prepared this report at the request of Ms. Shawna Scott of SWCA Environmental Consultants (SWCA). The project site is located in a semi-urban area of Nipomo, adjacent land uses consist of undeveloped lots, commercial, residential, and a school (Dana Elementary). This report has been prepared in support of the EIR for the proposed project to address the future noise environment of the area resulting from development of the proposed NCP facilities. Specifically this report presents collected noise measurements from similar proposed park facilities (i.e., local skate park, soccer field, etc.) to estimate stationary noise levels expected by the proposed project. This analysis includes noise data generated from existing peak-hour traffic on Tefft Street, Orchard Road, Pomeroy Road, Juniper Street, Camino Caballo, and Osage Street at potentially affected locations to compare to future noise levels due to project generated traffic. This acoustical analysis is required to determine if proposed facilities development would impact surrounding sensitive noise receptors (residential) located in close proximity to the NCP.

II. APPLICABLE NOISE STANDARDS

The County of San Luis Obispo Noise Element of the General Plan provides a policy framework for addressing potential and existing noise impacts during the planning process. Its purpose is to minimize future and existing noise conflicts. Among the most significant polices found in the Noise Element are numerical noise standards that limit noise exposure within noise-sensitive land uses resulting from transportation sources. An increase in the ambient stationary noise level surrounding the project site would result from the addition of the new facility, which could potentially result in a stationary noise impact that would exceed the thresholds defined in the County Noise Element.

A. TRANSPORTATION NOISE SOURCES

Policy 3.3.2 of the Noise Element states that “new development of noise-sensitive land uses shall not be permitted in areas exposed to existing or projected future levels of noise from transportation noise sources which exceed 60 dB Ldn or CNEL for outdoor activity areas and 45 Ldn or CNEL for interior spaces unless the project includes effective mitigation measures to reduce noise in outdoor activity areas and interior spaces to or below the levels for the given land use,” (refer to Tables 1 and 2).

Policy 3.3.3 of the Noise Element states that “Noise created by new transportation noise sources, including roadway improvement project, shall be mitigated so as not to exceed the levels specified in Table 1 within the outdoor activity areas and interior spaces of existing noise sensitive land uses.

Figure 1: Nipomo Regional Park



Source: Google Maps

TABLE 1
Maximum Allowable Noise Exposure-Transportation Noise Sources

Land Use	Outdoor Activity Areas[1] L_{dn}/CNEL, dB	Interior Spaces L_{dn}/CNEL, dB	Interior Spaces L_{EQ}, dB[2]
Residential (Except Temporary)	60 [3]	45	–
Bed and Breakfast, Hotels, Motels	60 [3]	45	–
Hospitals, Nursing and Personal Care	60 [3]	45	–
Public Assembly and Entertainment	–	–	35
Offices	60 [3]	–	45
Churches, Meeting Halls	–	–	45
Schools, Libraries, Museums	–	–	45
Outdoor Sports and Recreation	70	–	–

Notes:
1. Where the location of outdoor activity areas is unknown, the exterior noise level standard shall be applied to the property line of the receiving land use.
2. As determined for a typical worst-case hour during periods of use.
3. For other than residential uses, where an outdoor activity area is not proposed, the standard shall not apply. Where it is not possible to reduce noise in outdoor activity areas to 60 dB Ldn/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB Ldn/CNEL may be allowed.

Source: Noise Element, County of San Luis Obispo, General Plan

TABLE 2
Land Use Compatibility For New Development Near Transportation Sources

Land Use	Exterior Noise Exposure, Ldn or CNEL (dB)					
	55	60	65	70	75	80
Residential, Public Assembly, Entertainment						
Bed and Breakfast, Hotel, Motel						
Schools, Libraries, Museums, Hospitals						
Outdoor Sports and Recreation						
Offices						

	Acceptable, no mitigation required
	Conditionally Acceptable, Mitigation required
	Unacceptable, mitigation may not be feasible

Source: SLO County Noise Element, Policy Document

B. STATIONARY NOISE SOURCES

Policy 3.3.4 of the Noise Element states that "new development of noise-sensitive land uses shall not be permitted where the noise level due to existing stationary noise sources would exceed the noise level standards included in the Noise Element unless effective noise mitigation measures have been incorporated into the design of the development to reduce noise exposure to or below the levels specified." The hourly daytime stationary noise standard for a residential development is 50 dBA, while the maximum is 70 dBA. The hourly nighttime stationary noise standard for a residential development is 45 dBA, while the maximum is 60 dBA (refer to Table 3).

TABLE 3
Maximum Allowable Noise Exposure-Stationary Noise Sources[1]

Level	Daytime (7 a.m. to 9 p.m.)	Nighttime (9 p.m. to 7 a.m.)
Hourly Leq, dBA[2]	50	45
Maximum Level, dBA[2]	70	60
Maximum Level, Impulsive Noise dBA[3]	65	60
Notes: 1. As determined at the property line of the of the receiving land use. 2. Sound level measurements shall be made with slow meter response. 3. Sound level measurements shall be made with fast meter response.		
Source: SLO County Noise Element, Policy Document		

Policy 3.3.5 of the Noise Element states that "new proposed stationary noise sources or existing stationary noise sources that undergo modifications that may increase noise levels shall be mitigated as follows and shall be the responsibility of the developer of the stationary noise source. Policy 3.3.5 can be found in its entirety on page 3-3 of the County Noise Element, applicable standards from Policy 3.3.5 are provided below as follows:

b) Noise levels shall be reduced to or below the noise level standards in Table 3-2 (refer to Table 1 in this report) where the stationary noise source will expose an **existing** noise-sensitive land use (which is listed in the Land Use Element as an allowable use within its existing land use category) to noise levels that exceed the standards in Table 3-2.

c) Noise levels shall be reduced to or below the noise level standards in Table 3-2 where the stationary noise source will expose **vacant** land in the Agriculture, Rural Lands, Residential Rural, Residential Suburban, Residential Single Family, Residential Multi-Family, Recreation, Office and Professional, and Commercial Retail land use categories to noise levels that exceed the standards in Table 3-2.

Note: This policy may be waived when the Director of Planning and Building determines that such vacant land is not likely to be developed with a noise sensitive land-use.

III. STUDY METHOD

A. STATIONARY NOISE ASSESSMENT

The procedure used to assess noise resulting from this project focused on measuring noise levels at similar events and facilities such as soccer games at multi-use sports fields and skate parks to estimate noise levels that could be expected by these types of uses at the NCP. Ambient pre-project noise levels are measured at select locations to determine if recreational development would result in a stationary noise impact. The expected noise levels are then compared to published threshold values in the County's Noise Element to determine if a significant change in the noise environment would occur and if an exceedance of the threshold value would be expected. The one-hour Leq threshold outlined in the Noise Element is 50 dBA at the property line of the nearest sensitive receptor location, with a maximum noise level of 70 dBA allowed for short periods of time so long as the hourly average is maintained at 50 dBA Leq.

B. TRAFFIC NOISE ASSESSMENT

The procedure for assessing vehicular traffic noise impacts included measuring the peak-hour noise levels at select locations around the NCP while counting the traffic generating the noise during the period of measurement. The measured peak-hour noise levels are then adjusted logarithmically to determine the "future" noise levels by using the estimated traffic volume predictions for various road segments. Logarithms are used because they produce linear correlations, which can then be used to more readily evaluate future noise levels. Generally speaking, doubling the traffic volume will produce a 3 dB increase in the ambient noise environment.

From a practical standpoint, the peak-hour Leq noise level is essentially equivalent to the Ldn noise level (generally yielding results within 1-2 dBA of each other). The Ldn is the standard measure used for evaluating community noise impacts in the County Noise Element. For most situations involving noise originating from vehicular traffic, the peak-hour Leq can be used as the Ldn level in situations where there is little nighttime traffic or significant heavy truck volumes. Peak hour Leq was the methodology used in evaluation of traffic noise impacts for the proposed project. Noise measurements were taken for a duration of 15 minutes at each location. Further analysis is based on the average noise levels (Leq) as discussed in this report.

General guidelines for determining community noise impacts typically include:

- A three-dB change is barely perceptible, and is the minimum most people will notice in most environments.
- A five-dB change is a readily perceptible increase or decrease in sound level.
- A ten-dB increase in sound level is perceived as an approximate doubling of the loudness of the sound and represents a substantial change in loudness.

IV. MEASURED NOISE LEVELS

A. GENERAL INFORMATION

The subject noise investigation was conducted using a Bruel and Kjaer (B & K) Model 2231 precision integrating sound level meter. The meter internally computes a new Leq from the sound pressure level and updates the digital display once each second. The meter was calibrated externally at the beginning of each period of measurement using a B & K Model 4230 acoustic calibrator. In combination, these instruments yield sound level measurements accurate to within 0.1 decibel (dB). All models fulfill standards of relevant sections of IEC (International Electrotechnical Commission) 651 and ANSI (American National Standard) S1.4.1971 for Type 1 (precision) integrating sound level meters. All noise readings were conducted in the A-weighted decibel range. The A-weighting correlates well with how humans hear sounds, de-emphasizing very high and low frequencies.

B. STATIONARY NOISE MEASUEMENTS AT SIMILAR FACILITIES

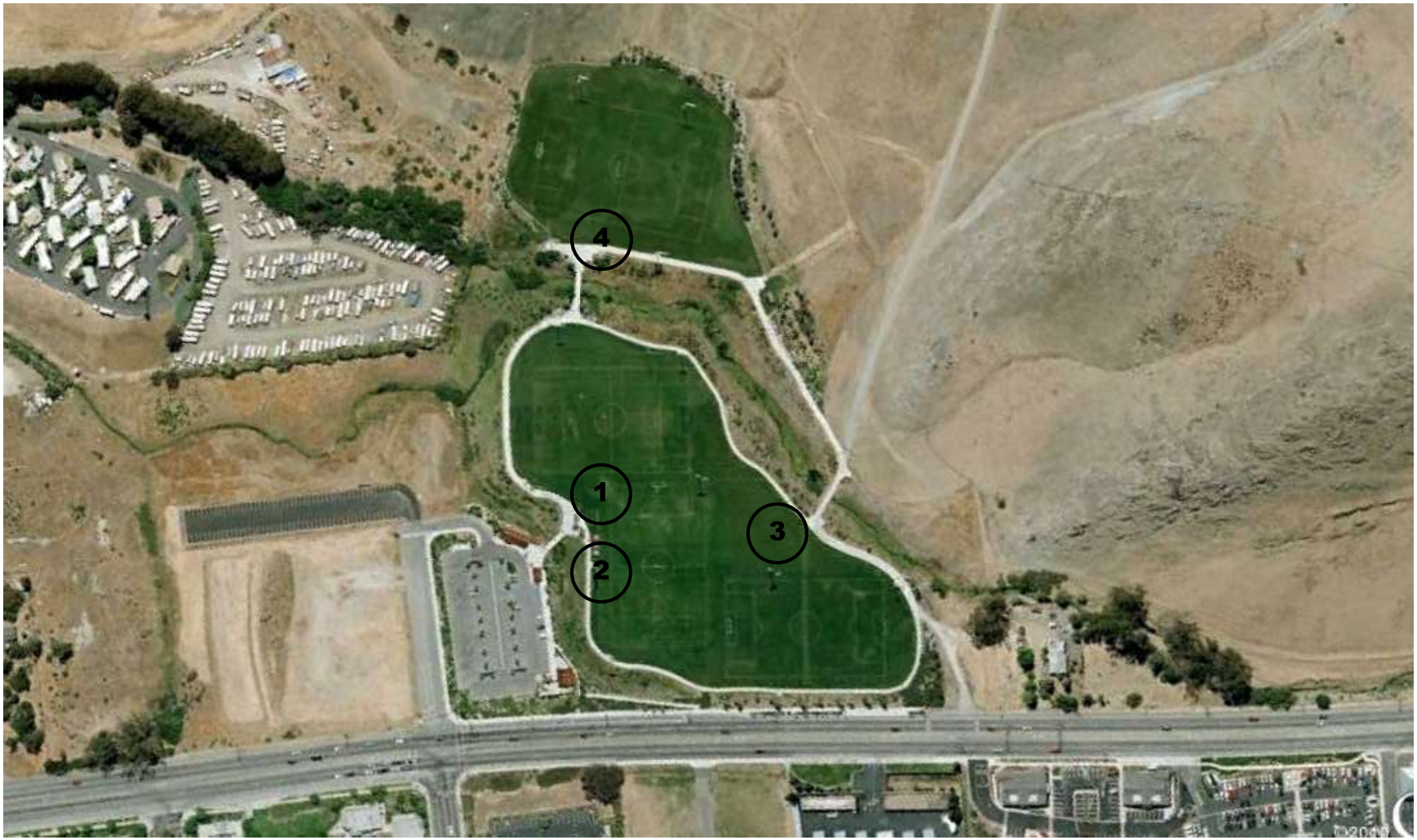
To help assess expected stationary noise levels resulting from development due to the project, similar noise sources and events were monitored. Noise was measured on November 19, 2010 at the Damon Garcia Sports Complex during a youth soccer tournament, and at the Templeton Skate Park on November 21, 2010 (Figures 2 & 3).

The measurement set conducted at Damon Garcia consisted of a multi-game youth soccer tournament. Three games were being played at the same time, measurement Location 3 was the combination of all three games being played at once. There was no amplified sound at any of the games; most of the noise measured from the games resulted from the crowd cheering during exciting plays. Very little noise is actually generated by participants or action on the field. Table 4 presents the results of the monitoring conducted during the soccer event.

TABLE 4
Noise Summary, Damon Garcia Sports Complex

Location	Distance from Center of Field (Feet)	Noise Levels (dBA)	
		Leq	Max
1	25	66.5	76.6
2	50	59.1	75.1
3	100	54.0	73.1
4	10	66.4	79.1

Figure 2: Damon Garcia Sports Complex



Noise Measurement Location: Damon Garcia Sports Complex

Figure 3: Templeton Skate Park



Noise Measurement Location: Templeton Skate Park

The skaters primarily generate the skate park noise when they are actively skating within the confines of the concrete at the facility. The noise environment around the park is subject to multiple impulsive types of episodes when the skaters fall off their boards and the boards bang around on the concrete. When the skaters are on their boards and skating through the facility, the sound of the skate wheels and trucks are quite noticeable in close proximity to the park. Table 5 presents the results of the monitoring conducted at the skate park.

TABLE 5
Noise Summary, Templeton Skate Park

Location	Distance from Center of Field (Feet)	Noise Levels (dBA)	
		Leq	Max
1	25	73.5	82.9
2	50	68.4	79.6
3	100	62.2	74.4

C. TRAFFIC NOISE MEASUEMENTS AROUND THE NCP

The level of traffic noise depends on the following three factors: (1) the volume of traffic; (2) the speed of the traffic; and, (3) the number of trucks in the traffic flow. Generally, heavier traffic volumes, higher speeds, and the greater numbers of trucks increase the loudness of traffic noise. Any condition (such as a steep incline) that causes heavy laboring of motor vehicle engines will also increase the resultant traffic noise levels. Vehicle noise around the NCP is a combination of the noise produced by the engines, exhausts, and tires.

Higher levels of existing noise resulting from automobile and truck traffic characterize the perimeter portions of the existing NCP site, especially adjacent to the West Tefft Street and Pomeroy Road corridors. Although higher levels of noise are found along the existing transportation corridors surrounding the NCP; noise levels rapidly attenuate as one moves towards the interior of the site because of the varying topography and in some locations the presence of dense thick wooded vegetation. A field investigation was conducted on November 23, 2010, noise measurements were conducted from approximately 3:30 PM to 5:45 PM to determine traffic related ambient noise levels around the perimeter and within the proposed NCP site (refer to Figure 4). Each of the short-term sites was measured for a duration of 15 minutes while vehicle volumes were classified. The hourly counts are then normalized from the data generated.

Generally speaking, the loudest traffic noise levels are associated with sites monitored adjacent to West Tefft Street and Pomeroy Road, which are the primary noise sources in the general area. There are a variety of commercial and retail areas to the north and east of the NCP (including Highway 101), which are additional noise generators in the immediate area. Most other areas surrounding the NCP are residential and do not have significant traffic volumes or excessive traffic noise levels. Table 6 presents the results of the sites monitored.

Figure 4: Nipomo Regional Park



Traffic Noise Measurement Locations: Nipomo Regional Park

TABLE 6
Measured Traffic Noise Levels

Location*	Period of Measurement	Noise Levels (dBA)	Traffic Volume, Measured	
		Leq	Number	Vehicles/ Hr
1	3:30-3:45 pm	63.8	228	912
2	4:00-4:15 pm	64.5	240	960
3	4:30–4:45 pm	61.0	150	600
4	5:00–5:15 pm	57.1	118	472
5	5:15–5:30 pm	55.6	70	280
6	5:30–5:45 pm	63.0	195	780

*Refer to Figure 4 for Measurement Locations

V. PROJECT IMPACTS

A. STATIONARY SOURCES

The project area is a mix of hardscaped surfaces, undeveloped fields, commercial/retail uses, and residential development. The topography surrounding the NCP is characterized as a "hard", which means that it would tend to be more reflective than absorptive of sound pressure waves. Hard sites generally do not have absorptive ground surfaces such as soft dirt, grass, or bushes and trees to attenuate noise levels.

Existing vegetation at the NCP consists of annual grassland, scattered herbaceous vegetation, and small clumps of brush and oak woodland habitat. The existing project site would be characterized as a "soft site", meaning that excess attenuation of sound pressure levels would be observed due to the ground cover and vegetation. After project development, more of the site would be hardscaped, decreasing the project areas natural noise attenuation capabilities. When added to the natural geometric spreading of sound pressure waves, this would result in an overall noise drop-off rate of approximately 6.0 dBA/(doubling distance) for a stationary source.

If one were to assume a conservative drop-off rate of 6 dBA per distance doubled, a safe-distance offset could be estimated in order to determine how far way from the nearest sensitive noise receptor location new facilities must be sited. Referring to Table 4, for a hypothetical non-amplified multi-game soccer event, the nearest field would need to be no closer than 200 feet from the closet receptor location to meet County exterior noise thresholds. Referring to Table 5, for a skate park, the active skating area should be no closer than 400 feet from the nearest receptor location. This evaluation is based on average conditions, with no loud music playing, and assumes only the sounds from voices and skateboards.

B. TRAFFIC SOURCES

To determine the traffic noise level increase due to project generated trips, the Traffic Impact Analysis (March 2010) was used in order to determine buildout traffic conditions with the additional NCP Master Plan uses included for future traffic conditions. Expected noise increases resulting from implementation of the NCP Master Plan resulting from additional vehicle trips are presented in Table 7. All estimated noise increases have been rounded to one decimal place.

TABLE 7
Estimated Future Traffic Noise Level Increase

Location*	Baseline Buildout ADT	Buildout Plus Project ADT	Estimated Noise Level Increase (dBA) Leq
1	8,400	8,602	0.1
2	19,200	19,510	0.1
3	9,350	9,564	0.1
4	3,100	3,122	0.0
5	1,300	1,322	0.1
6	6,700	6,764	0.0

*Refer to Figure 4 for Measurement Locations

As seen in Table 7, due to the relatively low number of expected additional trips, estimated noise level increases due to project generated traffic are expected to be negligible. Under controlled conditions in an acoustics laboratory, the trained healthy human ear is able to discern changes in sound levels of 1 dBA when exposed to steady single-frequency (pure tone) signals in the mid-frequency range. Outside such controlled conditions, the trained ear can detect changes of 2 dBA in normal environmental noise. It is widely accepted that the average healthy ear, however, can barely perceive noise level changes of 3 dBA (Caltrans Technical Noise Supplement, 2009). Since the expected noise level increase would be less than 1 dBA, traffic noise impacts are not expected to occur due to buildout of the NCP uses.

Issue	Impact				Source *(Refer to Section 3: Source List)*
	No Impact	Less Than Significant Impact	Potentially Significant Unless Mitigation Incorporated	Potentially Significant Impact	
12. NOISE. *Would the proposal result in:*					
(a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	✓	☐	☐	☐	1,2,4,31
(b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	✓	☐	☐	☐	5,6
(c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	✓	☐	☐	1,2,4,5,31
(d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	✓	☐	☐	5,6,31
(e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	✓	☐	☐	1,2,5,6
(f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	✓	☐	☐	☐	1,2

Discussion

The discussion of noise impacts is based upon the *San Salinas Regional Soccer Complex Final Environmental Noise Assessment Salinas, California* (hereinafter "noise assessment") prepared by Illingworth & Rodkin, Inc. in 2011. The noise assessment is included as Appendix K, found on CD on the inside back cover of this initial study.

The existing noise environment at the project site and in the vicinity is most influenced by traffic on Constitution Boulevard and East Laurel Drive. In order to quantify existing ambient noise levels, Illingworth & Rodkin conducted noise monitoring. Two long-term noise measurements were taken: one at the nearest single-family residences located on Oyster Bay Court (LT-1) approximately 350 feet from the nearest portion of the project site, and one in the parking lot of the existing adjacent soccer complex approximately 110 feet from the edge of the nearest proposed new soccer field (LT-2). At LT-1, hourly average noise levels typically ranged from 48 to 58 weighted decibels (dBA) average level (L_{eq}) during the day, and from 41 to 54 dBA L_{eq} at night. The calculated day-night average noise level (L_{dn}) at this location ranged from 56 to 59 dBA L_{dn}. Hourly average noise levels at LT-2 typically ranged from 55 to 64 dBA L_{eq} during the day, and from 47 to 55 dBA L_{eq} at night. The calculated day-night average noise level at this location ranged from 58 to 62 dBA L_{dn}.

CEQA does not define noise level increases that are considered substantial. Typically, project-generated noise level increases of three dBA L_{dn} over the Community Noise Equivalent Level (CNEL) or greater would be considered significant where exterior noise levels at a particular receptor exceed the normally acceptable noise level standard. Where noise levels would remain at or below the normally acceptable noise level standard with the project, noise level increases of five dBA L_{dn}/CNEL or greater would be considered significant.

Normally accepted noise levels are typically described by local jurisdictions in terms of noise compatibility standards. As described in general plan Table N-3, Noise/Land Use Compatibility Matrix, uses such as outdoor spectator sports/arenas are "conditionally acceptable" in noise environments of up to 75 Ldn/CNEL. For more noise sensitive residential, school, or transient lodging uses, exterior noise exposure levels of up to 60 Ldn CNEL are normally acceptable.

With regard to noise producing land uses, as identified in zoning code section 37-50.180, the maximum acceptable exterior noise level at the property line of noise sensitive residential land uses that can be created by noise from new development is 60 dBA Ldn/CNEL. Note (5) in section 37-50.180 states, "Sporting events and the like shall be exempt from these noise standards." This exemption is deemed to apply to a subset of the proposed project activities – the limited number of larger scale regional/local soccer tournaments at the site, including at the outdoor soccer stadium.

(a) A significant impact would occur if the proposed project would expose people to, or generate permanent noise levels in excess of noise standards contained in the general plan or zoning code.

The existing noise environment at the site and in the vicinity results primarily from traffic on Constitution Boulevard and East Laurel Drive. As described above, existing noise levels in the project area as measured in the noise assessment are significantly below the maximum conditionally acceptable noise exposure level for the type of use proposed. Further, general plan Figure N-1, Future Noise Contours and Impact Areas, indicates that noise levels at the project site would range from approximately 60 dBA to 65 dBA CNEL with the buildout of the general plan, also well within the maximum conditionally acceptable noise exposure level for the type of use proposed. In short, the proposed project would have a less-than-significant impact from potential exposure of project users to noise levels that exceed the city's noise compatibility standards.

Please refer to item "c" below for information on the noise generating effects of the proposed project and potential related impacts.

(b) Pile driving, the most common source of construction causing elevated vibration levels, is not proposed with the project, and there are no existing or planned sources of groundborne vibration that would be perceptible on or beyond the project's boundaries. Therefore, there is no impact.

(c) A significant impact would occur if the proposed project would result in a substantial permanent increase in ambient noise levels that has potential to adversely impact noise sensitive uses. The proposed project would result in permanent increases in noise levels due to traffic noise and project operations. Each of these noise sources is evaluated below.

Traffic Noise

Traffic data for area roadways, provided by Hexagon Transportation Consultants, Inc., were reviewed to calculate the relative increase in traffic noise levels expected with the operation of the project. Please refer to the Traffic and Transportation section of this initial study for more information on traffic effects. Fifteen study area intersections were evaluated in the analysis. PM peak hour traffic volumes under the existing plus project traffic scenario were compared to existing conditions to calculate the noise increase attributable to project traffic.

The data indicate that traffic volumes in the site vicinity would slightly increase as a result of the proposed project. Traffic noise levels due to the proposed project are expected to increase existing traffic noise levels by less than 1.0 dBA L_{eq} during the PM peak traffic hour. This increase would not be perceptible. On a 24-hour average basis, the CNEL will not be measurably increased (less than 1.0

dBA). A change in the CNEL of less than 1.0 dBA is not substantial and would not be expected to cause a change in community response to the noise environment. Impacts from traffic noise increases would be less than significant.

Noise from Facility Use

Use of the proposed project will generate noise, primarily from use of the eight turf fields, the two synthetic soccer fields with stadium seating, and on-site vehicle use. The fields would be used for practice from 4:00 pm to 8:00 pm Monday through Thursday by most of the leagues expected to use the facility. Two leagues are assumed to also practice on Friday. This schedule would occur during late spring, summer and early fall. At other times of the year, the leagues would either start earlier or practice times would only be two hours, or they would utilize the two lighted fields during the 4:00 pm to 8:00 pm timeframe. Two operational scenarios are evaluated in the noise assessment, league play/ tournaments, and a stadium event.

League Play and Tournaments. During league play and tournaments, the fields would be utilized for practice as described above and games would occur on weekends. A credible worst-case scenario assumes that all of the fields would be in use. Noise levels are highest during games when spectators are present and the spectators and players are cheering. Noise sources include the cheering and referee whistles. As identified in the noise assessment, soccer games typically generate “worst-case” noise levels of about 68 dBA Leq at a distance of 50 feet from the center of the field. Maximum noise levels of about 68 to 73 dBA typically result from whistles and shouting from players and spectators.

As indicated in the noise assessment, the closest noise sensitive receptors are residences located across Constitution Boulevard to the northeast of the project site. The existing day-night average noise level at the nearest residential property boundary ranged from 56 to 59 dBA Ldn. The nearest proposed soccer field is designated as Field 7. Play on Field 7 would only occur during daytime hours as this field would not be lit, and would result in maximum instantaneous noise level ranging from 54 to 61 dBA Lmax and an average level of 52 dBA Leq at the nearest residential property boundary. The cumulative hourly average noise level from play on all of the fields is calculated to be 55 dBA Leq. The 24-hour average noise level is calculated to be 53 dBA CNEL at the nearest residential property. This noise level is substantially below the absolute noise levels limits set forth in the general and the zoning code. Noise generated by soccer field use would have a less-than-significant impact.

Stadium Events. As previously noted, sports events are exempted from municipal code section 37-50.180 standards which state that new development projects may not result in noise generation that exceeds 60 dBA CNEL at the property line of residential uses. Activities at the project site are planned to include 9-10 larger scale, annual regional/local soccer tournaments of approximately 48 teams

each. These individual events are considered to be “sports events” pursuant to municipal code section 37-50.180 per note (5) in that section. These tournaments would include the use of the soccer stadium. Consequently, noise from these events is exempt from the noise standards. Nevertheless, an analysis of the noise effects of the infrequent use of the stadium when significant spectator numbers are expected is provided for disclosure purposes.

An event at the stadium could result in the attendance of up to 2,000 seated spectators. The primary source of noise from a stadium event would be the cheering from the crowd and the public address system. The noise from a crowd is proportional to the number of people in attendance. At an attendance of 2,000 people, the hourly average noise level is calculated to be up to 58 dBA L_{eq} at a reference distance of 450 feet from the center of the stadium bleachers. Maximum instantaneous noise levels are calculated to range from 60 to 65 dBA at the 450 feet reference distance. The stadium bleachers are proposed to be located on the west side of Field 1 which would be approximately 1,500 feet from the nearest residential property.

Taking into account the reduction in noise due to the distance to the receptor, a stadium event is calculated to result in an hourly average noise level of 48 to 51 dBA L_{eq} at the nearest residence and maximum instantaneous noise levels of up to 55 dBA L_{max}. The existing day-night average Ldn noise level at the nearest residential property boundary ranges from 56 to 59 dBA Ldn. Therefore, noise levels from a stadium event would not result in a substantial increase in noise levels at the nearest residential receptors and would be below the 60 dBA CNEL noise level limits established in the general plan and the zoning code. Therefore, noise impacts from stadium events would be less than significant.

Note that significant numbers of spectators are only likely to be present as part of the 9-10 tournaments per year that are anticipated at the project site. Consequently, noise from tournament/stadium use would occur infrequently during any given year.

Parking Lot Activities. The proposed project includes 421 new parking spaces that would be contained within the proposed project site (these are in addition to the 368 spaces existing/planned at the existing adjacent soccer fields). Autos would access the new parking lot from Constitution Boulevard. The sound of a passing car at 15 mph typically ranges from 46 to 56 dBA at 50 feet. The noise of an engine start is similar. Door slams create noise levels lower than engine starts. At its closest point, the new parking lot would be about 500 feet from the nearest single-family residences, resulting in noise levels ranging from 26 to 36 dBA. Expected noise levels would be substantially below existing ambient traffic noise levels resulting from local traffic. These activities would not cause a measurable increase in hourly average or daily average noise levels. Therefore, noise resulting from parking lot sources would result in a less-than-significant noise impact at adjacent residential land uses.

(d) Noise impacts resulting from construction depend on the noise generated by various pieces of construction equipment, the timing and duration of noise generating activities, and the distance between construction noise sources and noise sensitive receptors. Construction noise impacts primarily occur when construction activities occur during noise-sensitive times of the day (early morning, evening, or nighttime hours), the construction occurs in areas immediately adjoining noise sensitive land uses, or when construction durations last over extended periods of time.

Where noise from construction activities exceeds 60 dBA L_{eq} and exceeds the ambient noise environment by at least five dBA L_{eq} at noise-sensitive uses in the project vicinity for a period of one year or more, the impact would be considered significant. Typically, significant noise impacts do not result when standard construction noise control measures are enforced at the project site and when the duration of the noise generating construction period is limited to one construction season (typically one year) or less. Noise generated by grading, infrastructure improvements and the construction of proposed project facilities would not be expected to result in noise levels exceeding 60 dBA L_{eq} and the ambient noise environment by 5.0 dBA L_{eq} for a period greater than one year at the nearest sensitive receptors. Therefore, construction related noise impacts would be less than significant.

The following standard controls are assumed to be included in the project as a condition of project approval:

- Construction or demolition work will be limited to the hours between 7:00 a.m. and 7:00 p.m.

- All powered construction equipment would be equipped with intake and exhaust mufflers recommended by the manufacturers thereof. All mufflers shall be maintained in good condition or replaced as necessary

- Pavement breakers and jackhammers would also be equipped with acoustical attenuating shields or shrouds recommended by the manufacturers.

- Stationary noise generating equipment would be located as far as possible from adjacent sensitive land uses.

- Stationary equipment located near sensitive land uses would be acoustically shielded with temporary noise barriers.

- "Quiet" air compressors and other stationary noise sources would be used where technology exists.

- The applicant would designate a "disturbance coordinator" who would be responsible for responding to any complaints about construction noise. The disturbance coordinator would determine the cause of the noise complaint (e.g., bad muffler, etc.) and would require that reasonable measures be implemented to correct the problem.

(e) The project site is located outside the Salinas Municipal Airport 55 dBA CNEL noise contour for future buildout conditions (general plan Figure N-2). Occasional aircraft overflights are intermittently audible at the site, but these infrequent events do not substantially contribute to hourly average or daily average noise levels at the site. The proposed project users would not be significantly affected by aircraft noise and the impact would be less than significant.

(f) The project is not located in the vicinity of a private airstrip; therefore, there is no impact.

Mitigation Measures

No mitigation measures are required.

Arcadia Park Softball Fields

San Jose, CA

Draft Environmental Noise Impact Assessment

7 October 2014

DRAFT

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CSA Project Number: 14-0394

INTRODUCTION

This report summarizes our environmental noise impact assessment for the Arcadia Park Softball Fields located southwest of the intersection of Quimby Road and Capitol Expressway in San Jose, California. The 18-acre field complex will include four softball fields with a central public address system, a restroom and concession building, and two parking lots. It is part of a larger 81-acre parcel with prior planning approval for a mix of retail commercial use, residential, and a sports complex.[1] For readers less familiar with the fundamental concepts with acoustics, please refer to Appendix A, attached.

Following is a summary of our findings:

1. Environmental noise at the site falls into the City's *normally* and *conditionally acceptable* categories for land use compatibility with parks.
2. Estimated noise levels from softball activities are DNL 46 to 52 at the nearest planned residences. This is consistent with the City's DNL 55 dB criterion, and does not significantly increase environmental noise at the residences.
3. Stationary noise sources, including the public address system and mechanical equipment, must be selected and designed to meet the Municipal Code limit of 55 dB at adjacent residences.
4. Traffic noise associated with the project is estimated to increase environmental noise by less than 1 dB, which is considered less than significant.

PROJECT DESCRIPTION

The proposed field complex, south of Quimby Road, will contain four softball fields as shown on Figure 1, attached. Following is a summary of anticipated operational characteristics:

- Parking lots, with a combined total of 244 parking spaces, will be located north and east of the fields. The northern lot will be accessed via Quimby Road, and the eastern lot will be access the site via a new roadway as part of the larger parcel. This new roadway will extend from Quimby Road to Capitol Expressway.
- Existing residences are located to the west of the larger parcel, and future residences are planned for a separate site between the field complex site and existing residences (see Figure 1).
- The project will include a concession building between the four fields, and spectator seating along the sides of the fields.
- Fields will primarily be used for evening (5:30 PM to 10:00 PM) and weekend (8:00 AM to 10:00 PM) softball games. A secondary use will be afternoon Little League practices and games (4:00 PM to 5:30 PM).
- Schedules will accommodate up to three weeknight games, and nine weekend games, per field per day.
- Average attendance for softball games is 24 to 30 players with 10 to 15 spectators per field.
- Average attendance for little league practices and games is 15 to 20 players and coaches on each field.
- A central public address system will be used to make announcements to all fields. However, this system will not be used for game commentary.

[1] Evergreen East Hills Vision Strategy Project DEIR, dated February 2006. For reference, the noise assessment prepared for the DEIR, dated September 2005, indicates the four fields and public address system will have no adverse effect on residences off-site, but potential intra-project impacts.

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ACOUSTICAL CRITERIA

Acoustical criteria are included in the Envision San Jose 2040 General Plan and the San Jose Municipal Code, which are summarized as follows:

- Policy EC-1.1 provides land use compatibility guidelines for environmental noise, based on exterior noise levels. It identifies Day/Night Average Sound Levels[2] (DNL) of up to 65 dB[3] as *normally acceptable*, and DNL 65 to 80 dB as *conditionally acceptable*, for parks. For reference, the *normally acceptable* level for residences is DNL 60 dB or lower.
- Policy EC-1.2 of the General Plan considers noise impacts to be significant if a project would increase noise levels on adjacent sensitive land uses, including residences, as follows:
  - Cause the DNL at noise sensitive receptors to increase by five dB or more where the noise levels would remain *normally acceptable*; or
  - Cause the DNL at noise sensitive receptors to increase by three dB or more where noise levels would equal or exceed the *normally acceptable* level.
- Policy EC-1.3 of the General Plan limits noise generation of new nonresidential land uses to DNL 55 dB at adjacent residential properties.
- Policy EC-1.6 of the General Plan limits operational noise to the noise standards in the City's Municipal Code. Section 20.40.700 of the San Jose Municipal Code limits noise to 55 dB at residential properties.

NOISE ENVIRONMENT

On-Site Environmental Noise

The Evergreen Visioning Project EIR Noise Report, dated 9 September 2005, identifies noise levels along Quimby Road and at the terminus of Brahms Avenue. In summary, the identified noise level along Quimby Road in DN?L 67 dB at a distance of 100 feet from the roadway centerline. At the terminus of Brahms Avenue, near the southern end of the site, the noise level is DNL 57 dB.

Softball Activity Noise

Noise from softball activity will include the bat hitting the ball, players communicating, and spectator or crowd noise. To quantify noise from these types of activities, noise levels were measured during softball games at the Twin Creeks Sports Complex in Sunnyvale on 19 September 2014. This site was chosen due its similar field layout and usage to the proposed fields. Measurements were taken between approximately 7:00 and 9:00 PM with a Rion NL-22 Class 2 sound level meter. The meter was located between two outfields, approximately 300 feet from the home plate of the nearest field. The location is similar to the outfield between Fields 1 and 2 in Figure 1, attached. During the measurement period, two back-to-back softball games were played on each of the nearest two fields, with additional games on one

[2] Day-Night Average Sound Level (DNL) – A descriptor established by the U.S. Environmental Protection Agency to describe the average day-night level with a penalty applied to noise occurring during the nighttime hours (10 pm - 7 am) to account for the increased sensitivity of people during sleeping hours.
[3] A-Weighted sound pressure level (dB) represents the noisiness or loudness of a sound by weighting the amplitudes of various acoustical frequencies to correspond more closely with human hearing. A 10-dB (decibel) increase in noise level is perceived to be a doubling of loudness. A-Weighting is specified by the U.S. EPA, OSHA, Caltrans, and others for use in noise measurements.

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of the two fields directly behind these. Each of these games had approximately 20 players and about 6 to 10 spectators.

The average sound level (L_{eq})[4] during the measurement period was L_{eq} 51 dB. For reference, the loudest noise level measured, during energetic play, was 71 dB. With the exception of this play, nearly all observed sources fell within the range of typical noise levels shown in Table 1 below.

Table 1: Measured Typical Noise Levels from Softball Activities

Source	Typical Noise Level
Bat hitting ball	48 – 60 dB
Players	45 – 65 dB
Spectators Cheering	50 – 64 dB

Noise from Project Generated Traffic

Hexagon Transportation Consultants prepared a memo, dated 2 September 2014, summarizing peak hour traffic volumes for vehicles associated with the softball fields. These volumes, as well as overall traffic volumes, are summarized for three roadways in the project vicinity as follows:

- Quimby Road – The project will add 71 peak-hour trips to the existing 2,346
- Capitol Expressway – The project will add 47 peak-hour trips to the existing 5,719
- Future roadway between the fields and planned residences to the east – The project will add 35 peak-hour trips to the estimate of 797

In summary, project-generated trips will increase peak-hour volumes along local roadways by 4-percent or less. This corresponds with an increase in environmental noise of 1 dB or less.

ANALYSIS AND FINDINGS

The site, as well as noise associated with the project are compared with the noise criterion in the San Jose General Plan and Municipal Code as follow.

Land Use Compatibility

As indicated above, the noise environment at the project site ranges between approximately DNL 57 to 67 dB, depending on the distance to Quimby Road. This falls into the City's *normally* and *conditionally acceptable* land use categories for environmental noise. For reference, the portions of the site where transportation noise will exceed DNL 65 dB are the northern parking lot and outfields of Fields 1 and 3.

[4] L_{eq}--The equivalent steady-state A-weighted sound level that, in a stated period of time, would contain the same acoustic energy as the time-varying sound level during the same period.

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Softball Activity Noise

As indicated above, the reference noise level measured at the Sunnyvale fields was L_{eq} 51 dB with three games played concurrently. Adjusting this reference level for the additional players and spectators identified in the Project Description section above, as well as distance, results in average estimated noise levels of approximately L_{eq} 50 to 52 dB during softball games, and L_{eq} 45 to 48 dB during Little League play, at the nearest planned residences. Corresponding DNL is 46 to 52 dB at the residences, which will increase existing levels by 1 dB or less. This is consistent with the City's DNL 55 dB criterion, and the increase is not considered significant.

Complying with the City's noise goals does not imply that softball activity will be inaudible at the nearest adjacent residences. Table 2, below, summarizes typical estimated noise levels from individual noise sources, at the nearest planned residences.

Table 2: Estimated Typical Noise Levels from Softball Activities

Source	Typical Noise Level
Bat hitting ball	45 – 57 dB
Players	46 – 68 dB
Spectators cheering	50 – 65 dB

Stationary Noise Sources

Stationary noise sources are subject to the San Jose Municipal Code limit of 55 dB at adjacent residences. This may include noise from the planned public address system, and rooftop mechanical equipment. Detailed information for these systems is not available at this time. The design should include equipment selection, location, and if necessary, mitigation measures, to reduce radiated noise to the 55 dB criterion.

Traffic Noise Associated with the Project

As indicated in the Noise from Project Generated Traffic section above, project-generated traffic will increase the noise environment (DNL) by 1 dB or less in the project vicinity. This is considered a less than significant impact.

* * *

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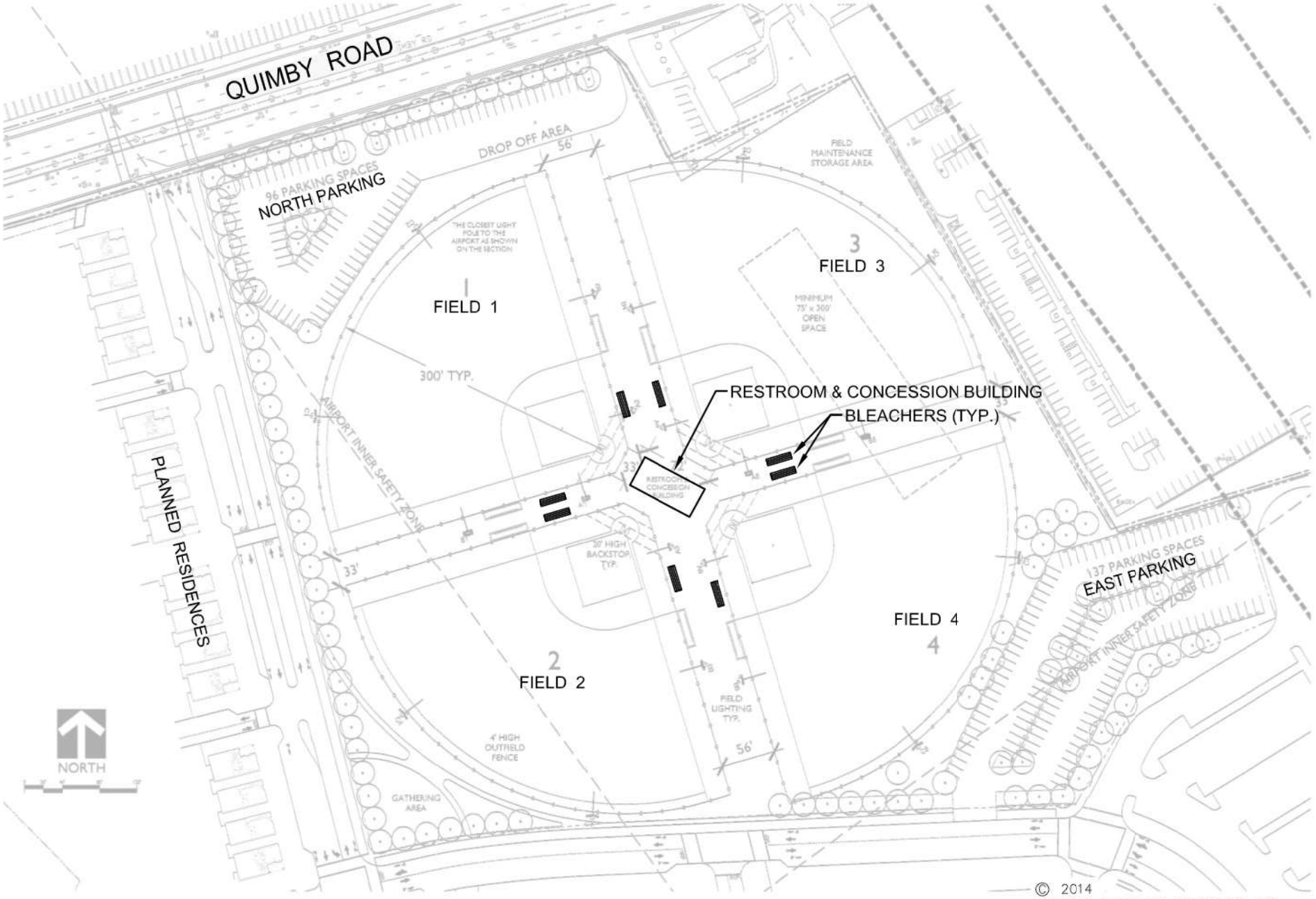

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ARCADIA SOFTBALL FIELDS: RESIDENCES ADJACENT TO SOFTBALL FIELDS

FIGURE 1

CSA #	GE/PNS
14-0394	09.25.14

Appendix A

FUNDAMENTAL CONCEPTS OF ENVIRONMENTAL NOISE

This section provides background information to aid in understanding the technical aspects of this report. Three dimensions of environmental noise are important in determining subjective response. These are:

a) The intensity or level of the sound;
b) The frequency spectrum of the sound; and
c) The time-varying character of the sound.

Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. Sound levels are usually measured and expressed in decibels (dB), with 0 dB corresponding roughly to the threshold of hearing.

The "frequency" of a sound refers to the number of complete pressure fluctuations per second in the sound. The unit of measurement is the cycle per second (cps) or hertz (Hz). Most of the sounds which we hear in the environment do not consist of a single frequency, but of a broad band of frequencies, differing in level. The name of the frequency and level content of a sound is its sound spectrum. A sound spectrum for engineering purposes is typically described in terms of octave bands, which separate the audible frequency range (for human beings, from about 20 to 20,000 Hz) into ten segments.

Many rating methods have been devised to permit comparisons of sounds having quite different spectra. Surprisingly, the simplest method correlates with human response practically as well as the more complex methods. This method consists of evaluating all of the frequencies of a sound in accordance with a weighting that progressively de-emphasizes the importance of frequency components below 1000 Hz and above 5000 Hz. This frequency weighting reflects the fact that human hearing is less sensitive at low frequencies and at extreme high frequencies relative to the mid-range.

The weighting system described above is called "A"-weighting, and the level so measured is called the "A-weighted sound level" or "A-weighted noise level." All sound levels in this report are A-weighted. In practice, the sound level is conveniently measured using a sound level meter that includes an electrical filter corresponding to the A-weighting characteristic. All U.S. and international standard sound level meters include such a filter.

Although a single sound level value may adequately describe environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise is a conglomeration of distant noise sources, which results in a relatively steady background noise having no identifiable source. These distant sources may include traffic, wind in trees, industrial activities, etc. and are relatively constant from moment to moment. As natural forces change or as human activity follows its daily cycle, the sound level may vary slowly from hour to hour. Superimposed on this slowly varying background is a succession of identifiable noisy events of brief duration. These may include nearby activities such as single vehicle passbys, aircraft flyovers, etc. which cause the environmental noise level to vary from instant to instant.

To describe the time-varying character of environmental noise, statistical noise descriptors were developed. "L_{10}" is the A-weighted sound level equaled or exceeded during 10 percent of a stated time period. The L_{10} is considered a good measure of the maximum sound levels caused by discrete noise events. "L_{50}" is the A-weighted sound level that is equaled or exceeded 50 percent of a stated time period; it represents the median sound level. The "L_{90}" is the A-weighted sound level equaled or exceeded during 90 percent of a stated time period and is used to describe the background noise.

As it is often cumbersome to quantify the noise environment with a set of statistical descriptors, a single number called the average sound level or "L_{eq}" is now widely used. The term L_{eq} originated from the concept of a so-called equivalent sound level which contains the same acoustical energy as a varying sound level during the same time period. In simple but accurate technical language, the L_{eq} is the average A-weighted sound level in a stated time period. The L_{eq} is particularly useful in describing the subjective change in an environment where the source of noise remains the same but there is change in the level of activity. Widening roads and/or increasing traffic are examples of this kind of situation.

In determining the daily measure of environmental noise, it is important to account for the different response of people to daytime and nighttime noise. During the nighttime, exterior background noise levels are generally lower than in the daytime; however, most household noise also decreases at night, thus exterior noise intrusions again become noticeable. Further, most people trying to sleep at night are more sensitive to noise.

To account for human sensitivity to nighttime noise levels, a special descriptor was developed. The descriptor is called the DNL (Day/Night Average Sound Level), which represents the 24-hour average sound level with a penalty for noise occurring at night. The DNL computation divides the 24-hour day into two periods: daytime (7:00 am to 10:00 pm); and nighttime (10:00 pm to 7:00 am). The nighttime sound levels are assigned a 10 dB penalty prior to averaging with daytime hourly sound levels. For highway noise environments, the average noise level during the peak hour traffic volume is approximately equal to the DNL.

The effects of noise on people can be listed in three general categories:

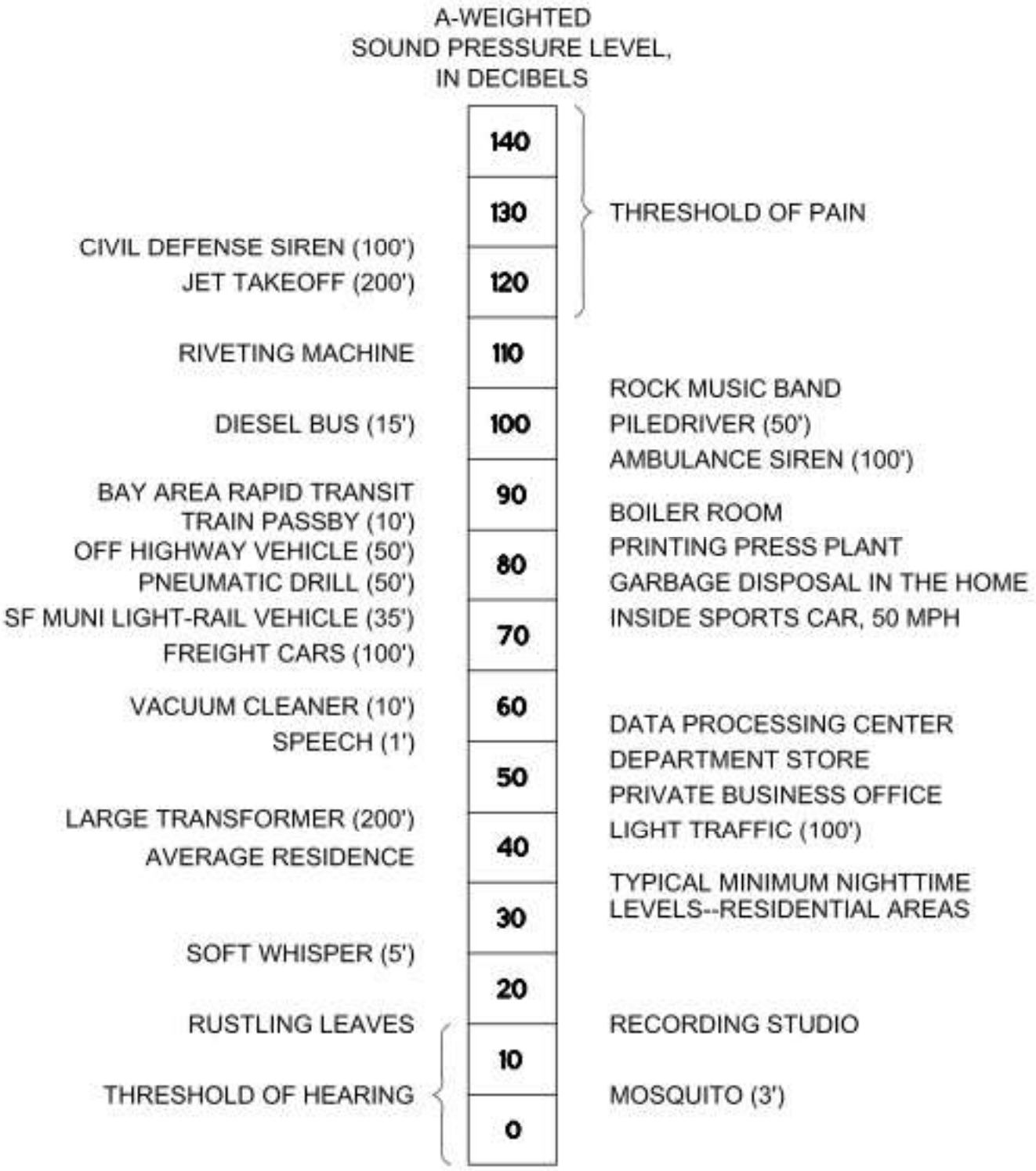
a) Subjective effects of annoyance, nuisance, dissatisfaction;
b) Interference with activities such as speech, sleep, and learning; and
c) Physiological effects such as startle, hearing loss.

The sound levels associated with environmental noise usually produce effects only in the first two categories. Unfortunately, there has never been a completely predictable measure for the subjective effects of noise nor of the corresponding reactions of annoyance and dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance and habituation to noise over time. Thus, an important factor in assessing a person's subjective reaction is to compare the new noise environment to the existing noise environment. In general, the more a new noise exceeds the existing, the less acceptable the new noise will be judged.

With regard to increases in noise level, knowledge of the following relationships will be helpful in understanding the quantitative sections of this report:

a) Except in carefully controlled laboratory experiments, a change of only 1 dB in sound level cannot be perceived.
b) Outside of the laboratory, a 3 dB change is considered a just-noticeable difference.
c) A change in level of at least 5 dB is required before any noticeable change in community response would be expected.
d) A 10 dB change is subjectively heard as approximately a doubling in loudness, and would almost certainly cause an adverse community response.

DRAFT



(100') = DISTANCE IN FEET BETWEEN SOURCE AND LISTENER

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TYPICAL SOUND LEVELS MEASURED IN THE ENVIRONMENT AND INDUSTRY

FIGURE 2

1107 C 11.25.03

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APPENDIX E

City of Fresno General Plan – Noise and Safety

9 NOISE AND SAFETY

The purpose of the Noise and Safety Element is to identify the natural and man-made public health and safety hazards that exist within the Planning Area, and to establish preventative and responsive objectives and policies and programs to mitigate their potential impacts. Specifically included are strategies to mitigate noise impacts from new development and direction for noise mitigation. Hazards that are addressed include geologic and seismic hazards, flooding, wildland fires, hazardous materials, and airport safety.

9.1 CONTEXT

The noise section of this element identifies existing noise sources within the Planning Area and establishes policies, standards and programs to mitigate potential impacts through design and performance measures. This element contains policies that guide the location of industrial land uses and transportation facilities, since they are common sources of excessive noise levels, as well as the location of noise sensitive uses, such as residences, schools, churches, and hospitals.

This element also addresses safety issues, including seismic and geologic hazards, flood hazards, wildfire hazards, hazardous materials, airport safety, emergency response, and safety services. It includes policies on natural hazards mitigation planning, which respond to the Federal Disaster Mitigation Act of 2000 and the Federal Emergency Management Agency's implementing regulations and support the County's Multi-Jurisdictional Local Hazard Mitigation Plan, which the City has adopted.

Relationship to General Plan Goals

The objectives and policies of this element support the following General Plan goals:

9. Promote a city of healthy communities and improve quality of life in established neighborhoods.

   Emphasize supporting established neighborhoods in Fresno with safe, well maintained, and accessible streets, public utilities, education and job training, proximity to jobs, retail services, health care, affordable housing, youth development opportunities, open space and parks, transportation options, and opportunities for home grown businesses.

16. Protect and improve public health and safety.

9.2 NOISE

California Government Code Section 65302(f) requires that general plans contain a Noise Element to identify and quantify potential noise problems and to provide effective policies for noise control and mitigation.

Noise Characteristics and Measurement

Noise is commonly defined as undesirable or unwanted sound. Noises vary widely in their scope, source, and volume, ranging from individual occurrences such as leaf blowers, to the intermittent disturbances of overhead aircraft, to the fairly constant

noise generated by traffic on freeways. Three aspects of community noise are used in assessing the noise environment:

- *Level* (e.g., magnitude or loudness). Sound levels are measured and expressed in decibels (dB) with 10 dB roughly equal to the threshold of hearing. Figure NS-1 shows the decibel levels associated with different common sounds. Transient noise events may be described by their maximum A-weighted noise level (dBA).
- *Frequency* composition or spectrum. Frequency is a measure of the pressure fluctuations per second, measured in units of hertz (Hz). The characterization of sound level magnitude with respect to frequency is the sound spectrum, often described in octave bands, which divide the audible human frequency range (e.g., from 20 to 20,000 Hz) into ten segments.
- *Variation* in sound level with time, measured as noise exposure. Most community noise is produced by many noise sources that change gradually throughout the day and produce a relatively steady background noise having no identifiable source. People may become habituated to moderate continuous transportation-generated noise, such as that generated by roadways. Identifiable events of brief duration, such as aircraft flyovers and the passage of freight trains, are more noticeable because they cause the community noise level to vary episodically instead of gradually. A single number called the equivalent sound level or "L_{eq}" describes the average noise exposure level over a period of time. Analysis of noise for planning purposes uses descriptors which emphasize the effect of night time noise, because during that time noise is perceived as more disruptive because background noise levels are generally lower than in the daytime, making outside noise intrusions more noticeable.

These weighted noise descriptors include:

- Community Noise Equivalent Level (CNEL) which reflects a 24-hour average of ambient sound but adds a five percent weighting factor for both evening (7 to 10 p.m.) and night-time (10 p.m. to 7 a.m.) sound; and
- Day-Night Average Level (L_{dn}) which reflects a 24-hour average of ambient sound but adds a 10 percent weighting factor for sound occurring during night-time hours (10 p.m. to 7 a.m.).

Both CNEL and L_{dn} reflect noise exposure over an average day with weighting to reflect the increased sensitivity to noise during the evening and night. The two descriptors are roughly equivalent. The CNEL descriptor is used in relation to major continuous noise sources, such as aircraft or traffic, and is the reference level for the Noise Element under State planning law. The general practice is to identify noise contours around transportation facilities such as airports, rail lines, highways, and major streets, and to identify noise levels at property lines from stationary sources such as industrial equipment.

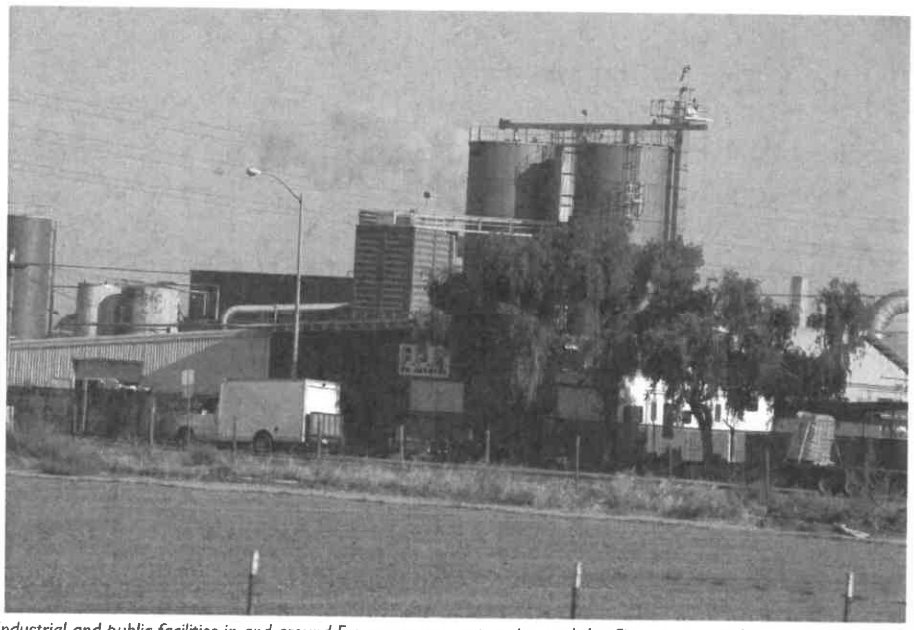
Knowledge of the following relationships is helpful in understanding how changes in noise and noise exposure are perceived:

- Except under special conditions, a change in sound level of 1 dB cannot be perceived;
- A 3 dB change is considered a just-noticeable difference;
- A 5 dB change is required before any noticeable change in community response would be expected. A 5 dB increase is often considered a significant impact; and
- A 10 dB increase is subjectively heard as an approximate doubling in loudness and almost always causes an adverse community response.

Forty-five dBA is usually set as the limit on indoor noise detectable from outdoor sound sources. Sixty dBA is considered to be the sound level of normal conversation and levels within this range are often used as a limit on outdoor ambient noise levels for suburban residential areas. Outdoor ambient noise levels are permitted to be higher for urban areas and commercial sites, and higher still for industrial areas.

Noise Generation in Fresno

In the urban environment, noise generators, such as transportation corridors and industrial uses, occur in close proximity to sensitive noise receivers, such as residential uses. Some land uses potentially constitute both a noise generator and a simultaneous noise receiver, e.g., recreational sites. Fresno has special noise considerations because it has grown up around two major rail corridors, and many freight trains run through the heart of the city daily. Fresno contains three airports and has four State highways that traverse it, as well as major streets at half-mile and one-mile grid intervals, carrying large volumes of passenger vehicle and truck traffic. Industrial and public facilities in and around the city also generate noise from processing materials and from the operation of equipment such as large pumps and backup generators. Residential and commercial uses also contribute noise from smaller equipment, such as swimming pool pumps, air conditioning units, and compressors for refrigeration.



Industrial and public facilities in and around Fresno can generate noise, and the City requires enclosure, muffling, and/or extra setbacks for stationary noise sources so that nearby properties are not exposed to excessive noise levels.

Longstanding City policy for stationary sources has been to require enclosure, muffling, and/or greater setbacks so that adjacent properties are not exposed to excessive noise levels. Nuisance noise abatement has been accomplished through the City's Noise Ordinance. Noise from transportation facilities has been controlled primarily by State and federal standards but also by distancing sensitive uses from these facilities, and by use of sound-proofing construction measures, such as masonry walls and sealed buildings.

Title 24 of the California Building Code sets out energy conservation requirements, which have also greatly helped mitigate indoor noise levels by requiring dual-pane windows and additional insulation in buildings. Federal Aviation Administration regulations for airports have supported planning and zoning designations, which have kept sensitive uses away from the noise attendant upon flight paths. Each of the three airports in Fresno has its own noise policies and land use compatibility criteria, all of which are incorporated into this Plan.

Figure NS-1: Typical Sound Levels

Outdoor Sound Levels

Threshold of Pain
Military Jet Takeoff with Afterburner at 50 feet







Ambulance Siren at 10 feet
Pile Driver at 50 feet
Gas Lawnmower at 3 feet
Sports Boat at 100 feet
Diesel Truck at 50 feet
Concrete Mixer at 50 feet



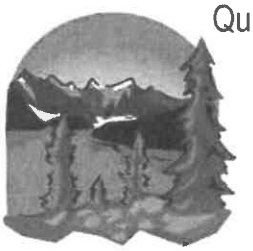
Leaf Blower at 50 feet

Commercial / Urban Area, Daytime
Urban Expressway at 300 feet
Suburban Area, Daytime



Quiet Urban Area, Nighttime
Quiet Suburban Area, Nighttime
Quiet Rural Area, Nighttime

Leaves Rustling
Quiet Wilderness Area, No Wind



Threshold of Human Hearing

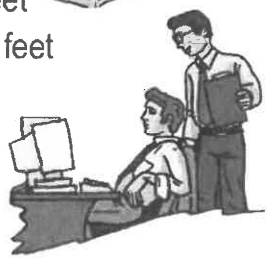
Indoor Sound Levels

Decibels (dBA)	
140	Threshold of Pain
130	
120	Rock Band Concert
110	
100	Night Club with Live Music
90	
80	Food Blender at 3 feet Noisy Restaurant Garbage Disposal at 3 feet
70	Vaccuum Cleaner at 10 feet Normal Conversation at 3 feet
60	Active Office Environment
50	Quiet Office Environment Dishwasher, Next Room
40	
30	Library Quiet Bedroom, Nighttime Concert Hall, Background
20	
10	Recording Studio
0	Threshold of Human Hearing













Source: URS, 2010.

Existing Noise Levels

The existing noise conditions in the City were measured at nine locations from May 30 to June 1, 2012. Noise monitoring sites were selected to be representative of typical residential, commercial, and industrial sites within the Planning Area, as well as arterial roadways, elevated and below-grade freeways, and railroad crossings with and without train horn soundings. At each of the nine long-term 24-hour noise monitoring sites, day-night statistical noise level trends were recorded to develop L_{dn} values. Descriptions of each location and the measured noise levels are listed in Table 9-1.

TABLE 9-1: MEASURED EXISTING NOISE LEVELS[1]

	Noise Level (dBA L_{dn})
Railroad crossing at Shields Ave.	84
Along Railroad near W. Barstow Ave.	74
SR 41 between W. Barstow & W. Shaw Ave.	76
SR 180 near N. Peach Ave.	76
E. Shaw Ave. near N. Cedar Ave.	72
N. Blackstone Ave. near E. Ashlan Ave.	70
S. Elm Ave. near E. Jensen Ave.	68
N. Valentine Ave. between W. Ashlan & W. Holland Ave.	67
S .Fruit Ave. north of Church Ave.	65

1. Values provided have been normalized to the reference distance of 100 feet.

Existing noise levels in the city are principally generated by transportation noise sources (refer to Figure NS-2: Existing Noise Contours). Vehicular traffic noise is the dominant source in most areas, but aircraft and rail activity are also significant sources of environmental noise in the local areas surrounding these operations. In several locations, industrial noise was clearly audible. However, overall average daily noise levels at existing nearby noise-sensitive receptors (e.g., residential areas) typically consist of traffic noise primarily and industrial noise secondarily. New noise-sensitive developments in close proximity to industrial land uses could be exposed to greater industrial noise levels.

Traffic Noise

The level of highway traffic noise depends on three factors: (1) the volume of the traffic, (2) the speed of the traffic, and (3) the number of trucks in the flow of traffic. Vehicle noise is a combination of the noises produced by the engine, exhaust, tires, and wind generated by taller vehicles. Other factors that affect the perception of traffic noise include: distance from the highway, terrain, vegetation, pavement type and condition, and natural and structural obstacles. While tire noise from autos is generally located at ground level, truck noise sources can be located as high as 10 to 15 feet above the roadbed due to tall exhaust stacks and higher engines.

Future noise exposure contours for Fresno's major roadways were modeled by applying the Federal Highway Administration's noise modeling procedure, using roadway, speed, and traffic mix data from the City and projected traffic volumes based on anticipated development under the General Plan.

In establishing noise contours for land use planning, it is customary to ignore noise attenuation afforded by buildings, roadway elevations, and depressions, and the barrier effect of natural terrain features. The result is a worst-case estimate of the existing and future (projected) noise environment. The assumption is that it is more desirable to overestimate the potential noise at a future noise-sensitive development site than to underestimate the noise environment and allow for potentially incompatible land-use development. The developed noise contours for the City are conservative, meaning that the contours are modeled with minimal noise attenuation by natural barriers, buildings, with the exception of significantly depressed sections of highways.

Future development within the Planning Area will result in increased traffic volumes, thus increasing noise levels in some areas (refer to Figure NS-3: Future Noise Contours). For example, future noise levels along highways are projected to increase by two to five decibels, while noise levels along most existing roadways are projected to increase by one to five decibels. New roadways, significantly expanded roadways, or sparsely populated areas where significant new development may also experience an increase in noise levels by more than five decibels. While there will be increases in some noise levels, efforts can be taken to help minimize such instances. For example, siting noise sensitive uses away from high-noise areas (e.g., major transportation routes) and buffering noise through design will help minimize future noise-related land use conflicts.

Railroad Operations Noise

Railroad activity in Fresno primarily occurs along two rail corridors, however there are also several spur lines. Warning horns generally are signaled within one-quarter mile of a grade crossing, although the area around the Community Regional Medical Center in downtown is designated as a quiet zone. Where grade crossings exist, and warning horns and crossing alarms are signaled, individual single event noise levels associated with a train generally reach 105 dBA to 110 dBA at a distance of 100 feet from the track centerline. Away from grade crossings, train pass-by noise levels are lower, typically 85 dBA to 90 dBA at a distance of 100 feet.

Airport Noise

There are two public airports in the Planning Area, Fresno-Yosemite International Airport and Fresno Chandler Executive Airport, and one private airport open to public use, Sierra Sky Park. In conjunction with Fresno-Yosemite International Airport, the Air National Guard maintains an airbase for military flight and training operations.

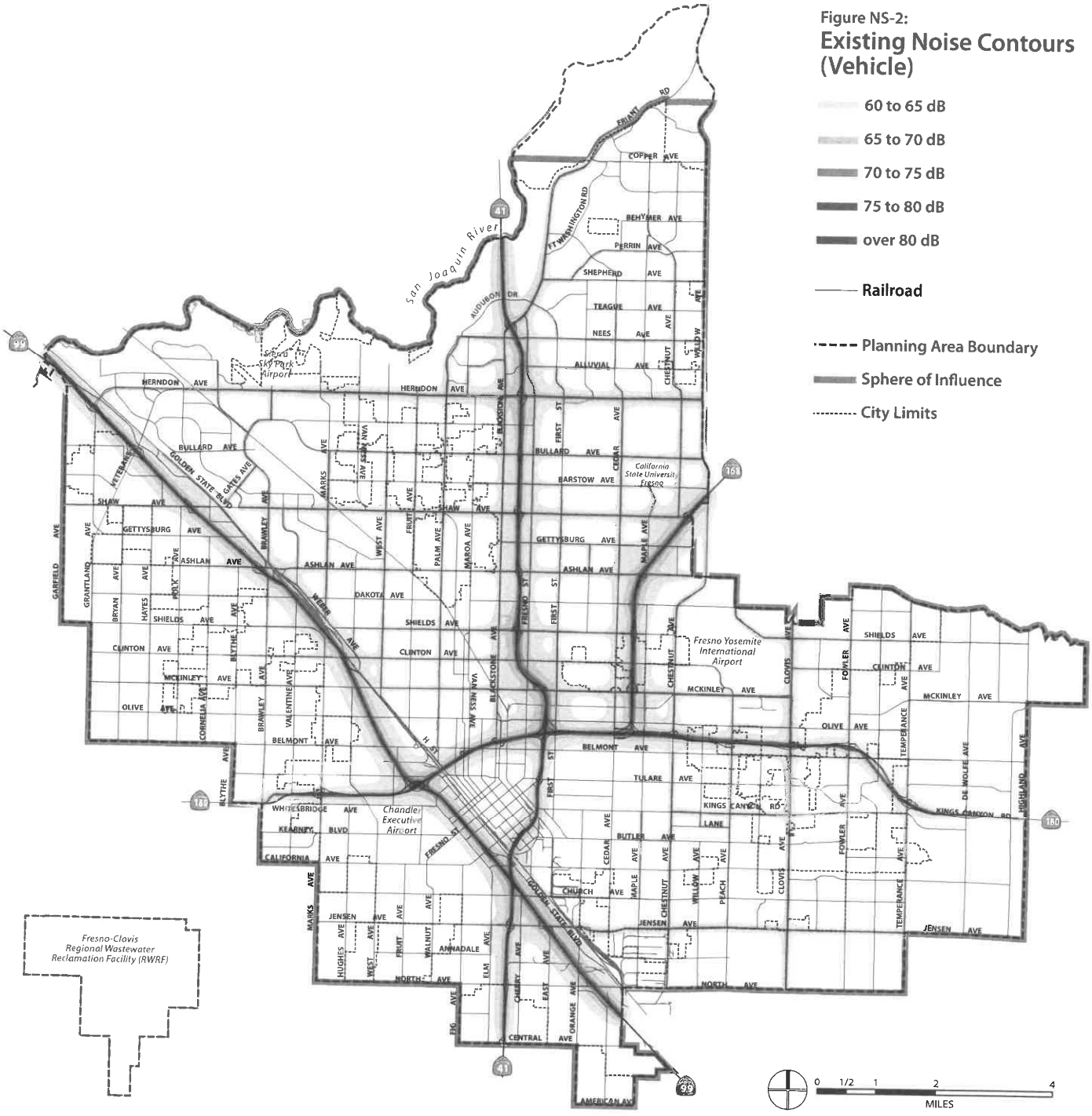
Each airport has its own City of Fresno airport land use plan designed to provide for public safety. In addition, the Fresno County Airport Land Use Commission (ALUC) must prepare an Airport Land Use Compatibility Plan (ALUCP) as required by the Caltrans Division of Aeronautics for each airport. ALUC and the Federal Aviation Administration (FAA) provide guidance to local jurisdictions on determining appropriate and compatible adjacent land uses through the detailed findings and policies of ALUCPs. Among other objectives, these airport plans strive to minimize the effects of aircraft noise on communities adjacent to airports and prevent uses incompatible with airport operations from locating near the airport. This General Plan and all other City land use plans must either be compatible with the adopted ALUCP or make a statement of overriding consideration justifying its incompatibility.

Figures NS-4 through 6 depict each airport's noise and safety zones that have been established to identify the compatibility criteria to apply to any given project proposed within the airport's compatibility zones. The noise contours shown on the maps are developed following Federal Aviation Regulation (FAR) Part 150 *Airport Noise Compatibility Planning*. The Part 150 program is designed to lessen the effect of airport noise on the surrounding community as development is proposed around an airport or the airport is modified or expanded. The specific criteria applied for each contour can be found in each airport's ALUCP, both the City's and the one prepared by the ALUC.

Major Stationary Noise Sources

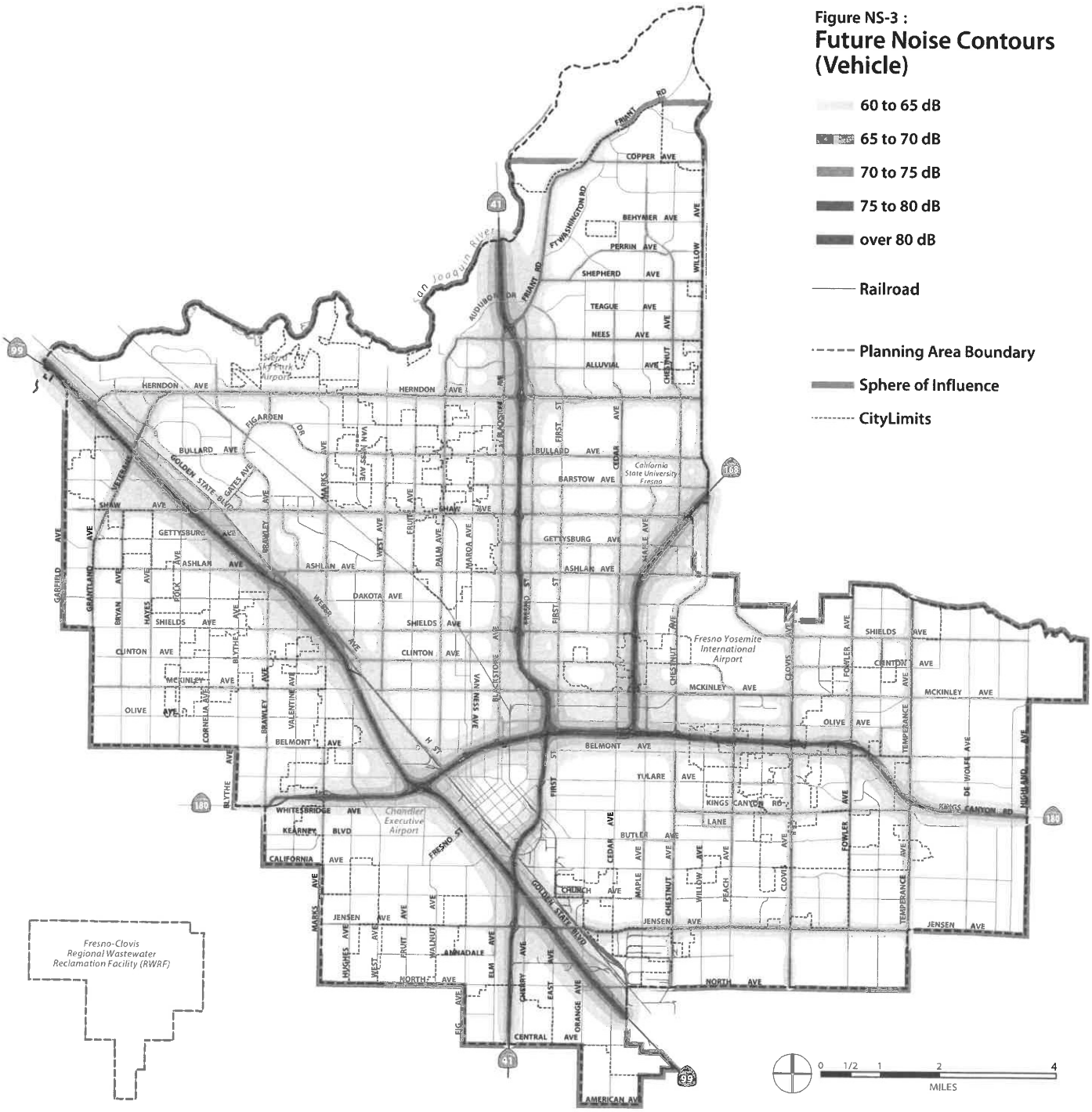
Noise can result from many industrial processes, even when the best available noise control technology is applied. Noise exposures within industrial facilities are controlled by federal and State employee health and safety regulations set by the Occupational Safety and Health Administration (OSHA) and Cal-OSHA, but exterior noise levels may exceed locally acceptable standards. Commercial, recreational, and public service facility activities can also produce noise that affects adjacent sensitive land uses. These noise sources can be continuous and may contain tonal components that may be annoying to individuals who live nearby. In addition, noise generation from fixed noise sources may vary based upon climatic conditions, time of day and existing ambient noise levels.

Industrial uses in Fresno are typically located in industrial districts near freeways and commercial uses, away from residences and other sensitive noise receptors. Noise sources associated with service commercial uses such as automotive repair facilities, wrecking yards, tire installation centers, car washes, loading docks, etc., are found at various locations within the city. The noise emissions of these types of uses are dependent on many factors and are therefore difficult to quantify precisely. Nonetheless, noise generated by the these uses contributes to the ambient noise environment in immediate vicinity of these uses and should be considered where either new noise-sensitive uses are proposed nearby or where similar uses are proposed in existing residential areas.



Note: The Fresno Air National Guard Base, a military airport, and the Fresno Yosemite International Airport are located in the area represented as Fresno Yosemite International Airport.

Source: City of Fresno, 2011; Salter Associates, 2012 Dyett & Bhatia, 2012.

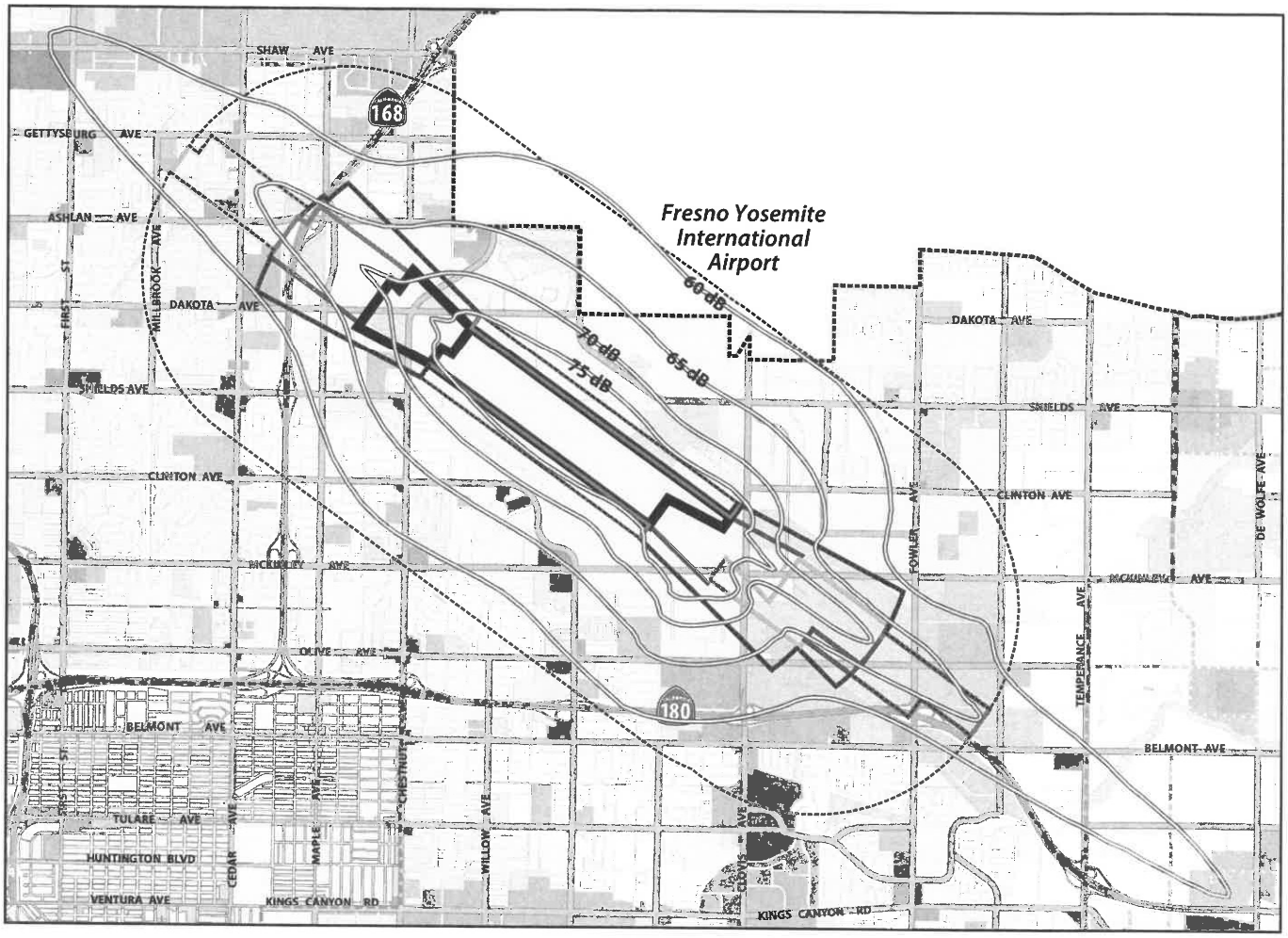


Note: The Fresno Air National Guard Base, a military airport, and the Fresno Yosemite International Airport are located in the area represented as Fresno Yosemite International Airport.

Source: City of Fresno, 2011; Salter Associates, 2012 Dyett & Bhatia, 2012.

Figure NS-4:

Existing Fresno Yosemite International Airport Noise and Safety Zones



0 1/2 1 2
MILES

Safety Zones

- Zone 1 RPZ
- Zone 2 Inner Approach/Departure
- Zone 3 Inner Turning
- Zone 4 Outer Approach/Departure
- Zone 5 Sideline
- Zone 6 Traffic Pattern

Noise Contours

- 75 dB

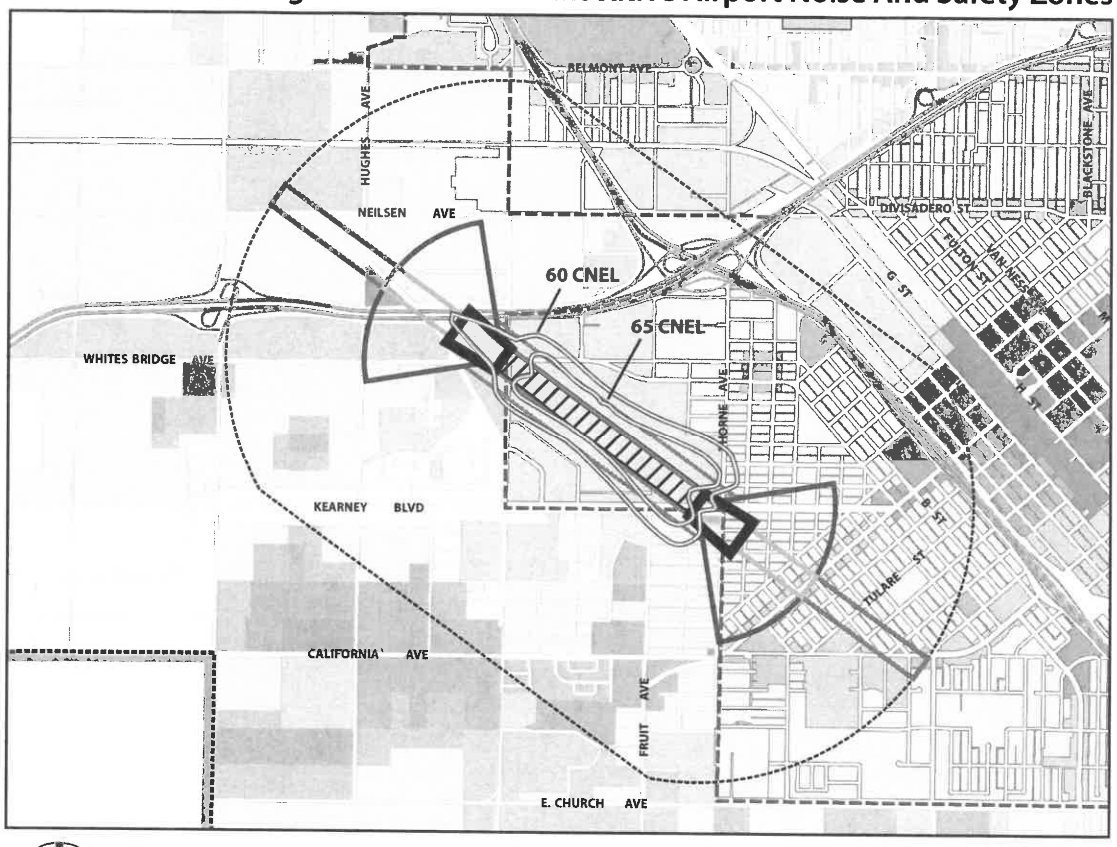
- Planning Area
- Sphere of Influence
- City Limits

Source: City of Fresno, 2014.

Note: The Planned Land Use (PLU) designations represented in the background of this map may not reflect the most current PLU. For the adopted PLU designations see Figure LU-1.

Figure NS-5:

Existing Fresno Chandler Executive Airport Noise And Safety Zones



Safety Zones

- Primary Surface
- Runway Proction Zone
- Inner Approach Zone
- Inner Turning Zone
- Outer Approach Zone
- Sideline Zone
- Traffic Pattern Zone

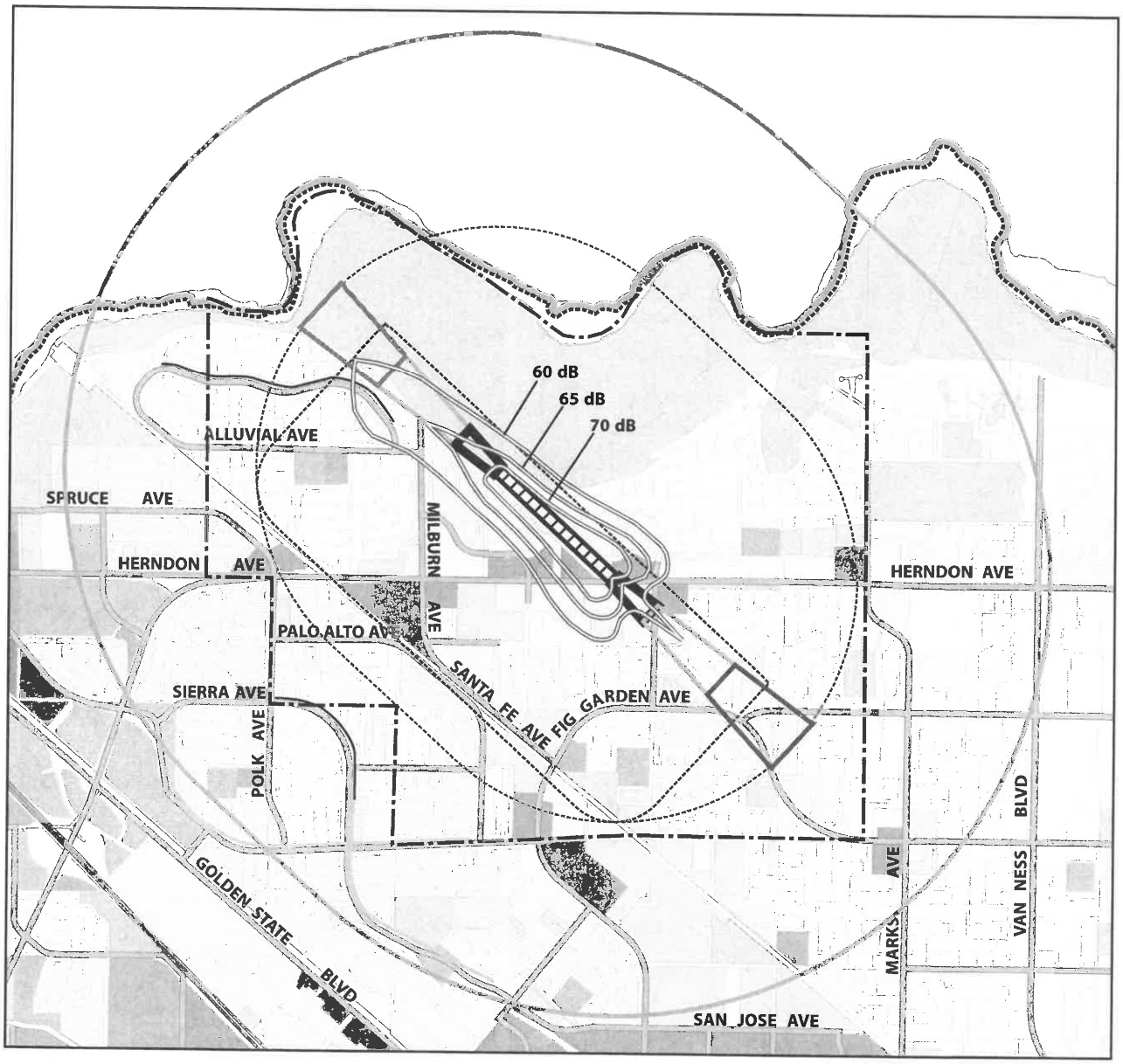
- Noise Contours
- Planning Area
- Sphere of Influence
- City Limits
- Downtown Planning Area

Source: City of Fresno, 2014.

Note: The Planned Land Use (PLU) designations represented in the background of this map may not reflect the most current PLU. For the adopted PLU designations see Figure LU-1.

Figure NS-6:

Existing Sierra Skypark Airport Noise and Safety Zones



Safety Zones

- Primary Surface
- Clear Zone
- Inner Approach Zone
- Outer Approach
- Horizontal Surface
- Conical Surface
- Traffic Pattern
- Primary Review Area Boundary
- Noise Contours
- Planning Area
- Sphere of Influence
- City Limits

Note: The Planned Land Use (PLU) designations represented in the background of this map may not reflect the most current PLU. For the adopted PLU designations see Figure LU-1.

Source: City of Fresno, 2014.

There are numerous park and school uses within the city. Noise generated by these uses depends on the age and number of people utilizing the respective facility at a given time and the types of activities they are engaged in. School playing field activities tend to generate more noise than those of neighborhood parks, as the intensity of school playground usage tends to be higher. At a distance of 100 feet from an elementary school playground being used by 100 students, average and maximum noise levels of 60 and 75 dB, respectively, can be expected. At organized events such as high-school football games with large crowds and public address systems, the noise generation is often significantly higher. As with service commercial uses, the noise generation of parks and school playing fields is variable.

Noise Control – Maximum Noise Level Standards

With the proposed intensification of land uses in the city, noise control will be an increasing consideration for infrastructure and new development, particularly for infill residential projects. Major cities in California commonly consider maximum noise levels of 65 dB to be considered "normally acceptable" for unshielded residential development including outdoor space in an urban environment. Suburban and rural jurisdictions tend to prefer a 60 dB or lower threshold for residential areas. Noise levels from 65 dB to 70 dB fall within the "conditionally unacceptable" range, and those in the 70 to 75 dB range are considered "normally unacceptable."

The General Plan is consistent with noise control practice in urban areas, employing 60 dB as being a desirable level, but accepting 65 dB as being in the "normally acceptable" range for noise due to the number of transportation sources located in proximity to urban residential areas. This policy supports the development of infill residential projects, as well as non-residential infill projects by setting a realistic, achievable threshold of impact for new development.

Section 10-101 of the City's Municipal Code contains the City's Noise Ordinance, which establishes excessive noise guidelines and exemptions. Standards are set for ambient noise based on district type (residential, commercial, and industrial) and time of day. Upon adoption of the new noise limits and policies proposed in this General Plan Update, the City will commence an update of its Noise Ordinance to provide regulatory consistency with adopted policies.

Acceptable ranges for exterior noise levels in the Noise Ordinance will be updated to be consistent with this General Plan. This update will need to increase the threshold in residential districts to 65 decibels and adjust noise limits for other planned uses. The updated Noise Ordinance will also specify maximum hourly noise levels for outdoor activity areas and indoor spaces measurement standards; uniform guidelines for acoustical studies based on current professional standards; required noise mitigation

standards and enforcement procedures for stationary noise sources which cause the allowable noise limits to be exceeded. Finally, the Noise Ordinance will establish performance standards for noise reduction for new developed property that may be exposed to community noise levels exceeding target acceptable noise levels for outdoor activity levels and interior spaces.

TABLE 9-2: TRANSPORTATION (NON-AIRCRAFT) NOISE SOURCES

Noise-Sensitive Land Use[1]	Outdoor Activity Areas[2]	Interior Spaces	
	L_{dn}/CNEL, dB	L_{dn}/CNEL, dB	L_{eq} dB[2]
Residential	65	45	-
Transient Lodging	65	45	-
Hospitals, Nursing Homes	65	45	-
Theaters, Auditoriums, Music Halls	-	-	35
Churches, Meeting Halls	65	-	45
Office Buildings	-	-	45
Schools, Libraries, Museums	-	-	45

1. Where the location of outdoor activity areas is unknown or is not applicable, the exterior noise level standard shall be applied to the property line of the receiving land use.
2. As determined for a typical worst-case hour during periods of use.

TABLE 9-3: STATIONARY NOISE SOURCES[1]

	Daytime (7:00 a.m. – 10:00 p.m.)	Nighttime (10:00 p.m. – 7:00 a.m.)
Hourly Equivalent Sound Level (Leq), dBA	50	45
Maximum Sound Level (Lmax), dBA	70	60

1. The Department of Development and Resource Management Director, on a case-by-case basis, may designate land uses other than those shown in this table to be noise-sensitive, and may require appropriate noise mitigation measures.
2. As determined at outdoor activity areas. Where the location of outdoor activity areas is unknown or not applicable, the noise exposure standard shall be applied at the property line of the receiving land use. When ambient noise levels exceed or equal the levels in this table, mitigation shall only be required to limit noise to the ambient plus five dB.

OBJECTIVE

NS-1 Protect the citizens of the City from the harmful and annoying effects of exposure to excessive noise.

IMPLEMENTING POLICIES

NS-1-a **Desirable and Generally Acceptable Exterior Noise Environment.** Establish 65 dB_A L_{dn} or CNEL as the standard for the desirable maximum average exterior noise levels for defined usable exterior

areas of residential and noise-sensitive uses for noise, but designate 60 dB_A L_{dn} or CNEL (measured at the property line) for noise generated by stationary sources impinging upon residential and noise-sensitive uses. Maintain 65 dB_A L_{dn} or CNEL as the maximum average exterior noise levels for non-sensitive commercial land uses, and maintain 70 dB_A L_{dn} or CNEL as maximum average exterior noise level for industrial land uses, both to be measured at the property line of parcels where noise is generated which may impinge on neighboring properties.

Commentary: *The Noise Ordinance will define usable exterior areas for single family and multiple family residential and noise sensitive uses to include rear yards and other outdoor areas intended to accommodate leisure or active use, excluding front or side yard areas, and front or side porches. Balconies or roof decks facing front and side yards shall be included in designated areas to be protected from noise where these spaces are used to calculate compliance with required outdoor living area as required by adopted development standards.*

NS-1-b **Conditionally Acceptable Exterior Noise Exposure Range.** Establish the conditionally acceptable noise exposure level range for residential and other noise sensitive uses to be 65 dB L_{dn} or require appropriate noise reducing mitigation measures as determined by a site specific acoustical analysis to comply with the desirable and conditionally acceptable exterior noise level and the required interior noise level standards set in Table 9-2.

NS-1-c **Generally Unacceptable Exterior Noise Exposure Range.** Establish the exterior noise exposure of greater than 65 dB L_{dn} or CNEL to be generally unacceptable for residential and other noise sensitive uses for noise generated by sources in Policy NS-1-a, and study alternative less noise-sensitive uses for these areas if otherwise appropriate. Require appropriate noise reducing mitigation measures as determined by a site specific acoustical analysis to comply with the generally desirable or generally acceptable exterior noise level and the required 45 dB interior noise level standards set in Table 9-2 as conditions of permit approval.

NS-1-d **Allowable Exterior Noise Environment for BRT and Activity Centers.** Exclude residential and noise sensitive uses located along Bus Rapid Transit corridors or within Activity Centers identified by this General Plan, from exterior noise standards in Policies NS-1-a through NS-1-c where it is determined application of noise mitigation measures will

be detrimental to the realization of the General Plan's mixed use policies.

Commentary: *Interior noise level standards of Table 9-2 will still apply.*

NS-1-e **Update Noise Ordinance.** Update the Noise Ordinance to ensure that noise exposure information and specific standards for both exterior and interior noise and measurement criteria are consistent with this General Plan and changing conditions within the city and with noise control regulations or policies enacted after the adoption of this element.

NS-1-f **Performance Standards.** Implement performance standards for noise reduction for new residential and noise sensitive uses exposed to exterior community noise levels from transportation sources above 65 dB L_{dn} or CNEL, as shown on Figure NS-3: Future Noise Contours, or as identified by a project-specific acoustical analysis based on the target acceptable noise levels set in Tables 9-2 and Policies NS-1-a through NS-1-c.

NS-1-g Noise mitigation measures which help achieve the noise level targets of this plan include, but are not limited to, the following:

- Façades with substantial weight and insulation;
- Installation of sound-rated windows for primary sleeping and activity areas;
- Installation of sound-rated doors for all exterior entries at primary sleeping and activity areas;
- Greater building setbacks and exterior barriers;
- Acoustic baffling of vents for chimneys, attic and gable ends;
- Installation of mechanical ventilation systems that provide fresh air under closed window conditions.

The aforementioned measures are not exhaustive and alternative designs may be approved by the City, provided that a qualified Acoustical Consultant submits information demonstrating that the alternative design(s) will achieve and maintain the specific targets for outdoor activity areas and interior spaces.

NS-1-h **Interior Noise Level Requirement.** Comply with the State Code requirement that any new multifamily residential, hotel, or dorm

buildings must be designed to incorporate noise reduction measures to meet the 45 dB L_{dn} interior noise criterion, and apply this standard as well to all new single-family residential and noise sensitive uses.

NS-1-i **Mitigation by New Development.** Require an acoustical analysis where new development of industrial, commercial or other noise generating land uses (including transportation facilities such as roadways, railroads, and airports) may result in noise levels that exceed the noise level exposure criteria established by Tables 9-2 and 9-3 to determine impacts, and require developers to mitigate these impacts in conformance with Tables 9-2 and 9-3 as a condition of permit approval through appropriate means.

Noise mitigation measures may include:

- The screening of noise sources such as parking and loading facilities, outdoor activities, and mechanical equipment;
- Providing increased setbacks for noise sources from adjacent dwellings;
- Installation of walls and landscaping that serve as noise buffers;
- Installation of soundproofing materials and double-glazed windows; and
- Regulating operations, such as hours of operation, including deliveries and trash pickup.

Alternative acoustical designs that achieve the prescribed noise level reduction may be approved by the City, provided a qualified Acoustical Consultant submits information demonstrating that the alternative designs will achieve and maintain the specific targets for outdoor activity areas and interior spaces. As a last resort, developers may propose to construct noise walls along roadways when compatible with aesthetic concerns and neighborhood character. This would be a developer responsibility, with no City funding.

NS-1-j **Significance Threshold.** Establish, as a threshold of significance for the City's environmental review process, that a significant increase in ambient noise levels is assumed if the project would increase noise levels in the immediate vicinity by 3 dB L_{dn} or CNEL or more above the ambient noise limits established in this General Plan Update.

Commentary: *When an increase in noise would result in a "significant" impact (increase of three dBA or more) to residents or*

businesses, then noise mitigation would be required to reduce noise exposure. If the increase in noise is less than three dBA, then the noise impact is considered insignificant and no noise mitigation is needed.

By setting a specific threshold of significance in the General Plan, this policy facilitates making a determination of environmental impact, as required by the California Environmental Quality Act. It helps the City determine whether (1) the potential impact of a development project on the noise environment warrants mitigation, or (2) a statement of overriding considerations will be required.

NS-1-k **Proposal Review.** Review all new public and private development proposals that may potentially be affected by or cause a significant increase in noise levels, per Policy NS-1-i, to determine conformance with the policies of this Noise Element. Require developers to reduce the noise impacts of new development on adjacent properties through appropriate means.

NS-1-l **Enforcement.** Continue to enforce applicable State Noise Insulation Standards and Uniform Building Code noise requirements, as adopted by the City.

NS-1-m **Transportation Related Noise Impacts.** For projects subject to City approval, require that the project sponsor mitigate noise created by new transportation and transportation-related stationary noise sources, including roadway improvement projects, so that resulting noise levels do not exceed the City's adopted standards for noise-sensitive land uses.

NS-1-n **Best Available Technology.** Require new noise sources to use best available control technology to minimize noise emissions.

Commentary: *Noise from mechanical equipment can be reduced by soundproofing materials and sound-deadening installation; controlling hours of operation will also reduce noise impacts during the morning or evening.*

NS-1-o **Sound Wall Guidelines.** Acoustical studies and noise mitigation measures for projects shall specify the heights, materials, and design for sound walls and other noise barriers. Aesthetic considerations shall also be addressed in these studies and mitigation measures such as variable noise barrier heights, a combination of a landscaped berm with wall, and reduced barrier height in combination with increased

distance or elevation differences between noise source and noise receptor, with a maximum allowable height of 15 feet. The City will develop guidelines for aesthetic design measures of sound walls, and may commission area wide noise mitigation studies that can serve as templates for acoustical treatment that can be applied to similar situations in the urban area.

Commentary: *While acoustical studies need to be site-specific in order to appropriately assess particular settings, having prototypical design measures and noise control templates that can be applied for similar situations and contexts can facilitate infill and other development.*

NS-1-p **Airport Noise Compatibility.** Implement the land use and noise exposure compatibility provisions of the adopted Fresno Yosemite International Airport Land Use Compatibility Plan, the Fresno-Chandler Executive Airport Master and Environs Specific Plan, and the Sierra Sky Park Land Use Policy Plan to assess noise compatibility of proposed uses and improvements within airport influence and environs areas.

9.3 SEISMIC AND GEOLOGIC HAZARDS

Seismicity

Fresno is in one of the more geologically stable areas of California and does not lie within a known active earthquake fault zone. Although a number of faults are located within the Sierra Nevada Mountain Range, none are considered active. The nearest active fault is located by Independence, CA, approximately 100 miles to the east along the Fresno County-Inyo County boundary. Overall, seismic-related concerns (including liquefaction and subsidence) are considered fairly minor for the Planning Area. The city is not located in an Alquist-Priolo Special Fault Study Zone, that is, it has not been identified as a zone of special study around active faults. Hidden faulting in Western Fresno County did manifest itself in the Coalinga Earthquake of 1983, causing ground shaking in Fresno, but minimal damage. In the future, Fresno could be affected by major seismic events from the following active fault systems in other regions of California:

- The San Andreas Fault paralleling the Coast Ranges in western Fresno County;
- The Owens Valley Fault system in the Eastern Sierra Region of California;
- The White Wolf Fault paralleling the Tehachapi range southeast of Bakersfield
- Hidden thrust fault(s) in the west side of the San Joaquin Valley; and

- The Long Valley Caldera, a seismic and volcanic area in the Eastern Sierra that lies between Mono Lake and Crowley Lake.

The principal potential earthquake hazard for Fresno is ground shaking, which could cause damage to buildings and infrastructure elements such as bridges and pipes. The distance between Fresno and major faults minimizes this potential hazard.

Soil Hazards

Expansive soils, soil erosion, and water infiltration are issues that can cause safety concerns in Fresno.

Expansive soils are largely comprised of clays, which expand in volume when water is absorbed and shrink as the soil dries. Expansion is measured by shrink-swell potential, which is the volume change in soil with a gain in moisture. If the shrink-swell potential is rated moderate to high, then damage to buildings, roads, structural foundations, and pipes can occur. In the northern portion of Fresno's SOI, there are some areas of expansive clay soil that require special construction standards for foundations and infrastructure. Expansive clay problems can be surmounted by appropriate engineering design and construction techniques.

Highly erodible soils are those that are easily carried by water and, to a lesser extent, by wind. Surface erosion is more commonly visible, but subsurface erosion can lead to damage to pipes, roads, foundations, and other structural elements. Soil erosion potential is identified by a specific soil's "K Factor," which provides an indication of a soil's inherent susceptibility to erosion, absent of slope and groundcover factors. Values of K range from 0.05 to 0.43, and the higher the value, the more susceptible the soil is to sheet erosion by water. The addition of weight, such as pools and decks, onto susceptible soil, as well as private irrigation systems and the action of burrowing rodents, are factors that may aggravate land slippage. Fresno is not susceptible to soil erosion with the exception of land within 300 feet of the toe of the San Joaquin River bluffs, where the steep slopes and soil composition predispose it to instability and erosion.

Soils are also defined by their rainfall runoff potential, which is the degree to which soil allows or disallows rainfall water to infiltrate and transmit down to the groundwater table. Groups of soils having similar runoff potential under similar storm and cover conditions, absent of slope, are placed into one of four hydrologic group classifications: A, B, C or D. Definitions of the classes are as follows:

- **Soil Group A. High Infiltration (Low runoff potential)**—Soils having high infiltration rates, even when thoroughly wetted and consisting chiefly of deep, well drained sands or gravels. These soils have a high rate of water transmission.
- **Soil Group B. Moderate Infiltration**—Soils having moderate infiltration rates, even when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately fine to moderately course textures. These soils have a moderate rate of transmission.
- **Soil Group C. Slow Infiltration**—Soils having slow infiltration rates, even when thoroughly wetted and consisting chiefly of soils with a layer that impedes downward movement of water, or soils with moderately fine to fine textures. These soils have a slow rate of transmission.
- **Soil Group D. Very Slow Infiltration (High runoff potential)**—Soils having very slow infiltration rates, even when thoroughly wetted and consisting chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a clay pan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very slow rate of water transmission.

Hydrological groups are used in equations that estimate runoff from rainfall. These estimates are needed for solving hydrologic problems that arise in planning watershed protection and flood prevention projects and for designing structures for the use, control, and disposal of water.

OBJECTIVE

NS-2 Minimize risks of property damage and personal injury posed by geologic and seismic risks.

IMPLEMENTING POLICIES

NS-2-a **Seismic Protection.** Ensure seismic protection is incorporated into new and existing construction, consistent with the Fresno Municipal Code.

NS-2-b **Soil Analysis Requirement.** Identify areas with potential geologic and/or soils hazards, and require development in these areas to conduct a soil analysis and mitigation plan by a registered civil engineer (or engineering geologist specializing in soil geology) prior to allowing on-site drainage or disposal for wastewater, stormwater runoff, or swimming pool/spa water.

NS-2-c **Landfill Areas.** Require proposed land uses on or near landfill areas to be designed and maintained to comply with California Code of Regulations, Title 27, Section 21190, Post Closure Land Use.

NS-2-d **Bluff Preservation Overlay Zone.** Per the requirements of the Bluff Preservation Overlay Zone District and Policy POSS-7-f (Chapter 5, Parks and Open Space), the following standards shall be applicable for property located within the Bluff Preservation zone:

- Require proposed development within 300 feet of the toe of the San Joaquin River bluffs to undertake an engineering soils investigation and evaluation report that demonstrates that the site is sufficiently stable to support the proposed development, or provide mitigations to provide sufficient stability; and
- Establish a minimum setback of 30 feet from the San Joaquin River bluff edge for all buildings, structures, decks, pools and spas (which may be above or below grade), fencing, lighting, steps, etc.
    - An applicant may request to reduce the minimum setback to 20 feet from the bluff edge if it can be demonstrated, to the satisfaction of the City's Building Official and the Planning Director, that the proposed building, structure, deck, pool and/or spas (which may be above or below grade), fencing, steps, etc., will meet the objectives of the Bluff Preservation Overlay Ordinance. In no case shall the setback be reduced to less than 20 feet.

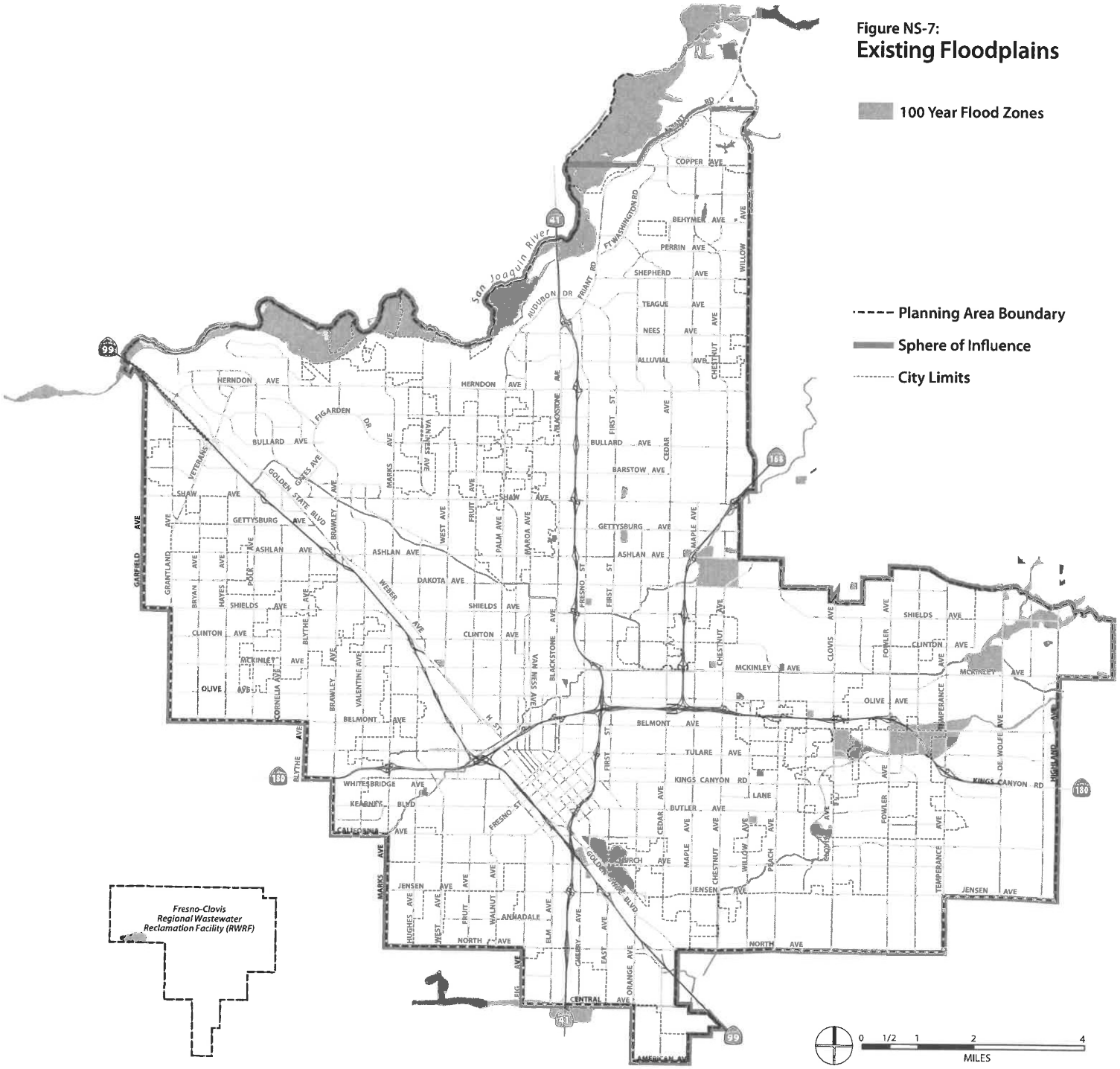
9.4 STORM DRAINAGE AND FLOOD CONTROL

Fresno's precipitation comes in episodic storm events, which may be severe and may cause localized flooding. The Fresno area receives inflows of regional runoff from a large watershed to the east, and is in the path of natural drainage from the valley floor, foothills and Sierra Nevada range. The San Joaquin River, confined between bluffs, comprises the northern boundary of Fresno. Figure NS-7: Flood Plains shows the locations of the existing 100-year floodplains in the Planning Area, as mapped by FEMA's National Flood Insurance Maps.

The Fresno Metropolitan Flood Control District (FMFCD) is responsible for flood control and storm water planning and management. It was authorized as a "special act"

district and established by voter approval in 1956 to serve a 54-square mile area. Since its creation the district boundaries have been expanded several times and now include approximately 400 square miles—almost the entire portion of the Fresno-Clovis Metropolitan Area, with the exception of 6.5 square miles of SEDA which has yet to be annexed to the District. Once all of SEDA is annexed, FMFCD will develop and adopt Storm Water Master Plans for SEDA based on this General Plan.

The District was formed for the purpose of acquiring and constructing flood control and drainage facilities to safely convey, discharge, store and conserve storm water received on land within the District boundaries or which flows through the District. Eight flood control reservoirs and major basin facilities have been constructed along the Big Dry Creek, Redbank Creek, Dog Creek, Pup Creek, and Fancher Creek, comprising the Fresno Stream Group. The District also serves as the local sponsor of the U.S. Army Corps of Engineers for five the flood control facilities within the Redbank-Fancher Creeks Flood Control Project.



Source: FEMA, 2014.

The urban storm water drainage program provides a system comprised of storm drainage collection, conveyance, detention and retention serving planned urban and rural areas within the Fresno-Clovis environs. The adopted Storm Drainage and Flood Control Master Plan divides the service area into 163 local drainage areas. Collectively, the system has in excess of 600 miles of storm drainage pipeline and 154 local stormwater management basins together with ancillary facilities, such as storm water lift pump stations.

This system expands as the area of urbanization expands. Facilities are funded and constructed by owners/developers of properties pursuant to the City's drainage fee requirements in Fresno Municipal Code section 12-1901 et. seq., or constructed by FMFCD under publicly awarded contracts. The City also requires drainage to be directed to public streets, so that storm water travels along paved surface areas to inlets per the Fresno Municipal Code. The inlets accept the water into the storm drainage pipelines which convey water to stormwater management basins. The pipeline system is designed with a peak flow capacity to accommodate a two-year intensity storm event (50 percent probability of occurring in any given year). The basin capacity utilizes the percentage of runoff from the two-year pipeline data, but with a volume from six inches of rainfall. All basins are designed with relief systems so that additional capacity can be created by dewatering between rainfall events. The District's drainage services program includes topographic mapping; master plan engineering and facility design; system construction; and operation and maintenance.

Any infill project that increases the amount of impervious surfacing, changes the existing drainage pattern(s), and/or generates storm flows faster or greater than the existing condition could result in the existing pipeline collection system being overburdened. Typically, infill projects are required to mitigate any increase in runoff by either increasing the capacity of the existing system (i.e., build more infrastructure) or holding storm runoff on site to ensure offsite runoff does not increase.

As the owner and operator of the storm water drainage system, the District has primary responsibility for implementing the U.S. Clean Water Act requirements through a National Pollutant Discharge Elimination System discharge permit issued by the Regional Water Quality Control Board (RWQCB). This program is comprised of pollutant removal in the stormwater basins and education to avoid storm water pollution; best management practices for commercial, industrial and new development storm water quality control; monitoring to assess storm water impacts upon the quality of receiving water; and the preparation of ordinances for adoption by local governments to enforce storm water quality control measures.

The District's programs include water conservation efforts through its design and operation of storm water drainage facilities to detain and retain water from storm

events as well as receive dry season surface water supplies for groundwater recharge. Approximately 90 basins are intertied with Fresno Irrigation District (FID) canals and receive surface water through contracts with the irrigation district and the cities of Fresno and Clovis. Storm water drainage basins serving primarily residential areas are also designed to accommodate passive and active recreational activities. Recreational use of 27 basins has been accommodated by improvements including baseball and playground areas, and two basins have been specifically designed to accommodate use by individuals with disabilities, while a third accommodates a high quality little league baseball facility. District flood control and drainage facilities also provide important open space in the urban area and areas for wildlife habitat. Through a memorandum of understanding, which serves as a Section 1601 Master Streambed Alteration Agreement with the California Department of Fish and Wildlife, restoration and protection of rural streams for flood control purposes also brings long-term net benefits for fish, wildlife, water quality, native plants, and stream habitats.

OBJECTIVE

NS-3 Minimize the risks to property, life, and the environment due to flooding and stormwater runoff hazards.

IMPLEMENTING POLICIES

NS-3-a **Stormwater Drainage and Flood Control Master Plan.** Support the full implementation of the FMFCD Storm Drainage and Flood Control Master Plan, the completion of planned flood control and drainage system facilities, and the continued maintenance of stormwater and flood water retention and conveyance facilities and capacities. Work with the FMFCD to make sure that its Storm Drainage and Flood Control Master Plan is consistent with the General Plan.

NS-3-b **Curb and Gutter Installation.** Coordinate with Fresno Metropolitan Flood Control District (FMFCD) to install curbing, gutters, and other drainage facilities with priority to existing neighborhoods with the greatest deficiencies and consistent with the Storm Drainage and Flood Control Master Plan.

NS-3-c **Dual Use Facilities.** Support multiple uses of flood control and drainage facilities as follows:

- Use, wherever practical, FMFCD facilities for groundwater management and recharge; and

- Promote recreational development of ponding basin facilities located within or near residential areas, compatible with the stormwater and groundwater recharge functions.

NS-3-d **Landscaped Buffer.** City will support the development of FMFCD ponding basins including the landscaping and irrigation for the top one third of the side sloped areas consistent with the FMFCD Basin Design Criteria.

NS-3-e **Pollutants.** Work with FMFCD to prevent and reduce the existence of urban stormwater pollutants pursuant to the requirements of the National Pollution Discharge Elimination Systems Act.

NS-3-f **Flooding Emergency Response Plans.** Work with responsible agencies to update emergency dam failure inundation plans, evacuation plans and other emergency response plans for designated flood-prone areas, including the San Joaquin riverbottom.

NS-3-g **Essential Facilities Siting Outside of Floodplains.** Avoid siting emergency response and essential public facilities, such as fire and police stations, within a 100-year floodplain, unless it can be demonstrated that the facility can be safely operated and accessed during flood events.

NS-3-h **Runoff Controls.** Implement grading regulations and related development policies that protect area residents from flooding caused by urban runoff produced from events that exceed the capacity of the Storm Drainage and Flood Control Master Plan system of facilities. Place all structures and/or flood-proofing in a manner that does not cause floodwaters to be diverted onto adjacent property, increase flood hazards to other property, or otherwise adversely affect other property.

NS-3-i **New Development Must Mitigate Impact.** Require new development to not significantly impact the existing storm drainage and flood control system by imposing conditions of approval as project mitigation, as authorized by law. As part of this process, closely coordinate and consult with the FMFCD to identify appropriate conditions that will result in mitigation acceptable and preferred by FMFCD for each project.

Commentary: *The City recognizes the expertise and significant role of the FMFCD, and will give the highest deference to its*

recommendations for mitigation measures, consistent with applicable law.

NS-3-j **National Flood Insurance Program.** Continue to participate in the National Flood Insurance Program (NFIP) by ensuring compliance with applicable requirements. Review NFIP maps periodically to determine if areas subject to flooding have been added or removed and make adjustments to the Land Use Diagram Figure LU-1.

NS-3-k **100-Year Floodplain Policy.** Require developers of residential subdivisions to preserve those portions of development sites as open space that may be subject to 100-year flood events, unless the flood hazard can be substantially mitigated by development project design.

NS-3-l **200-Year Floodplain Protection.** Promote flood control measures that maintain natural conditions within the 200-year floodplain of rivers and streams and, to the extent possible, combine flood control, recreation, water quality, and open space functions. Discourage construction of permanent improvements that would be adversely affected by periodic floods within the 200-year floodplain, particularly in the San Joaquin riverbottom.

NS-3-m **Flood Risk Public Awareness.** Continue public awareness programs to inform the general public and potentially affected property owners of flood hazards and potential dam failure inundation. Remind households and businesses located in flood-prone areas of opportunities to purchase flood insurance.

NS-3-n **Precipitation Changes.** Work with FMFCD to evaluate the planned and existing stormwater conveyance system in light of possible changes to precipitation patterns in the future.

9.5 WILDLAND FIRE HAZARDS

Fresno's high summer temperatures, intense sunlight, and low rainfall could encourage wildland fires by drying and pre-heating combustible material and fostering spontaneous combustion of flammable material. Fresno's estimated maximum wind speed is 70 mph, which could fan blazes to a high intensity. Fire hazards are typically highest in heavily wooded areas, as trees are a great source of fuel, as are grasslands. Given that the Planning Area is largely urbanized or working agricultural land and lacks steep topographies, wildfire threats are minimal. Although Fresno is proximate to high and very high fire hazard designated areas, the city is largely categorized as little or no threat or moderate fire hazard, which is largely attributed to paved areas. Small areas

along the San Joaquin River Bluff area in northern Fresno are prone to wildfire due to relatively steep terrain and vegetation and therefore classified as high fire hazard.

Policies related to fire protection and response are located in the Public Utilities and Services Element.

9.6 HAZARDOUS MATERIALS

A material is considered hazardous if it appears on a list of hazardous materials prepared by a federal, State, or local agency, or if it has characteristics defined as hazardous by such an agency. The California Code of Regulation defines a hazardous material as a substance that, because of physical or chemical properties, quantity, concentration, or other characteristics, may either (1) cause an increase in mortality or an increase in serious, irreversible, or incapacitating illness, or (2) pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported or disposed of, or otherwise managed. Hazardous materials have been and are commonly used in commercial, agricultural, and industrial applications and, to a limited extent, in residential areas.

Hazardous wastes are defined in the same manner. Hazardous wastes are hazardous materials that no longer have practical use, such as substances that have been discarded, discharged, spilled, contaminated, or are being stored prior to proper disposal. Hazardous materials and hazardous wastes are classified according to four properties: toxic (causes human health effects), ignitable (has the ability to burn), corrosive (causes severe burns or damage to materials), and reactive (causes explosions or generates toxic gases).

Sites previously contaminated by hazardous materials are required to be identified and cleaned up. The contaminated sites in Fresno are largely associated with leaking underground storage tanks and are predominately clustered south of Downtown, near Fresno Yosemite International Airport and Palm Bluffs Corporate Center (northwest Fresno), and along the Union Pacific Railroad Tracks as shown on Figure PU-3: Regional Groundwater Contamination shows the locations of known leaking underground storage tanks and known hazardous waste sites requiring cleanup under federal or State direction.

Releases, leaks, or disposal of chemical compounds, such as petroleum hydrocarbons, on or below the ground surface can lead to contamination of underlying soil and groundwater. Depending of the conditions and intensity of the release, groundwater contamination can migrate beyond the property boundary of the original release site. Disturbance of a previously contaminated area through grading or excavation

operations could expose the public to health hazards from physical contact with contaminated materials or hazardous vapors. Improper handling or storage of contaminated soil and groundwater can further expose the public to these hazards, or potentially spread contamination through surface water runoff or air-borne dust.

In addition, contaminated groundwater can spread down gradient, potentially contaminating subsurface areas of surrounding properties. This also poses a threat due to the high number of private water wells and the City's reliance on groundwater as the principal potable water source. Groundwater quality is discussed in the Public Utilities and Services Element.

OBJECTIVE

NS-4 Minimize the risk of loss of life, injury, serious illness, and damage to property resulting from the use, transport, treatment, and disposal of hazardous materials and hazardous wastes.

IMPLEMENTING POLICIES

NS-4-a **Processing and Storage.** Require safe processing and storage of hazardous materials, consistent with the California Building Code and the Uniform Fire Code, as adopted by the City.

NS-4-b **Coordination.** Maintain a close liaison with the Fresno County Environmental Health Department, Cal-EPA Division of Toxics, and the State Office of Emergency Services to assist in developing and maintaining hazardous material business plans, inventory statements, risk management prevention plans, and contingency/emergency response action plans.

NS-4-c **Soil and Groundwater Contamination Reports.** Require an investigation of potential soil or groundwater contamination whenever justified by past site uses. Require appropriate mitigation as a condition of project approval in the event soil or groundwater contamination is identified or could be encountered during site development.

NS-4-d **Site Identification.** Continue to aid federal, State, and County agencies in the identification and mapping of waste disposal sites (including abandoned waste sites), and to assist in the survey of the kinds, amounts, and locations of hazardous wastes.

NS-4-e **Compliance with County Program.** Require that the production, use, storage, disposal, and transport of hazardous materials conform to the

standards and procedures established by the County Division of Environmental Health. Require compliance with the County's Hazardous Waste Generator Program, including the submittal and implementation of a Hazardous Materials Business Plan, when applicable.

NS-4-f **Hazardous Materials Facilities.** Require facilities that handle hazardous materials or hazardous wastes to be designed, constructed, and operated in accordance with applicable hazardous materials and waste management laws and regulations.

NS-4-g **Hazmat Response.** Include policies and procedures appropriate to hazardous materials in the City's disaster and emergency response preparedness and planning, coordinating with implementation of Fresno County's Hazardous Materials Incident Response Plan.

NS-4-h **Household Collection.** Continue to support and assist with Fresno County's special household hazardous waste collection activities, to reduce the amount of this material being improperly discarded.

NS-4-i **Public Information.** Continue to assist in providing information to the public on hazardous materials.

9.7 AIRPORT SAFETY

There are two public airports in the Planning Area, Fresno-Yosemite International Airport (FYI) and Chandler Executive Airport (FCH), and one private airport open to public use, Sierra Sky Park. In conjunction with Fresno-Yosemite International Airport, the Air National Guard maintains an airbase for military flight and training operations. Each airport has its own airport land use plan designed to provide for public safety. The Fresno County Airport Land Use Commission (ALUC) provides guidance to local jurisdictions on adjacent land uses through Airport Land Use Compatibility Plans (ALUCPs). This General Plan and all other City land use plans must be compatible with the ALUCPs.

Airports may impact public safety due to the potential for aircraft crashes. Policies in this section are designed to minimize public exposure to risks associated with airport operations and to minimize the siting of land uses near airports that might interfere with airport operations. As shown earlier in this chapter, Figures NS-4 through NS-6 show each airport's safety zones, which are established to identify the land or water area surrounding the airport runways that could be impacted by an airport hazard.



Fresno Yosemite International Airport is one of two public airports in Fresno, and it has its own land use plan.

OBJECTIVE

NS-5 Protect the safety, health, and welfare of persons and property on the ground and in aircraft by minimizing exposure to airport-related hazards.

IMPLEMENTING POLICIES

NS-5-a **Land Use and Height.** Incorporate and enforce all applicable Airport Land Use Compatibility Plans (ALUCPs) through land use designations, zoning, and development standards to support the continued viability and flight operations of Fresno's airports and to protect public safety, health, and general welfare.

- Limit land uses in airport safety zones to those uses listed in the applicable ALUCPs as compatible uses, and regulate compatibility in terms of location, height, and noise.
- Ensure that development, including public infrastructure projects, within the airport approach and departure zones complies with Part 77 of the Federal Aviation Administration Regulations (Objects Affecting Navigable Airspace), particularly in terms of height.

NS-5-b **Airport Safety Hazards.** Ensure that new development, including public infrastructure projects, does not create safety hazards such as glare from direct or reflective sources, smoke, electrical interference, hazardous chemicals, fuel storage, or from wildlife, in violation of adopted safety standards.

NS-5-c **Avigation Easements.** Employ avigation easements in order to secure and protect airspace required for unimpeded operation of publicly owned airports.

Commentary: *Avigation easements are established in the form of land use covenants and are binding upon present and subsequent property owners.*

NS-5-d **Disclosure.** As a condition of approval for residential development projects, require sellers to prepare and provide State Department of Real Estate Disclosure statements to property buyers notifying of noise and safety issues related to airport operations.

NS-5-e **Planned Expansion.** Allow for the orderly expansion and improvement of publicly-owned airports, while minimizing adverse environmental impacts associated with these facilities.

- Periodically update airport facility master plans in accordance with FAA regulations.
- Require land use within the boundaries of the Fresno-Yosemite International Airport and Chandler Downtown Airport to conform to designations and policies specified in adopted City of Fresno compatible land use plans.
- Provide local jurisdictions surrounding the City's publicly owned airports with specific guidelines for effectively dealing with the presence and operation of these airports.

9.8 EMERGENCY RESPONSE

Police and fire protection services are addressed in the Public Utilities and Services Element.

Emergency Planning

The California Emergency Services Act requires cities to prepare and maintain an Emergency Plan for natural, manmade, or war-caused emergencies that result in

conditions of disaster or in extreme peril to life. The City does have an adopted Emergency Operations Plan (EOP). The EOP does not designate evacuation routes, which may not be necessary since Fresno does not face any expected natural hazards from likely sources or locations.

Local Hazard Mitigation Planning

The purpose of a Local Hazard Mitigation Plan is to reduce or eliminate long term risk to human life and property resulting from hazards, by identifying risks before they occur and putting together resources, information, and strategies for emergency response. Fresno County is the lead agency on the Multi-Jurisdictional Local Hazard Mitigation Plan (MHMP) for the county. On December 1, 2009, the Fresno County Board of Supervisors adopted the Fresno County MHMP. It includes a City of Fresno annex which lists information most relevant to Fresno in the areas of health, infrastructure, housing, government, environment, and land use.

The MHMP meets the requirements of the Disaster Mitigation Act of 2000 (DMA). A federally-approved hazard mitigation plan enables Fresno County to apply for federal pre-disaster hazard mitigation grant funds to support mitigation projects. The DMA establishes a national hazard mitigation program to reduce the loss of life and property, human suffering, economic disruption and disaster assistance costs resulting from natural disasters. The DMA also provides a source of pre-disaster hazard mitigation funding to assist local governments in implementing effective hazard mitigation measures to ensure the continued functionality of critical services and facilities after a natural disaster.

OBJECTIVE

NS-6 Foster an efficient and coordinated response to emergencies and natural disasters.

IMPLEMENTING POLICIES

NS-6-a **County Multi-Jurisdiction Hazard Mitigation Plan.** Adopt and implement the Fresno County Multi-Jurisdiction Hazard Mitigation Plan and City of Fresno Local Hazard Mitigation Plan Annex.

Commentary: *The federal Disaster Mitigation Act of 2000 requires that cities, counties, and special districts have a Local Hazard Mitigation Plan to be eligible to receive FEMA hazard mitigation funds. Cities and counties can adopt and use all or part of a regional multi-jurisdictional plan, such as the one prepared by Fresno County, in lieu of preparing all or part of a Local Hazard Mitigation Plan.*

NS-6-b **Disaster Response Coordination.** Maintain coordination with other local, State, and Federal agencies to provide coordinated disaster response.

NS-6-c **Emergency Operations Plan.** Update the City's Emergency Operations Plan periodically, using a whole community approach which integrates considerations for People with access and functional needs in all aspects of planning.

NS-6-d **Evacuation Planning.** Maintain an emergency evacuation plan in consultation with the Police and Fire Departments and other emergency service providers, which shows potential evacuation routes and a list of emergency shelters to be used in case of catastrophic emergencies.

Commentary: *The evacuation plan will be flexible in order to consider many scenarios and multiple modes of transportation beyond private automobiles. It will provide special provisions for disadvantaged populations, such as those with physical disabilities or those with low or very low incomes, and for areas with fewer resources through neighborhood emergency preparedness programs.*

NS-6-e **Critical Use Facilities.** Ensure critical use facilities (e.g. City Hall, police and fire stations, schools, hospitals, public assembly facilities, transportation services) and other structures that are important to protecting health and safety in the community remain operational during an emergency.

- Site and design these facilities to minimize their exposure and susceptibility to flooding, seismic and geological effects, fire, and explosions.
- Work with the owners and operators of critical use facilities to ensure they can provide alternate sources of electricity, water, and sewerage in the event that regular utilities are interrupted in a disaster.

NS-6-f **Emergency Vehicle Access.** Require adequate access for emergency vehicles in all new development, including adequate widths, turning radii, hard standing areas, and vertical clearance.

NS-6-g **Emergency Preparedness Public Awareness Programs.** Continue to conduct programs to inform the general public, including people with access and functional needs, of the City's emergency preparedness and disaster response procedures.

Appendix G
Traffic Impact Study

Kaiser Permanente - Fresno Medical Office Building

Traffic Impact Study
May 2020

Prepared by:
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Kaiser Permanente - Fresno Medical Office Building
Traffic Impact Study

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Table of Contents

Section	Description	Page
	Executive Summary	E-1
1.0	Introduction	1
1.1	Description of the Region/Project	2
1.1.1	Project Access	2
1.1.2	Study Area	2
1.1.3	Study Scenarios	2
1.2	Methodology	2
1.2.1	Roadway Segment Analysis	3
1.3	Policies to Maintain Level of Service	3
2.0	Existing Conditions	9
2.1	Existing Traffic Counts and Roadway Geometrics	9
2.2	Existing Functional Roadway Classification System	9
2.3	Affected Streets and Highways	10
2.4	Level of Service	10
2.4.1	Roadway Segment Capacity Analysis	10
2.5	Bikeway and Pedestrian Facilities	14
2.6	Public Transit and Active Transport Systems	14
2.7	Study Area Collision Data	15
3.0	Traffic Impacts	19
3.1	Trip Generation	19
3.2	Trip Distribution	19
3.3	Project Traffic	19
3.4	Existing Plus Project Traffic Conditions	23
3.5	Approved/Pending Project Traffic	23
3.6	Near-Term Traffic Conditions	23
3.7	Cumulative Year 2042 Without Project Traffic Conditions	30
3.8	Cumulative Year 2042 Plus Project Traffic Conditions	30
3.9	Impacts	30
3.9.1	Roadway Segment Capacity Analysis	30
3.10	Senate Bill 743	35
3.10.1	Vehicle Miles Traveled (VMT) Assessment	35
3.11	Bikeway and Pedestrian Facilities	37

4.0 Intersection LOS Analysis 39
4.1 Methodology 39
4.1.1 Intersection Analysis 39
4.1.2 Study Area 42
4.1.3 Study Scenarios 42
4.1.4 Policies to Maintain Level of Service 42
4.2 Evaluation of Study Scenarios 43
4.2.1 Existing 43
4.2.2 Existing Plus Project 43
4.2.3 Near-Term Plus Project 43
4.2.4 Cumulative Year 2042 Without Project 44
4.2.5 Cumulative Year 2042 Plus Project 44
4.3 Intersection Capacity Analysis 44
4.3.1 Queuing Analysis 44
4.4 Recommended Transportation Improvements 61
4.5 Project Onsite Circulation 67
4.6 Equitable Share Responsibility 67

Appendices

Appendix A – City of Fresno Roadway Functional Class and Peak Hour Level of Service Thresholds
Appendix B – Traffic Count Data Worksheets
Appendix C – Collision Data Worksheets
Appendix D – Fresno COG Travel Model Outputs
Appendix E – TurnsW32 Worksheets
Appendix F – Synchro 10 (HCM 6th Edition) Worksheets
Appendix G – Peak Hour Signal Warrant Worksheets
Appendix H – Approved Trip Generation/Distribution Assumptions Memo

List of Tables

1-1 Roadway Segment Level of Service Definitions 8
1-2 Peak Hour Two-Way Volumes 8
2-1 Existing Segment Operations 14
3-1 Project Trip Generation 19
3-2 Segment Operations 35
4-1 Signalized Intersections Level of Service Definitions 40
4-2 Unsignalized Intersections Level of Service Definitions 41
4-3 Intersection Operations 59
4-4 Queuing Operations 60
4-5 Intersection Operations with Transportation Improvements 64
4-6 Left Turn and Right Turn Storage Requirements 66
4-7 Traffic Signal Mitigation Impact Fee 67

4-8 Project Fair Share Cost to Caltrans Facilities 68
4-9 Equitable Share Responsibility 68

List of Figures

1-1 Regional Location 5
1-2 Project Location 6
1-3 Project Site Plan 7
2-1 Existing Lane Geometry 11
2-2 Existing AM Peak Hour Traffic 12
2-3 Existing PM Peak Hour Traffic 13
2-4 Existing Bicycle and Pedestrian Facilities 16
2-5 Existing Transit Facilities 17
2-6 Study Area Collision Map (01/01/2014 – 12/31/2018) 18
3-1 Project Trip Distribution 20
3-2 Project AM Peak Hour Traffic 21
3-3 Project PM Peak Hour Traffic 22
3-4 Existing Plus Project AM Peak Hour Traffic 24
3-5 Existing Plus Project PM Peak Hour Traffic 25
3-6 Approved/Pending Project Location 26
3-7 Approved/Pending Project AM and PM Peak Hour Traffic 27
3-8 Near-Term Plus Project AM Peak Hour Traffic 28
3-9 Near-Term Plus Project PM Peak Hour Traffic 29
3-10 Cumulative Year 2042 Without Project AM Peak Hour Traffic 31
3-11 Cumulative Year 2042 Without Project PM Peak Hour Traffic 32
3-12 Cumulative Year 2042 Plus Project AM Peak Hour Traffic 33
3-13 Cumulative Year 2042 Plus Project PM Peak Hour Traffic 34
3-14 Planned Bicycle and Pedestrian Facilities 38
4-1 Existing Lane Geometry 45
4-2 Existing AM Peak Hour Traffic 46
4-3 Existing PM Peak Hour Traffic 47
4-4 Project AM Peak Hour Traffic 48
4-5 Project PM Peak Hour Traffic 49
4-6 Existing Plus Project AM Peak Hour Traffic 50
4-7 Existing Plus Project PM Peak Hour Traffic 51
4-8 Approved/Pending Project AM and PM Peak Hour Traffic 52
4-9 Near-Term Plus Project AM Peak Hour Traffic 53
4-10 Near-Term Plus Project PM Peak Hour Traffic 54
4-11 Cumulative Year 2042 Without Project AM Peak Hour Traffic 55
4-12 Cumulative Year 2042 Without Project PM Peak Hour Traffic 56
4-13 Cumulative Year 2042 Plus Project AM Peak Hour Traffic 57
4-14 Cumulative Year 2042 Plus Project PM Peak Hour Traffic 58
4-15 Cumulative Year 2042 Lane Geometry 65

Executive Summary

This Traffic Impact Study (TIS) has been prepared for the purpose of analyzing traffic conditions related to the proposed Kaiser Permanente Fresno Medical Office Building ("MOB Project") in the City of Fresno. This TIS provides information relevant to analyzing the MOB Project's environmental effects under the California Environmental Quality Act ("CEQA") as well as its consistency with the City's General Plan performance standards.

The MOB Project consists of the development of an approximately 145,000 square feet medical office building to be located west of the Locust Avenue and First Street intersection (APN: 303-201-11 and 303-201-17). The MOB Project is located on the valley floor at an elevation of approximately 308 feet above sea level with the surrounding area mostly flat. The City of Fresno is in the center of the San Joaquin Valley, located approximately 220 miles northwest of the City of Los Angeles and 170 miles south of the City of Sacramento.

Site access will be provided at the existing intersections of Locust Avenue and First Street and Private Driveway (north of Locust Avenue) and First Street. The Locust Avenue and First Street intersection will provide left-in/left-out and right-in/right out access while the Private Driveway and First street intersection provides left-in and right-in/right-out access only.

STUDY AREA

The following intersections and roadway segments included in this TIS were determined in consultation with City of Fresno and Caltrans staff and include:

Roadway Segments

- ✓ First Street between:
  - Alluvial Avenue and Private Driveway
  - Private Driveway and Herndon Avenue
- ✓ Herndon Avenue between:
  - Fresno Street and First Street

Intersections

- ✓ Herndon Avenue / SR 41 SB Off Ramp
- ✓ Herndon Avenue / SR 41 NB Off Ramp
- ✓ Herndon Avenue / Fresno Street
- ✓ Alluvial Avenue / First Street
- ✓ Private Driveway / First Street
- ✓ Locust Avenue / First Street
- ✓ Herndon Avenue / First Street

IMPACTS

Segments

The City adopted its current General Plan on December 18, 2014 and certified a Master Environmental Impact Report ("EIR") for the General Plan (State Clearinghouse Number 2012111015) (the "General Plan EIR"). The General Plan EIR analyzed future development's potential environmental effects by projecting the LOS on roadway segments throughout the City. Accordingly, the TIS analyzed the MOB Project's effect on roadway segments for comparison purposes with the impacts identified by the General Plan EIR.

Results of the AM and PM peak hour LOS segment analysis along the existing street and highway system are reflected in Table E-1. Results of the analysis show that all of the study roadway segments meet the minimum acceptable level of service criteria during both the AM and PM peak hour when considering the Existing Plus Project, Near-Term Plus Project, Cumulative Year 2042 Without Project and Cumulative Year 2042 Plus Project scenarios.

Vehicle Miles Travelled (VMT)

In recognition of the fact that as of July 1, 2020, level of service will no longer be considered an effect on the environment for CEQA purposes pursuant to Senate Bill 743, the TIS also analyzed the MOB Project's effects with respect to vehicle miles travelled ("VMT"). The MOB Project's purpose is to alleviate overcrowding at existing Kaiser facilities located at the southeast corner of Alluvial and Fresno Street. The health care providers that will operate from the proposed MOB Project are all currently housed in the existing Kaiser facility, and providers and patients will simply transfer from the existing facility to the proposed MOB Project. As a result, the MOB Project will not generate 'new' trips to the transportation network but instead, existing provider and patient trips will be rerouted throughout the transportation network. Therefore, the net change in VMT as a result of the MOB Project will be negligible, if any. Accordingly, the MOB Project will not result in significant transportation impacts with respect to VMT.

As a result, this TIS shows that traffic impacts resulting from the MOB Project would be within the impacts analyzed in the General Plan EIR.

INTERSECTION LOS ANALYSIS

Although not considered impacts for CEQA purposes, the General Plan establishes LOS performance criteria for intersections within the City. Accordingly, the TIS also analyzed the MOB Project's effect on LOS at key intersections for comparison purposes with the standards identified by the General Plan.

Table E-2 shows intersections that are expected to fall short of desirable operating conditions for various scenarios. Potential transportation improvements that would alleviate LOS deficiencies

in the study area are discussed below. Results of the analysis show that the MOB Project will contribute to an unacceptable LOS at all of the study intersections with the exception of the Private Driveway at First Street intersection when comparing the Cumulative Year 2042 scenarios.

Table E-1
Segment Operations

STREET SEGMENT	SEGMENT DESCRIPTION	TARGET LOS	PEAK HOUR	EXISTING		EXISTING PLUS PROJECT		NEAR-TERM PLUS PROJECT		CUMULATIVE YEAR 2042 WITHOUT PROJECT		CUMULATIVE YEAR 2042 PLUS PROJECT	
				VOLUME	LOS	VOLUME	LOS	VOLUME	LOS	VOLUME	LOS	VOLUME	LOS
Herndon Avenue													
Fresno Street to First Street	6 Lanes Divided (Expressway)	D	AM	4,489	D	4,646	D	4,843	D	5,609	D	5,766	D
			PM	4,548	D	4,744	D	4,939	D	5,444	D	5,640	D
First Street													
Alluvial Avenue to Private Driveway	4 Lanes Divided (Arterial)	D	AM	1,274	D	1365	D	1485	D	2023	D	2114	D
			PM	1,667	D	1739	D	1850	D	2428	D	2500	D
Private Driveway to Herndon Avenue	4 Lanes Divided (Arterial)	D	AM	1,500	D	1,798	D	1,887	D	2,234	D	2,532	D
			PM	1,853	D	2,225	D	2,351	D	2,631	D	3,003	D

LOS = Level of Service / **BOLD** denotes LOS standard has been exceeded

Table E-2
Intersection Operations

INTERSECTION	CONTROL	TARGET LOS	PEAK HOUR	EXISTING		EXISTING PLUS PROJECT		NEAR-TERM PLUS PROJECT		CUMULATIVE YEAR 2042 WITHOUT PROJECT		CUMULATIVE YEAR 2042 PLUS PROJECT	
				DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS
1. Herdon Avenue / SR 41 SB Off Ramp	Signalized	C *	AM	**87.7**	**F ***	**90.8**	**F**	**131.7**	**F**	**++**	**F**	**++**	**F**
			PM	**90.1**	**F ***	**97.9**	**F**	**125.4**	**F**	**226.9**	**F**	**235.3**	**F**
2. Herndon Avenue / SR 41 NB Off Ramp	Signalized	C *	AM	**115.7**	**F ***	**134.2**	**F**	**170.5**	**F**	**295.5**	**F**	**++**	**F**
			PM	**123.3**	**F ***	**142.0**	**F**	**175.0**	**F**	**221.1**	**F**	**236.2**	**F**
3. Herndon Avenue / Fresno Street	Signalized	D	AM	50.1	D	52.3	D	**58.2**	**E**	**106.2**	**F**	**109.1**	**F**
			PM	54.9	D	**63.9**	**E**	**80.7**	**F**	**106.9**	**F**	**109.9**	**F**
4. Alluvial Avenue / First Street	Signalized	D	AM	53.0	D	53.7	D	54.7	D	**68.9**	**E**	**73.5**	**E**
			PM	45.1	D	46.9	D	50.6	D	**89.0**	**F**	**93.3**	**F**
5. Private Driveway / First Street	One-Way Stop Sign	D	AM	10.7	B	12.1	B	12.7	B	13.4	B	15.0	C
			PM	12.5	B	20.9	C	24.2	C	15.5	C	25.3	D
6. Locust Avenue / First Street	Two-Way Stop Sign	D	AM	28.1	D	**272.2**	**F**	**++**	**F**	**70.4**	**F**	**++**	**F**
			PM	**194.8**	**F +**	**++**	**F +**	**++**	**F +**	**++**	**F +**	**++**	**F +**
7. Herndon Avenue / First Street	Signalized	D	AM	**75.0**	**E**	**81.9**	**F**	**84.3**	**F**	**89.9**	**F**	**101.2**	**F**
			PM	**65.0**	**E**	**75.5**	**E**	**83.8**	**F**	**96.4**	**F**	**103.1**	**F**

DELAY is measured in seconds

LOS = Level of Service / **BOLD** denotes LOS standard has been exceeded

For signalized intersections, delay results show the average for the entire intersection. For one-way and two-way stop controlled intersections, delay results show the delay for the worst movement.

* Existing State highway facility is operating at less than the target LOS; the existing MOE shall be maintained.

+ Meets peak hour signal warrants.

++ Calculated value exceeds software limitations.

RECOMMENDED TRANSPORTATION IMPROVEMENTS

This section describes potential transportation improvements to alleviate level of service deficiencies at study intersections as described above.

✓ Herndon Avenue / SR 41 SB Off Ramp

Recommended transportation improvements to achieve acceptable levels of service:

- Existing Plus Project, Near-Term Plus Project, and Cumulative Year 2042 Plus Project scenarios:
  - Widen the southbound approach to 2 left turn lanes and 1 right turn lane (adding 1 left turn lane)

The improvements identified above for the Existing Plus Project and Near-Term Plus Project scenarios are sufficient to meet the existing Measures of Effectiveness (MOE) at the intersection. As noted in Table 4-3 above, the existing delay/LOS in the AM peak hour is 87.7/F and 90.1/F for the PM peak hour.

The improvements identified above for the Cumulative Year 2042 Plus Project scenario are not sufficient to meet the existing MOE at the intersection. It should be noted that Herndon Avenue is at its ultimate configuration of six (6) travel lanes (3 in each direction). Accommodating additional travel lanes along Herndon Avenue and at the SR 41 SB Off Ramp and Herndon Avenue intersection is not possible due to the presence of residential and office development that currently exists along Herndon Avenue and the reconstruction/ lengthening of the SR 41 bridge structure. Caltrans has previously identified improvements at the interchange which consist of an auxiliary lane to the SR 41 SB Off Ramp. The Project will be required to pay applicable Caltrans fees as noted below.

✓ Herndon Avenue / SR 41 NB Off Ramp

Recommended transportation improvements to achieve acceptable levels of service:

- Existing Plus Project, Near-Term Plus Project, and Cumulative Year 2042 Plus Project scenarios:
  - Widen the northbound approach to 2 left turn lanes and 3 right turn lanes (adding 1 right turn lane)

The improvements identified above for the Existing Plus Project scenario are sufficient to meet the existing MOE at the intersection. As noted in Table 4-3 above, the existing delay/LOS in the AM peak hour is 115.7/F and 123.3/F for the PM peak hour.

The improvements identified above for the Near-Term and Cumulative Year 2042 Plus Project scenarios are not sufficient to meet the existing MOE at the intersection. It should be noted that Herndon Avenue is at its ultimate configuration of six (6) travel lanes (3 in each direction). Accommodating additional travel lanes along Herndon Avenue and at the SR 41 NB Off Ramp and Herndon Avenue intersection is not possible due to the presence of residential and office

development that currently exists along Herndon Avenue and the reconstruction/ lengthening of the SR 41 bridge structure. Caltrans has previously identified improvements at the interchange which consist of an additional ramp lane and auxiliary lane to the SR 41 NB Off Ramp. The Project will be required to pay applicable Caltrans fees as noted below.

✓ Herndon Avenue at Fresno Street
No transportation improvements Recommended.

The Herndon Avenue at Fresno Street intersection is currently at its ultimate configuration per City of Fresno staff. Furthermore, accommodating additional travel lanes along Herndon Avenue and Fresno Street is not possible due to the presence of residential and office development that currently exists along Herndon Avenue and Fresno Street.

✓ Alluvial Avenue / First Street
Recommended transportation improvements to achieve acceptable levels of service:
- Cumulative Year 2042 Plus Project scenario:
  - Widen the westbound approach to 1 left turn lane, 2 through lanes, and 1 right turn lane (adding 1 right turn lane)

The improvements identified above for the Cumulative Year 2042 Plus Project scenario are not sufficient to meet the City of Fresno's level of service criteria. The improvements identified above will achieve LOS 'E' for the AM and PM peak hour under the Cumulative Year 2042 Plus Project scenario. However, the improvements will reduce the average delay to less than the average delay shown under Cumulative Year 2042 Without Project conditions as shown in Table 4-3.

Accommodating additional travel lanes along Alluvial Avenue and First Street would encroach upon existing bicycle and pedestrian facilities along the roadway. The City of Fresno's General Plan (Adopted December 18, 2014), policy number MT-1-n, identifies a peak hour LOS standard of D or better for all roadway areas outside of identified Activity Centers and Bus Rapid Transit Corridor districts, unless the City Traffic Engineer determines that mitigation to maintain this LOS would be infeasible and/or conflict with the achievement of other General Plan policies. Providing additional travel lanes along Alluvial Avenue and First Street would conflict with the achievement of policy number E-1-j, E-1-k, and E-1-I.

✓ Locust Avenue / First Street
Recommended transportation improvements to achieve acceptable levels of service:
- Existing Plus Project, Near-Term Plus Project, and Cumulative Year 2042 Plus Project scenarios:
  - Install Traffic Signal

The improvements identified above for the Existing Plus Project, Near-Term Plus Project, and Cumulative Year 2042 Plus Project scenarios are sufficient to meet the City of Fresno's minimum

level of service criteria.

✓ Herndon Avenue at First Street
No transportation improvements Recommended.

The Herndon Avenue at First Street intersection is currently at its ultimate configuration per City of Fresno staff. Furthermore, accommodating additional travel lanes along Herndon Avenue and Fresno Street is not possible due to the presence of residential and office development that currently exists along Herndon Avenue and First Street.

LEVEL OF SERVICE RESULTING FROM TRANSPORTATION IMPROVEMENTS

The level of service resulting from the transportation improvements identified above is shown in Table E-3 for study area intersections.

Table E-3
Intersection Operations with Transportation Improvements

INTERSECTION	CONTROL	PEAK HOUR	EXISTING PLUS PROJECT		NEAR-TERM PLUS PROJECT		CUMULATIVE YEAR 2042 PLUS PROJECT	
			DELAY	LOS	DELAY	LOS	DELAY	LOS
1. Herdon Avenue / SR 41 SB Off Ramp	Signalized	AM	34.6	C	63.5	E	**197.7**	**F**
		PM	45.6	D	57.8	E	57.8	E
2. Herndon Avenue / SR 41 NB Off Ramp	Signalized	AM	84.1	F	115.3	F	**257.6**	**F**
		PM	102.0	F	**134.8**	**F**	**207.2**	**F**
3. Herndon Avenue / Fresno Street	Signalized	AM	52.3	D	**58.2**	**E**	**109.1**	**F**
		PM	**63.9**	**E**	**80.7**	**F**	**109.9**	**F**
4. Alluvial Avenue / First Street	Signalized	AM					**57.4**	**E**
		PM					**70.0**	**E**
6. Locust Avenue / First Street	Signalized	AM	12.7	B	13.1	B	16.4	B
		PM	34.4	C	36.8	D	29.6	C
7. Herndon Avenue / First Street	Signalized	AM	**81.9**	**F**	**84.3**	**F**	**101.2**	**F**
		PM	**75.5**	**E**	**83.8**	**F**	**103.1**	**F**

DELAY is measured in seconds
LOS = Level of Service / **BOLD** denotes LOS standard has been exceeded
For signalized intersections, delay results show the average for the entire intersection.

Equitable Share Responsibility

The signalization of the Locust Avenue and First Street intersection is included in the City of Fresno's Traffic Signal Mitigation Impact Fees (TSMI Fee). The City of Fresno Master Fee Schedule was used to determine the TSMI Fee for the MOB Project. The TSMI Fee shown in Table E-4 was calculated using the charge rate of $1,802 per 1,000 square feet of medical/dental office.

Table E-4
Traffic Signal Mitigation Impact Fee

INTERSECTIONS	RATE MEDICAL/DENTAL OFFICE (per 1,000 sq.ft)	PROJECT BUILDING SQUARE FOOTAGE (KSF)	TSMI FEE
Locust Avenue / First Street	$1,802	145	$261,290.00

Caltrans has previously identified improvements at the SR 41 NB and SB Off Ramps. Table E-5 identifies the number of MOB Project trips that will impact Caltrans' facilities and the corresponding fee the MOB Project is responsible for. The MOB Project's trip distribution was used to identify MOB Project trips at the interchange. The trip distribution is based upon a select zone run prepared by the Fresno Council of Governments (Fresno COG), as well as engineering judgement, prevailing traffic patterns in the study area, complementary land uses, major routes, and population centers. Results of the trip distribution show that no MOB Project trips will impact the SR 41 Southbound Off-Ramp at the Herndon Avenue interchange.

Table E-5
Project Fair Share Cost to Caltrans Facilities

IMPROVEMENT	IMPROVEMENT COST	COST PER TRIP	PROJECT TRIPS	PROJECT IMPROVEMENT FEE
SR 41 NB Off-Ramp to Herndon Avenue - Add ramp lane and auxiliary lane	$5,078,900	$500	63	$31,500.00
SR 41 SB Off-Ramp to Herndon Avenue - Auxiliary lane	$7,783,000	$1,700	0	$0.00

The MOB Project will be required to contribute a fair share towards the costs of improvements that are identified for the Cumulative Year 2042 scenarios. The intent of determining the equitable responsibility for the improvements identified above for the Cumulative Year 2042 scenarios, is to provide a starting point for early discussions to address traffic mitigation equitability and to calculate the equitable share for mitigating traffic impacts.

The formula used to calculate the equitable share responsibility to City of Fresno and Caltrans facilities is as follows:

Equitable Share = (Project Trips)/(Future Year Plus Approved Project Traffic - Existing Traffic)

Table E-6 shows the equitable share responsibility to City of Fresno and Caltrans Facilities. The equitable share responsibility shown in Table E-6 is the result of LOS enhancements related to capacity.

Table E-6
Equitable Share Responsibility

INTERSECTION	PEAK HOUR	EXISTING	PROJECT TRIPS	CUMULATIVE YEAR 2042 PLUS PROJECT	FAIR SHARE PERCENTAGE
Herndon Avenue / SR 41 SB Off Ramp (Additional SB Left Turn Only)	AM	5,871	78	8,638	2.8%
	PM	6,644	148	8,613	7.5%
Alluvial Avenue / First Street	AM	2,896	105	4,350	7.2%
	PM	3,694	130	5,217	8.5%

1.0 Introduction

The City of Fresno ("City") adopted its current General Plan on December 18, 2014 and certified a Master Environmental Impact Report ("EIR") for the General Plan (State Clearinghouse Number 2012111015) (the "General Plan EIR"). The proposed Kaiser Permanente Medical Office Building ("MOB Project") would be located within the "Office" use designation under the General Plan, which permits professional and medical offices up to a maximum floor area ratio of 2.0. The MOB Project is a permitted use and proposes a floor area ratio of approximately 0.47 (assuming 145,000 square feet of development on the 7.1-acre site), so it is consistent with the General Plan's use and density regulations.

Public Resources Code Section 21083.3 and California Environmental Quality Act ("CEQA") Guidelines Section 15183 provide that proposed projects that are consistent with a "community plan" (including the General Plan) for which an EIR was certified is exempt from CEQA, "except as might be necessary to examine whether there are project-specific significant effects which are peculiar to the Project or its site." CEQA Guidelines Section 15183(c) specifies that "if an impact is not peculiar to the parcel or to the proposed Project, has been addressed as a significant effect in the prior EIR, or can be substantially mitigated by the imposition of uniformly applied development policies or standards…, then an EIR need not be prepared for the project solely on the basis of that impact."

In other words, projects consistent with the General Plan are exempt from subsequent CEQA review unless they would result in project-specific impacts. If a project's impacts are within the universe of effects previously covered in the General Plan EIR, or if they can be reduced to a less than significant level through the imposition of uniformly applied development standards (such as General Plan policies, zoning requirements, General Plan EIR mitigation measures, or standards from other plans), no new CEQA document (e.g., a Mitigated Negative Declaration or and EIR) is required.

Pursuant to CEQA Guidelines Section 15183, the analysis included in this report can be used by the City of Fresno to determine if the MOB Project would result in project-specific effects peculiar to the MOB Project or its site that differ from those impacts already analyzed and disclosed in the General Plan EIR. As discussed within this report, the analysis provides substantial evidence in support of the conclusion that the MOB Project would not result in any significant impacts that: (1) are peculiar to the MOB Project or its site; (2) were not identified as significant in the General Plan EIR; or (3) were previously identified significant effects but that would have a substantial increase in severity as compared to the General Plan EIR.

This Traffic Impact Study (TIS) has been prepared for the purpose of analyzing traffic conditions relevant to assessing the MOB Project's environmental effects under CEQA as well as its consistency with the City's General Plan performance standards using Level of Service (LOS) goals and policies. Sections 1, 2 and 3 of this TIS evaluate the MOB Project with respect to CEQA, pursuant to CEQA Guidelines Section 15183 and the General Plan EIR. Section 3 also includes an analysis of the MOB Project's potential effects with respect to vehicle miles

travelled (VMT) pursuant to Senate Bill 743. Section 4 of this TIS evaluates the MOB Project with respect to City of Fresno and California Department of Transportation (Caltrans) intersection LOS goals and policies for purposes of identifying transportation improvements that may be desirable for the MOB Project to implement pursuant to the General Plan's requirements.

1.1 Description of the Region/Project

The MOB Project is located on the valley floor at an elevation of approximately 308 feet above sea level with the surrounding area mostly flat. The City of Fresno is in the center of the San Joaquin Valley, located approximately 220 miles northwest of the City of Los Angeles and 170 miles south of the City of Sacramento. Figures 1-1 and 1-2 show the location of the MOB Project along with major roadways and highways in the MOB Project area. The MOB Project site plan is provided in Figure 1-3.

1.1.1 *Project Access*

Site access will be provided at the existing intersections of Locust Avenue and First Street and Private Driveway (north of Locust Avenue) and First Street. The Locust Avenue and First Street intersection will provide left-in/left-out and right-in/right out access while the Private Driveway and First street intersection provides left-in and right-in/right-out access only.

1.1.2 *Study Area*

The roadway segments included in this TIS include:

- ✓ First Street between:
  - Alluvial Avenue and Private Driveway
  - Private Driveway and Herndon Avenue
- ✓ Herndon Avenue between:
  - Fresno Street and First Street

1.1.3 *Study Scenarios*

The TIS completed for the proposed MOB Project includes level of service (LOS) analysis for the following traffic scenarios:

- ✓ Existing Conditions
- ✓ Existing Plus Project
- ✓ Near-Term (Opening Year)
- ✓ Cumulative Year 2042 Without Project
- ✓ Cumulative Year 2042 Plus Project

1.2 Methodology

When preparing this TIS, guidelines set by the City of Fresno were followed. In analyzing roadway segment capacities, LOS methodologies from the Highway Capacity Manual (HCM) 6th Edition were applied. The City of Fresno LOS standards were applied to quantitatively assess the performance of study area roadway segments. In addition, safety concerns were considered when determining the need for appropriate mitigation resulting from increased traffic near sensitive uses.

1.2.1 *Roadway Segment Analysis*

The General Plan EIR analyzed future development's potential environmental effects by projecting the LOS on roadway segments throughout the City. Accordingly, the TIS analyzed the MOB Project's effect on roadway segments for comparison purposes with the impacts identified by the General Plan EIR.

According to the HCM, LOS is categorized by two parameters of traffic: uninterrupted and interrupted flow. Uninterrupted flow facilities do not have fixed elements such as traffic signals that cause interruptions in traffic flow. Interrupted flow facilities do have fixed elements that cause an interruption in the flow of traffic, such as stop signs and signalized intersections along arterial roads. A roadway segment is defined as a stretch of roadway generally located between signalized or controlled intersections.

Segment LOS is important in order to understand whether the capacity of a roadway can accommodate future traffic volumes. Table 1-1 provides a definition of segment LOS. The performance criteria used for evaluating volumes and capacities on the road and highway system for this study were estimated using Table 5.14-2 (Roadway Functional Class and Peak Hour Level-of-Service Thresholds) from the City of Fresno General Plan and Development Code Update Master Environmental Impact Report. The tables consider the capacity of individual road and highway segments. Street segment capacity was determined using information shown in Table 1-2 based on the Level of Service Tables included in Appendix A. Traffic counts and roadway geometrics used to develop LOS calculations were obtained from field review findings and count data provided from the traffic count sources identified in Section 2.1.

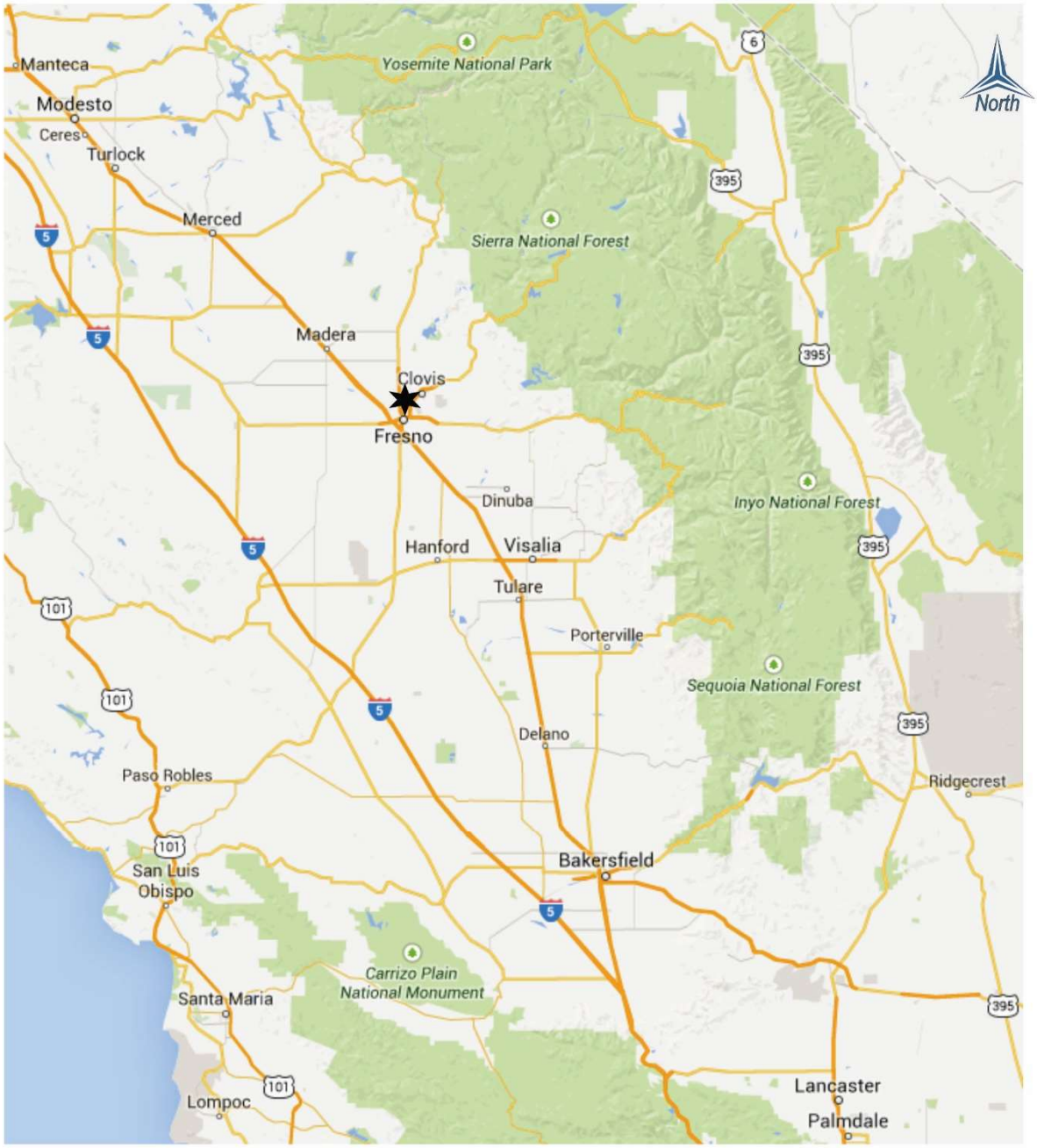
1.3 Policies to Maintain Level of Service

Although not considered impacts for CEQA purposes, the General Plan establishes LOS performance criteria for intersections within the City to maintain acceptable levels of service along the highway, street, and road network. To accomplish this, the City of Fresno adopted minimum levels of service in an attempt to control congestion that may result as new development occurs. Accordingly, the TIS also analyzed the MOB Project's effect on LOS at key intersections for comparison purposes with the standards identified by the General Plan.

The City of Fresno's General Plan (Adopted December 18, 2014), policy number MT-1-n, identifies a peak hour LOS standard of D or better for all roadway areas outside of identified

Activity Center and Bus Rapid Transit Corridor districts, unless the City Traffic Engineer determines that mitigation to maintain this LOS would be infeasible and/or conflict with the achievement of other General Plan policies.

Kaiser Permanente - Fresno Medical Office Building **Figure 1-1**
Regional Location



LEGEND

★ Project Location

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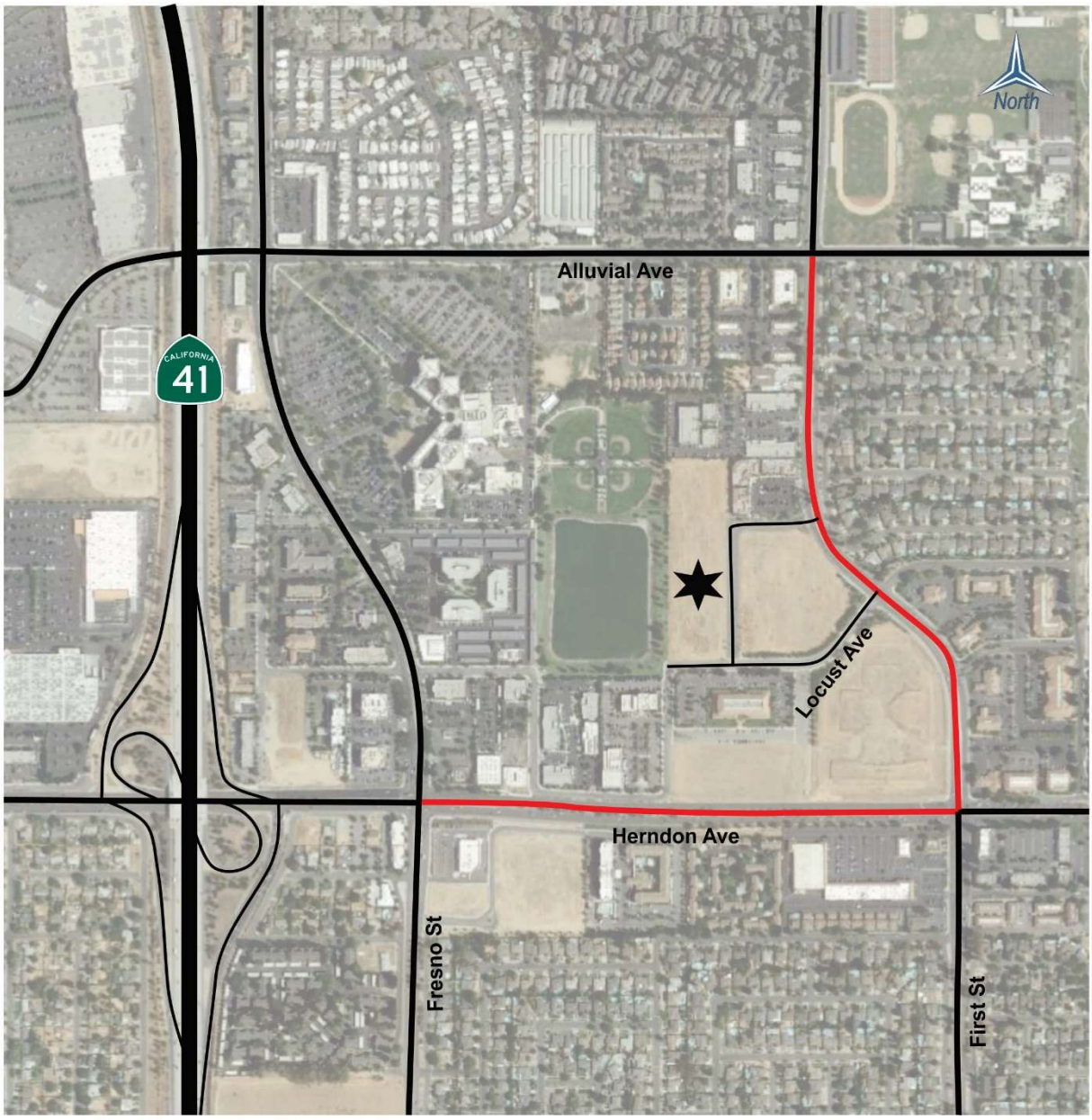
Kaiser Permanente - Fresno Medical Office Building
Project Location

Figure 1-2



Kaiser Permanente - Fresno Medical Office Building
Project Site Plan

Figure 1-3



Table 1-1
Roadway Segment
Level of Service Definitions
(Highway Capacity Manual)

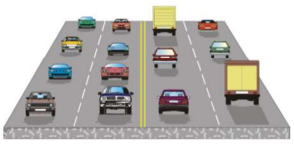
LEVEL OF SERVICE	DEFINITION	
A	Represents free flow. Individual vehicles are virtually unaffected by the presence of others in the traffic stream.	
B	Is in the range of stable flow, but the presence of other vehicles in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver.	
C	Is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual vehicles becomes significantly affected by interactions with other vehicles in the traffic stream.	
D	Is a crowded segment of roadway with a large number of vehicles restricting mobility and a stable flow. Speed and freedom to maneuver are severely restricted, and the driver experiences a generally poor level of comfort and convenience.	
E	Represents operating conditions at or near the level capacity. All speeds are reduced to a low, but relatively uniform value. Small increases in flow will cause breakdowns in traffic movement.	
F	Is used to define forced or breakdown flow (stop-and-go gridlock). This condition exists when the amount of traffic approaches a point where the amount of traffic exceeds the amount that can travel to a destination. Operations within the queues are characterized by stop and go waves, and they are extremely unstable.	

Table 1-2
Peak Hour Two-Way Volumes

Level of Service					
Lanes	Divided	B	C	D	E
City Expressway					
2	Divided	*	520	1,910	2,160
4	Divided	*	1,180	4,050	4,340
6	Divided	*	1,860	6,170	6,520
City Arterial					
2	Divided	*	440	1,640	1,860
4	Divided	*	1,000	3,470	3,730
6	Divided	*	1,560	5,270	5,610

* LOS is not achievable because of type of facility

2.0 Existing Conditions

2.1 Existing Traffic Counts and Roadway Geometrics

The first step toward assessing MOB Project traffic impacts is to assess existing traffic conditions. Existing AM and PM peak hour turning movements were collected at intersections adjacent to study roadway segments by National Data and Surveying Services. Intersection turning movement counts were conducted for the peak hour periods of 7:00-9:00 AM and 4:00-6:00 PM for all study intersections on Tuesday, October 22, 2019. Traffic count data worksheets are provided in Appendix B. The day on which counts were taken is representative of typical traffic volumes within the study area. Schools were in session and the weather was mild.

2.2 Existing Functional Roadway Classification System

Functional classification is the process by which streets and highways are grouped into classes, or systems, according to the type of service they are intended to provide. Fundamental to this process is the recognition that individual streets and highways do not serve travel independently in any major way. Rather, most travel involves movement through a network of roads.

The current hierarchical system of roadways consists of the following six (6) basic classifications:

- ✓ **Freeways** – Limited-access facilities designed for high speed regional mobility. Freeways may include up to eight lanes (four lanes in each direction).
  - **State Route 41** – currently exists as a six-lane facility with a posted speed limit of 65 mph in the study area. According to the California Department of Transportation's website, the average annual daily traffic (AADT) along SR 41 in this area consisted of approximately 109,000 trips in 2017.
- ✓ **Expressways** – are high-speed, two- to six-lane divided roadways, primarily servicing through and cross-town traffic, with no direct access to abutting property and at-grade intersections located at approximately half-mile intervals. Expressways do not presently exist within the study area.
  - **Herndon Avenue** – is a divided 6-lane roadway with a posted speed limit of 50 mph.
- ✓ **Super Arterials** – Four-to six-lane divided roadways with a primary purpose of moving traffic to and from major traffic generators and between community plan areas. Access will typically be limited to right-turn entrance and exit vehicular movements. Super Arterials do not presently exist within the study area.
- ✓ **Arterial** – Four- to six-lane divided roadways, with somewhat limited access to abutting properties, and with the primary purpose of moving traffic within and between community plan areas and to and from freeways and expressways.

- **Fresno Street** – is a divided 4-lane roadway with a posted speed limit of 45. Class II bike lanes are present along the roadway north of Herndon Avenue.
- **Alluvial Avenue** – is a divided 4-lane roadway with a posted speed limit of 40 mph. Class II bike lanes are present along the roadway.
- **First Street** – is a divided 4-lane roadway with a posted speed limit of 40 mph. Class II bike lanes are present along the roadway.

✓ **Collectors** – Two to four-lane undivided roadways, with the primary function of connecting local streets and arterials and neighborhood traffic generators and providing access to abutting properties.

✓ **Local Streets** – Two- to three-lane public or private roadways designed to provide direct access to properties while discouraging through traffic between major streets. They are intended to carry low volumes of traffic and support unrestricted on-street parking.

- **Locust Avenue** – is an undivided 2-lane roadway without a posted speed limit.

2.3 Affected Streets and Highways

Roadway segments near and adjacent to the MOB Project site were analyzed to determine levels of service utilizing HCM-based methodologies described previously. The study roadway segments included in this TIS are listed below. Counts were taken on Tuesday, October 22, 2019.

Roadway Segments

✓ First Street between:
- Alluvial Avenue and Private Driveway
- Private Driveway and Herndon Avenue

✓ Herndon Avenue between:
- Fresno Street and First Street

The existing lane geometry at study roadway is shown in Figure 2-1. Figures 2-2 and 2-3 show existing traffic volumes for the AM and PM peak hours in the study area.

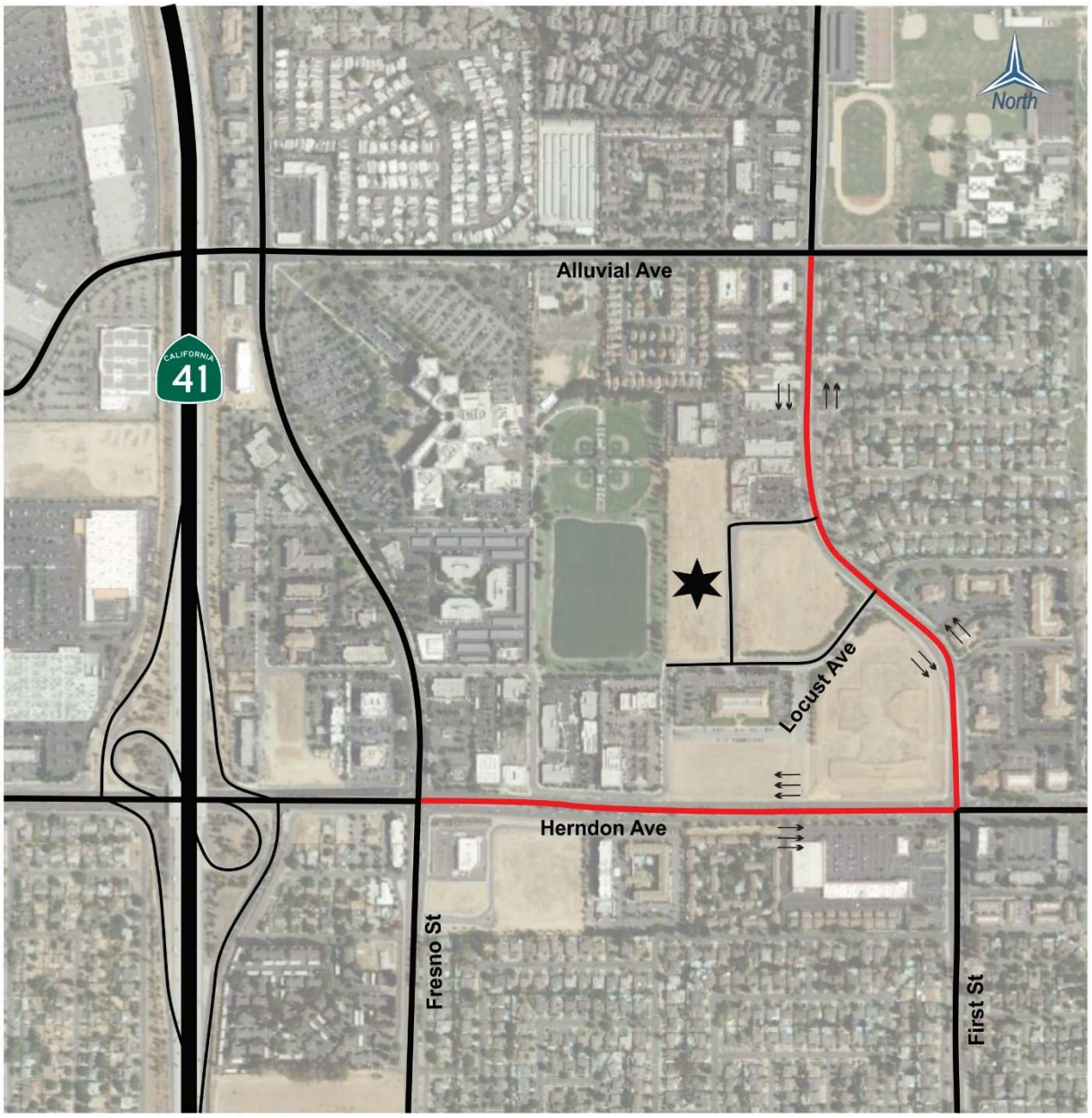
2.4 Level of Service

2.4.1 *Roadway Segment Capacity Analysis*

Results of the AM and PM peak hour LOS segment analysis along the existing street system are reflected in Table 2-1. The performance criteria used for evaluating volumes and capacities on the road and highway system for this study were estimated using Table 5.14-2 from the City of Fresno General Plan and Development Code Update Master Environmental Impact Report included in Appendix A. Results of the analysis show that all of the study roadway segments meet the minimum acceptable level of service criteria during both the AM and PM peak hour.

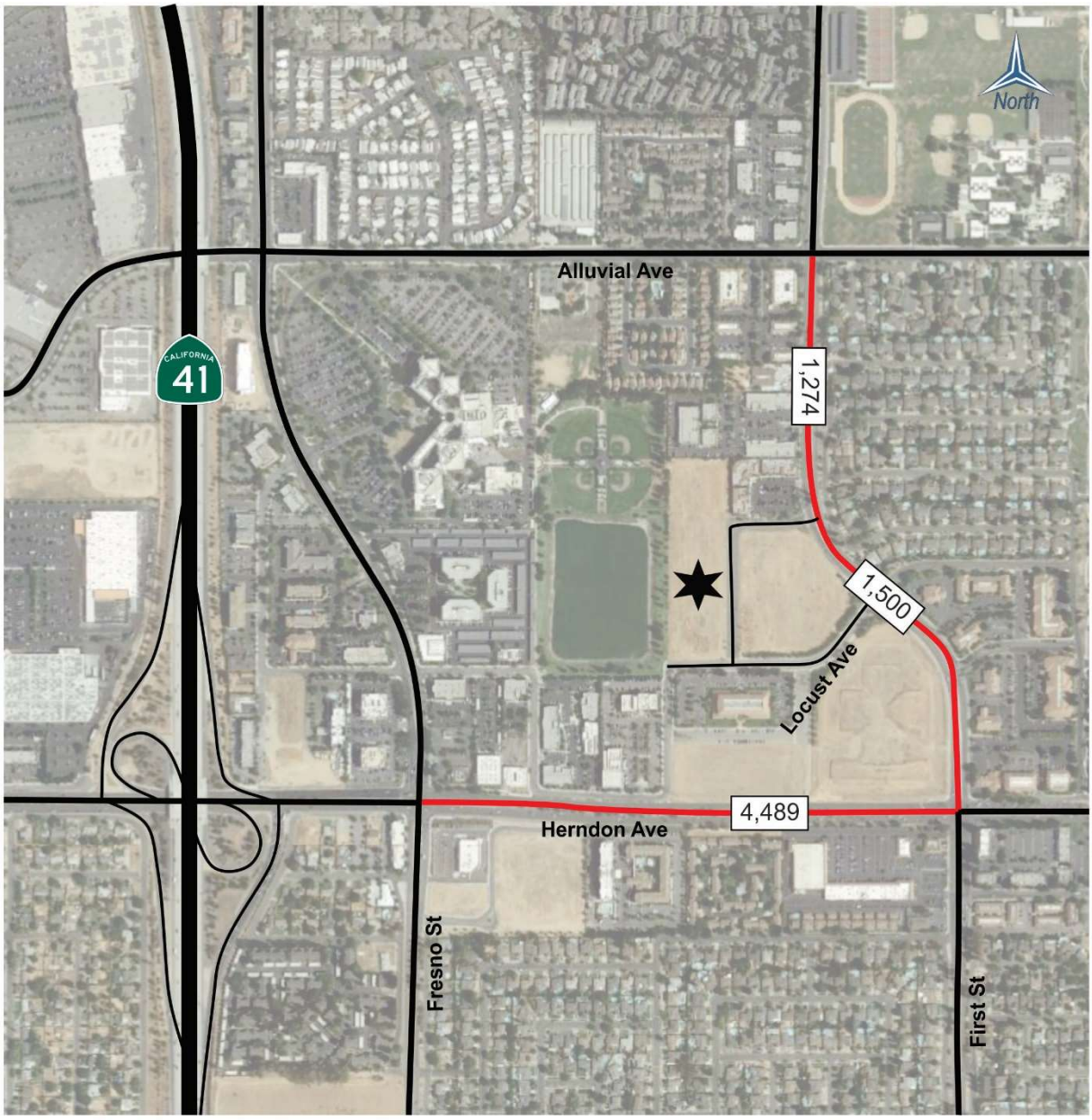
Kaiser Permanente - Fresno Medical Office Building
Existing Lane Geometry

Figure 2-1



Kaiser Permanente - Fresno Medical Office Building
Existing AM Peak Hour Traffic

Figure 2-2



Kaiser Permanente - Fresno Medical Office Building
Existing PM Peak Hour Traffic

Figure 2-3

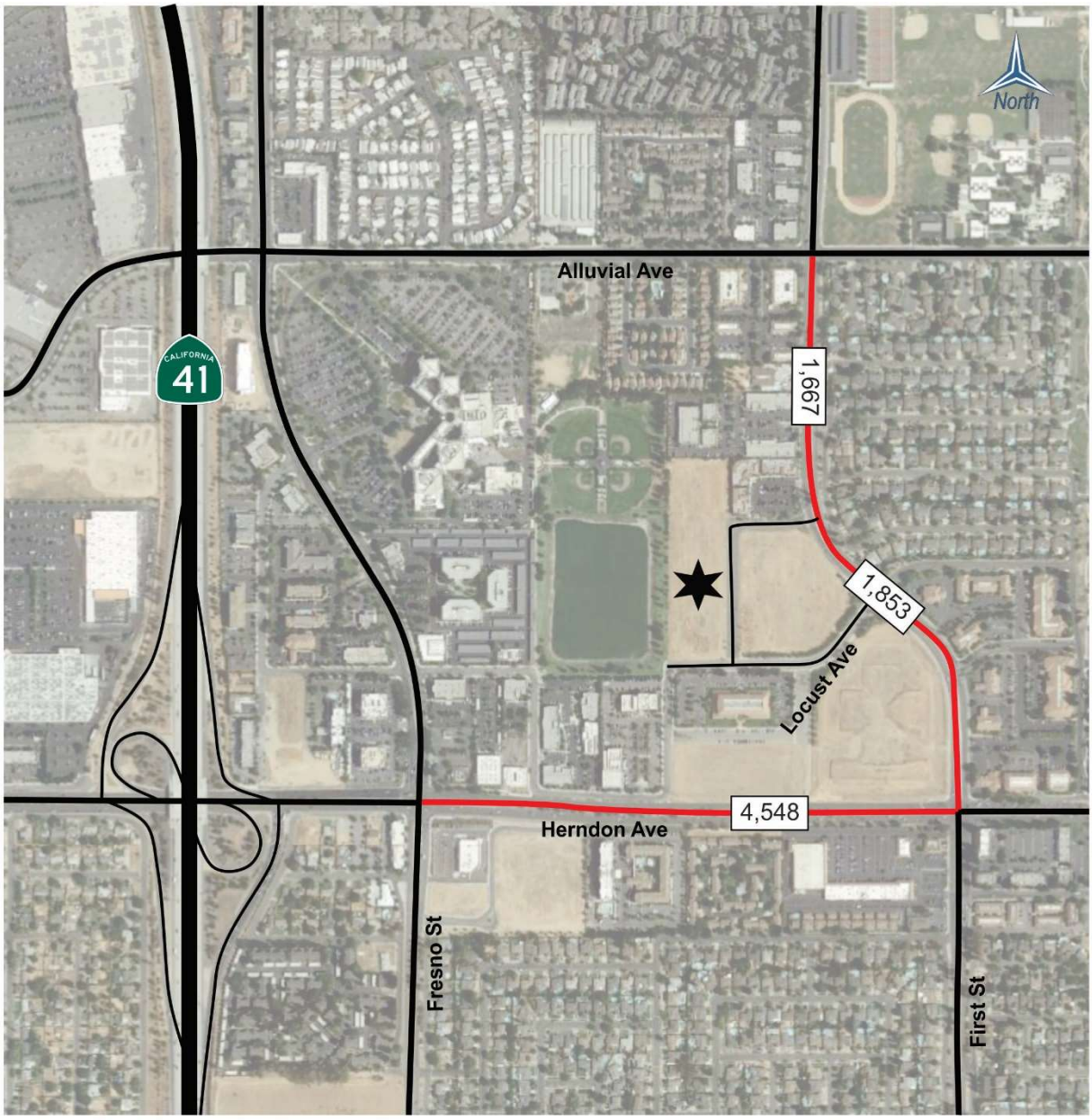


Table 2-1
Existing Segment Operations

STREET SEGMENT	SEGMENT DESCRIPTION	TARGET LOS	PEAK HOUR	EXISTING	
				VOLUME	LOS
Herndon Avenue					
Fresno Street to First Street	6 Lanes Divided (Expressway)	D	AM	4,489	D
			PM	4,548	D
First Street					
Alluvial Avenue to Private Driveway	4 Lanes Divided (Arterial)	D	AM	1,274	D
			PM	1,667	D
Private Driveway to Herndon Avenue	4 Lanes Divided (Arterial)	D	AM	1,500	D
			PM	1,853	D

LOS = Level of Service / **BOLD** denotes LOS standard has been exceeded

2.5 Bikeway and Pedestrian Facilities

Investment in bikeways provides an inexpensive environment-friendly transportation opportunity. Bicycling is considered an effective alternative mode of transportation that can help to improve air quality and reduce the number of vehicles traveling along existing highways, especially within the cities and unincorporated communities. While the numbers of cyclists are small in comparison to the amount of auto traffic, the City of Fresno seeks to use a more flexible system of multi-modal measures or indicators of LOS provided by public roadways to evaluate current and projected conditions for each mode of travel and identify congestion points or deficiencies which need to be addressed in planning for future improvements.[1] Existing bikeway facilities in the study area are presented in Figure 2-4.

Pedestrian facilities include sidewalks, walkways, crosswalks, signals, lighting, and benches, among other items. Where such facilities exist, people will be much more likely to make shorter trips by walking rather than by vehicle. Pedestrian facilities serving the school and recreational facilities enhance the safety of those who choose to walk to and from these destinations. Existing sidewalks in the study area are also presented in Figure 2-4.

2.6 Public Transit and Active Transport Systems

While congestion is not currently a major issue in the study area, overreliance on automobiles creates other costs for both society and households and means that many in the southeast community who cannot drive (the young, the old, the disabled, the poor) must rely on those who can drive for their mobility. For this reason, it is important to encourage public transit systems

1 City of Fresno General Plan (Adopted December 18, 2014) – Chapter 4 Mobility and Transportation

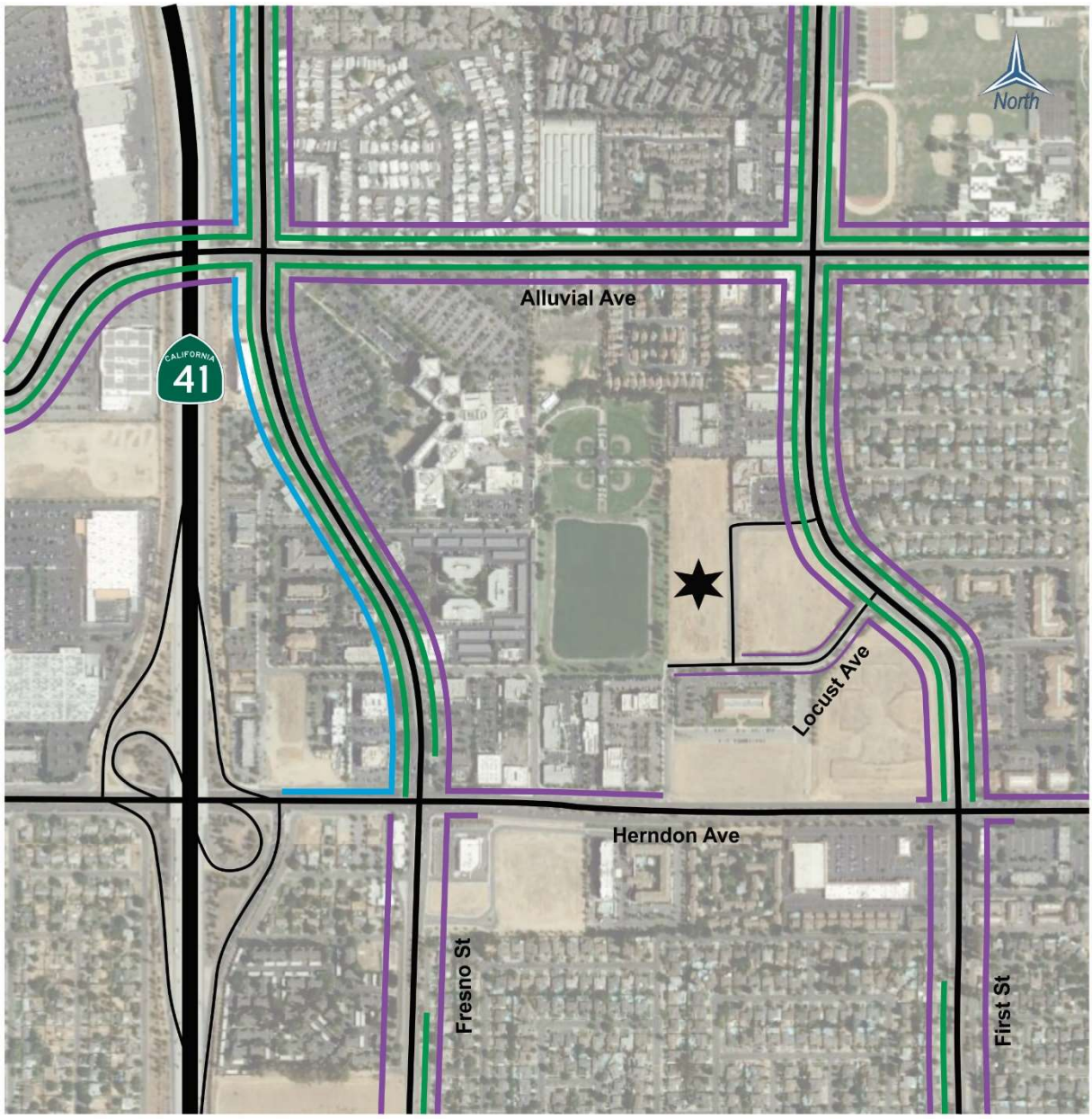
and increased use of active modes of transportation, including bicycling and walking. The public transit system alternatives in the study area include fixed route public transit systems.

Figure 2-5 shows existing transit routes in the study area. All shown bus routes are serviced by Fresno Area Express (FAX). FAX Routes 32 and 34 operate in the study area with multiple stops within a mile of the MOB Project site. The Yosemite Area Regional Transportation System (YARTS) provides regularly scheduled public transit service into Yosemite National Park which includes a bus stop along Fresno Street north of Herndon Avenue.

2.7 Study Area Collision Data

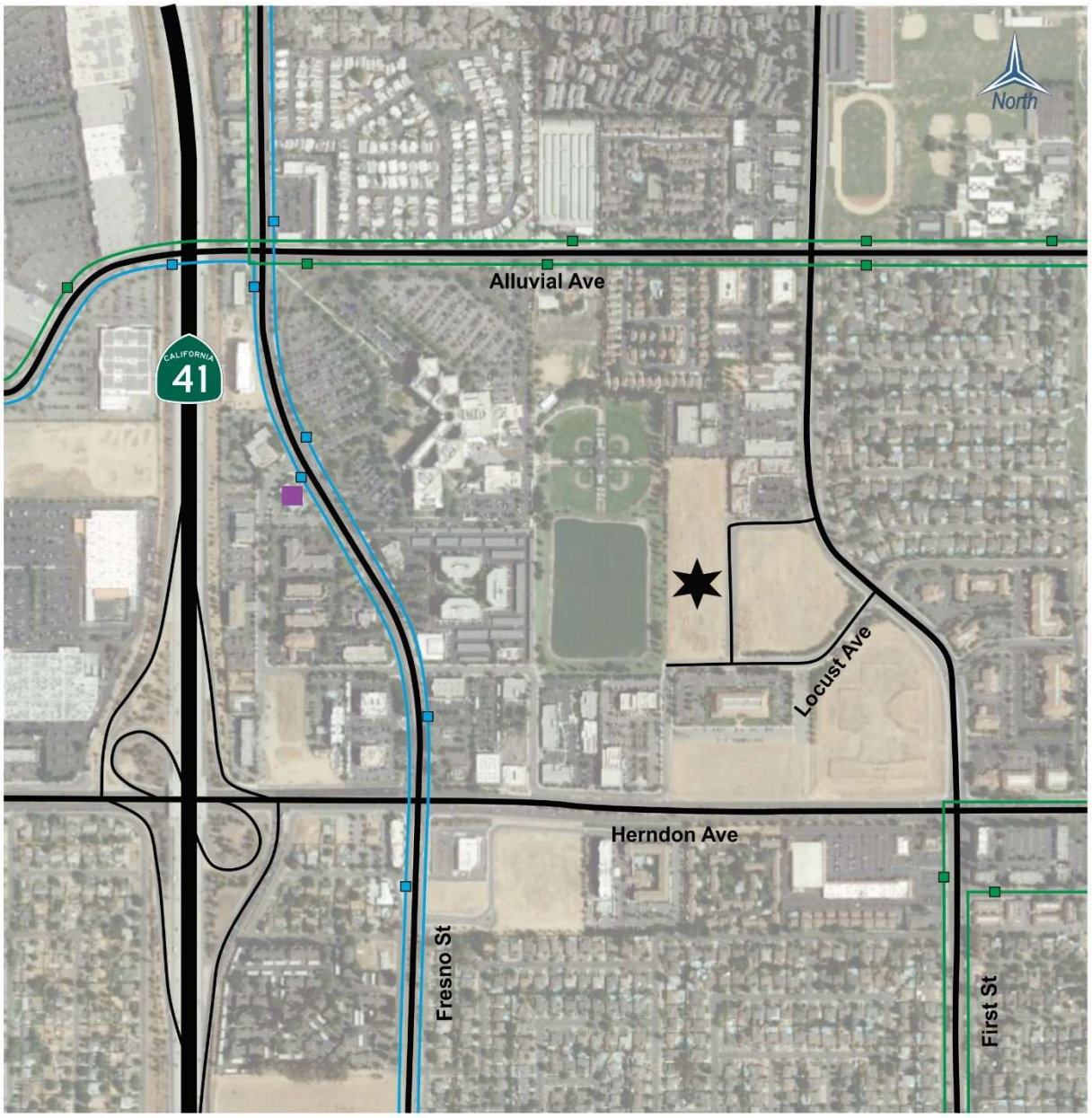
The Transportation Injury Mapping System (TIMS) provided by University of California, Berkeley was used to evaluate traffic collisions in the study area. TIMS utilizes geocoded data provided by the Statewide Integrated Traffic Records System (SWITRS). SWITRS is a tool used by California Highway Patrol (CHP) and other Allied Agencies throughout California and includes various types of statistical reports and data. The database serves as a means to collect and process data gathered from a collision scene. Information from the TIMS database shows that approximately 23 injury or fatal accidents have occurred throughout the study area in the past 5 years. A graphical representation of traffic collisions throughout the study area for the past 5 years is provided in Figure 2-6. Collision data worksheets are provided in Appendix C. Fresno County had approximately 14,495 injury or fatal accidents over the same timeframe referenced above. The City of Fresno had 634. Injury and fatal accidents in the study area represent 0.2% of incidents that occurred in Fresno County and 4% of incidents that occurred in the City of Fresno.

Kaiser Permanente - Fresno Medical Office Building **Figure 2-4**
Existing Bicycle and Pedestrian Facilities



Kaiser Permanente - Fresno Medical Office Building
Existing Transit Facilities

Figure 2-5



Kaiser Permanente - Fresno Medical Office Building
Study Area Collision Map (01/01/2014 - 12/31/2018)

Figure 2-6



3.0 Traffic Impacts

This chapter provides an assessment of the traffic the MOB Project is expected to generate and the impact of that traffic at study area road segments.

3.1 Trip Generation

To assess the impacts that the MOB Project may have on the surrounding roadway network, the first step is to determine MOB Project trip generation. MOB Project trip generation was determined using trip generation rates from the Institute of Transportation Engineers (ITE) Trip Generation Manual (10th Edition). Trips associated with the approximately 145,000-square foot medical office development was derived from the Medical-Dental Office Building (720) Land Use in the ITE Trip Generation Manual. The considerations described above led to the recommended trip generation for weekday AM (7:00-9:00am) and PM (4:00-6:00pm) peak hours shown in Table 3-1. It should be noted that Kaiser Permanente representatives have indicated that health care providers that will operate out of the new medical office building will transfer from the Fresno Medical Center and First Street Medical Offices. Consequently, patients being served by said health care providers will also relocate to the new medical office building. However, the LOS analysis provided in this traffic study did not account for the relocation of 'existing' health care providers and patients to the new medical office building. Instead, the traffic analysis conservatively estimated that all trips to the MOB Project site are 'new' trips.

Table 3-1
Project Trip Generation

LAND USE	Quantity	DAILY TRIP ENDS (ADT)		WEEKDAY AM PEAK HOUR					WEEKDAY PM PEAK HOUR				
		RATE	VOLUME	RATE	IN:OUT SPLIT	VOLUME			RATE	IN:OUT SPLIT	VOLUME		
						IN	OUT	TOTAL			IN	OUT	TOTAL
Medical Office (720)	145.000 k.s.f	34.8	5,046	2.78	78:22	314	89	403	3.46	28:72	140	362	502
TOTAL TRIP GENERATION			**5,046**			**314**	**89**	**403**			**140**	**362**	**502**

Source: Generation factors from ITE Trip Generation Manual, 10th Edition.
Trip ends are one-way traffic movements, entering or leaving.
The numbers in parenthesis are ITE land use codes.

3.2 Trip Distribution

MOB Project trip distribution is shown in Figure 3-1 and is based upon a select zone run prepared by the Fresno Council of Governments (Fresno COG), as well as engineering judgement, prevailing traffic patterns in the study area, complementary land uses, major routes, and population centers. Fresno COG model plots are provided in Appendix D.

3.3 Project Traffic

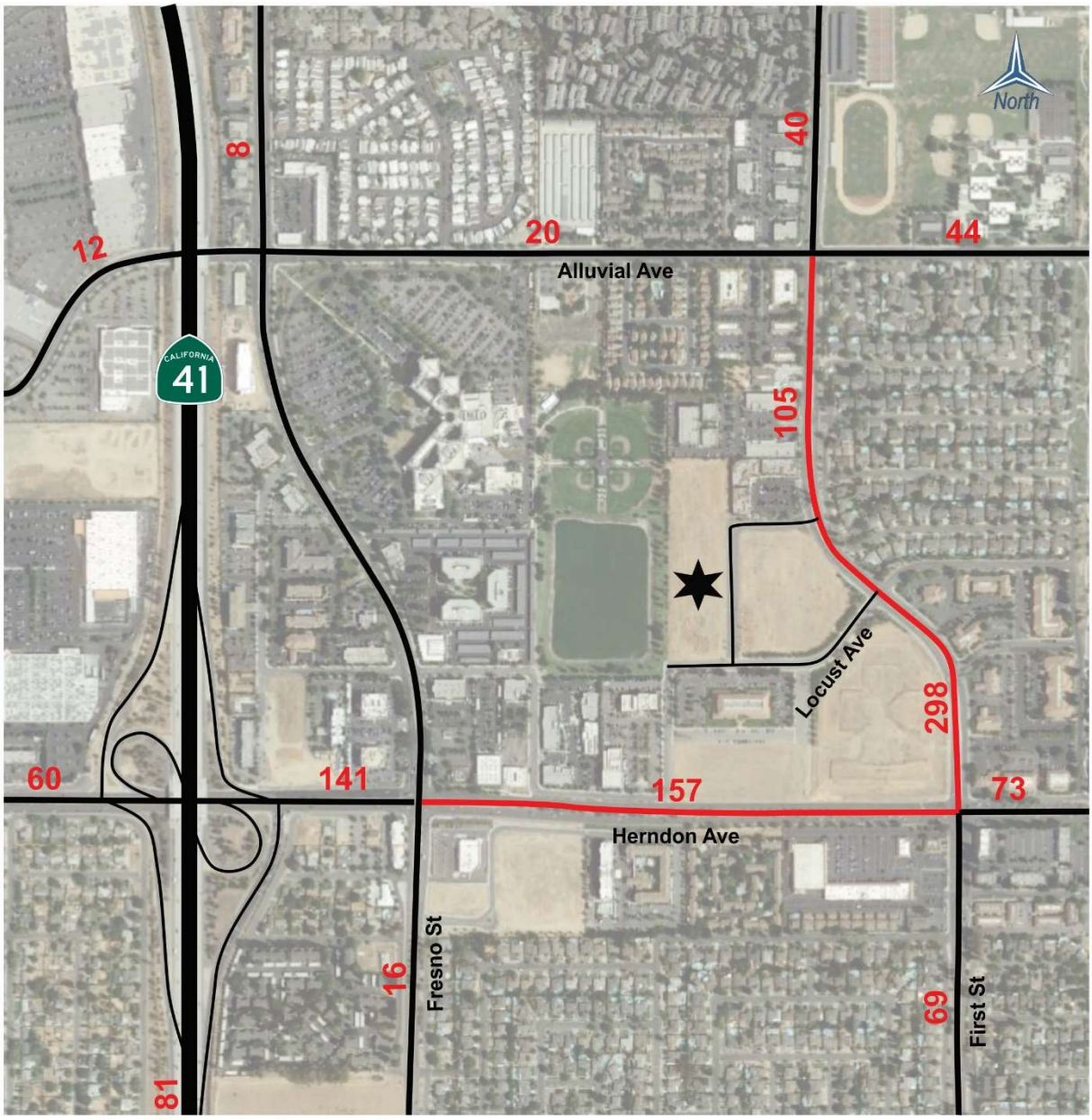
MOB Project traffic as shown in Table 3-1 was distributed to the roadway system using the trip distribution percentages shown in Figure 3-1. A graphical representation of the resulting AM and PM peak hour MOB Project trips used is shown in Figures 3-2 and 3-3.

Kaiser Permanente - Fresno Medical Office Building
Project Trip Distribution

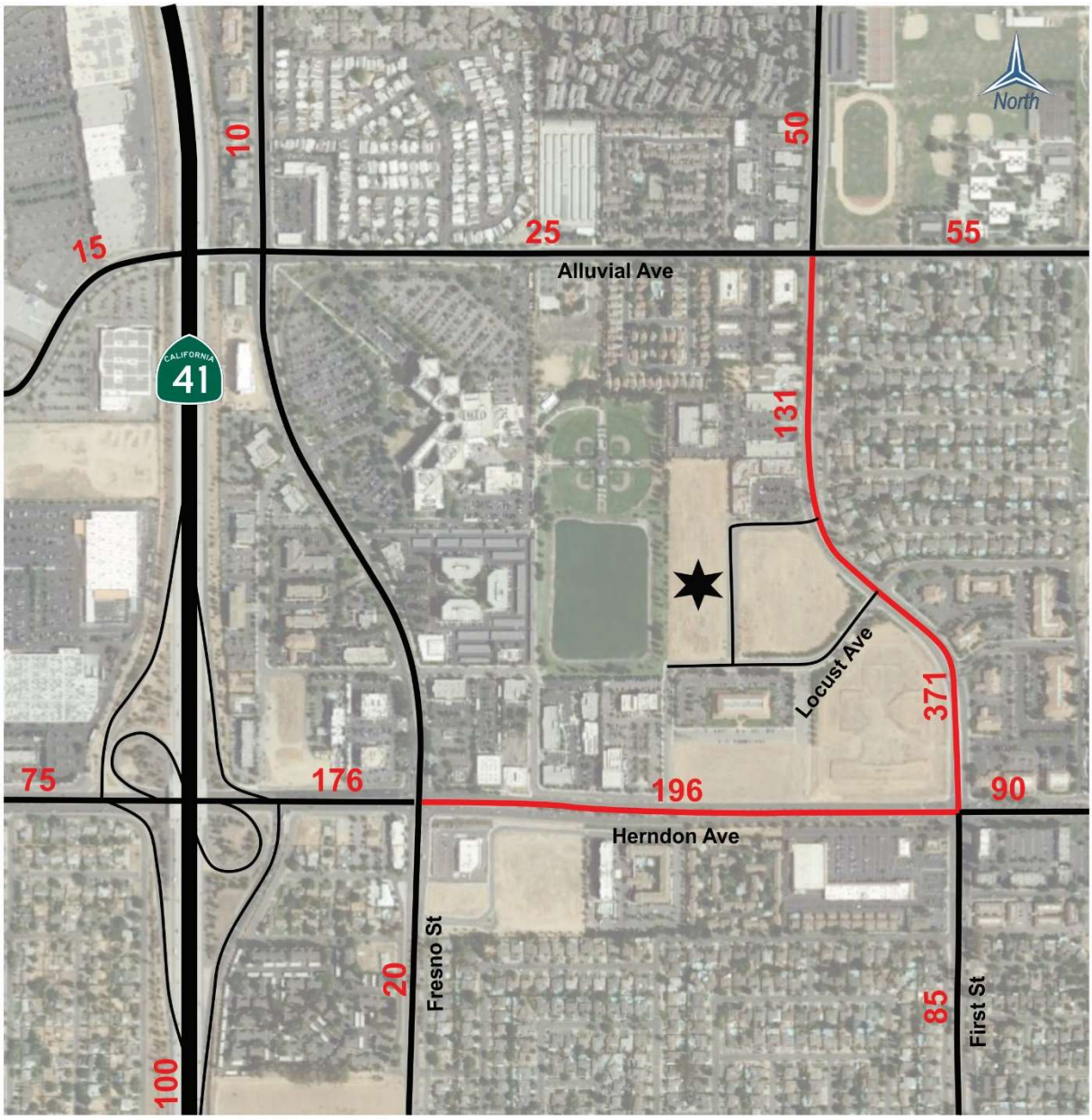
Figure 3-1



Kaiser Permanente - Fresno Medical Office Building **Figure 3-2**
Project AM Peak Hour Trips



Kaiser Permanente - Fresno Medical Office Building **Figure 3-3**
Project PM Peak Hour Trips



3.4 Existing Plus Project Traffic Conditions

An Existing Plus Project Scenario was analyzed to include existing traffic plus traffic generated by the MOB Project. The resulting traffic is shown in Figures 3-4 and 3-5.

3.5 Approved/Pending Project Traffic

Traffic impact analyses typically require the analysis of approved or pending developments that have not yet been built in the vicinity of the MOB Project. There are several development projects in the MOB Project's vicinity that will add new trips to the roadway segments being evaluated in this TIS. The approved and pending developments are listed below.

- ✓ Home 2 Suites by Hilton Development – 117 room hotel with ancillary facilities
- ✓ Brighton Academy Child Day Care Facility – 4,700 square foot facility
- ✓ Kaiser Hospital – 39,259 square foot hospital expansion and 6,020 square foot modular medical office building
- ✓ Tract Map 6211 – 8 lot single family residential subdivision
- ✓ Sugar Pine Business Center – 7,800 square feet of retail/office use
- ✓ Medical/Dental Office – 6,800 square foot building

Trip generation and distribution information for the approved and pending developments was estimated using trip generation rates from the ITE Trip Generation Manual (10th Edition) and engineering judgement and prevailing traffic patterns. Figure 3-6 shows the location of the Approved and Pending projects used in the analysis while Figure 3-7 shows the AM and PM peak hour trips for Approved and Pending project traffic. The peak hour trips for the Approved and Pending project traffic was applied to the Near-Term and Cumulative Year 2042 traffic conditions discussed later in the report.

3.6 Near-Term Traffic Conditions

A Near-Term Scenario was analyzed to include year 2022 traffic (estimated MOB Project Opening-Day) plus traffic generated by the MOB Project plus traffic generated by approved and pending projects. The 2022 traffic volumes were estimated by utilizing the incremental method and the TurnsW32 program. Interpolating between the 2019 and 2035 segment volumes of the regional travel models determined the 2022 street segment volumes. The TurnsW32 program calculated the forecasted turning movement volumes for the year 2022 by utilizing these 2022 segment volumes along with the existing traffic volumes for all turning movements. For reference, TurnsW32 worksheets are provided in Appendix E. The resulting traffic is shown in Figures 3-8 and 3-9.

Kaiser Permanente - Fresno Medical Office Building **Figure 3-4**
Existing Plus Project AM Peak Hour Traffic

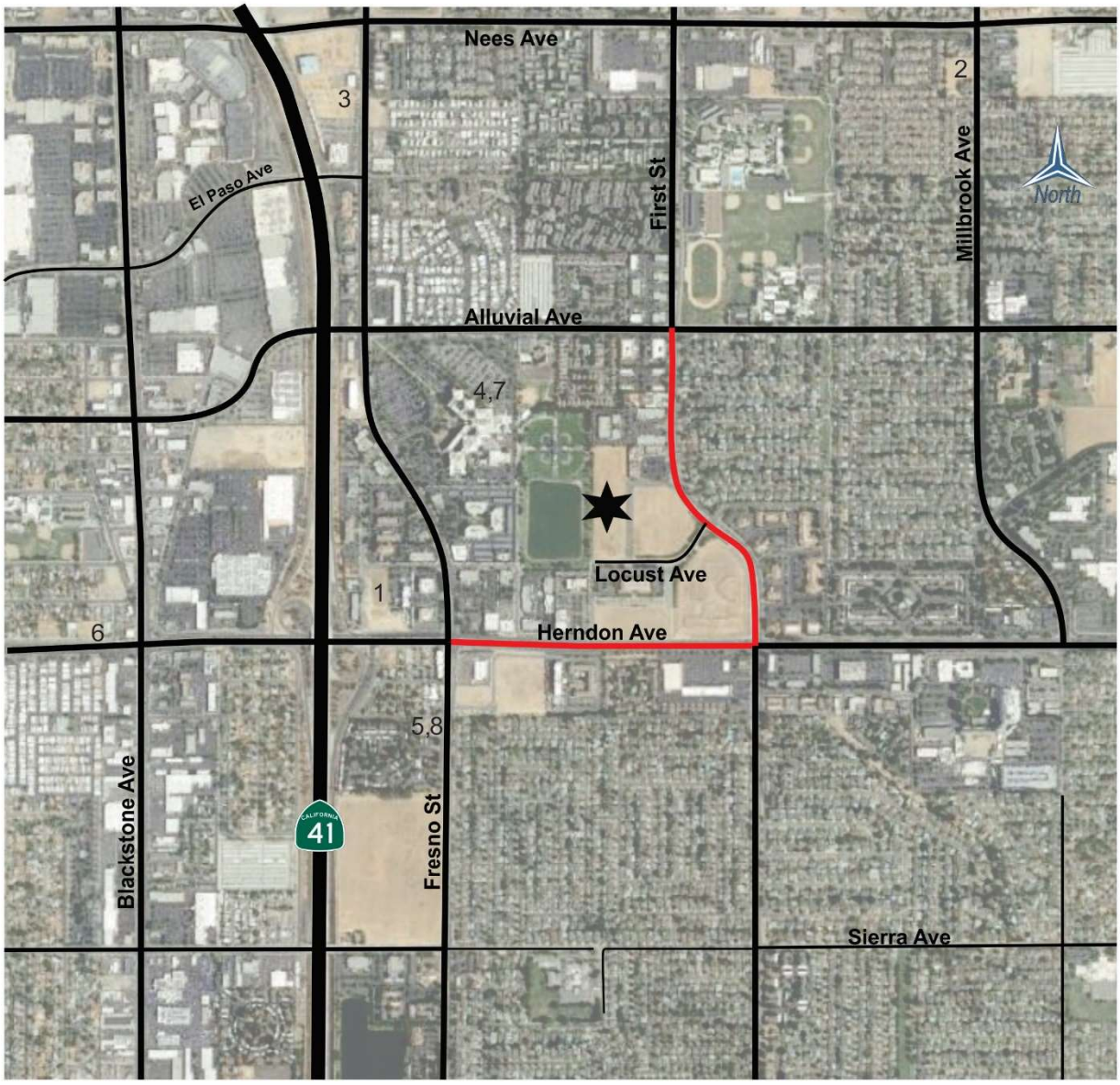


Kaiser Permanente - Fresno Medical Office Building **Figure 3-5**
Existing Plus Project PM Peak Hour Traffic



Kaiser Permanente - Fresno Medical Office Building
Approved/Pending Project Location

Figure 3-6



LEGEND

- Project Location
- Study Segment

1 - Home 2 Suites by Hilton
2 - Proposed 8-Lot SFR Subdivision
3 - 7,800sf retail/office use building
4 - 6,020sf modular medical office building
5 - 6,800sf medical/dental office building
6 - 3,127sf office building
7 - 39,259sf hospital expansion
8 - 4,704sf day care facility

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Kaiser Permanente - Fresno Medical Office Building **Figure 3-7**
Approved/Pending Project AM and PM Peak Hour Traffic



Kaiser Permanente - Fresno Medical Office Building
Near-Term Plus Project AM Peak Hour Traffic

Figure 3-8



Kaiser Permanente - Fresno Medical Office Building **Figure 3-9**
Near-Term Plus Project PM Peak Hour Traffic



3.7 Cumulative Year 2042 Without Project Traffic Conditions

The impacts of the MOB Project were analyzed considering future traffic conditions, approximately twenty (20) years after the assumed opening day of the MOB Project, or in this case the year 2042. The levels of traffic expected in 2042 relate to the cumulative effect of traffic increases resulting from the implementation of the General Plans of local agencies, including the City of Fresno and Fresno County. Traffic conditions without the MOB Project in the Year 2042 were estimated using the Fresno COG regional travel model. Future traffic forecasts along study area roadway segments were estimated by utilizing the incremental method published by Fresno COG and the TurnsW32 program.

For reference, the Fresno COG model outputs are provided in Appendix D. Traffic conditions resulting from this scenario are shown in Figures 3-10 and 3-11.

3.8 Cumulative Year 2042 Plus Project Traffic Conditions

The addition of MOB Project trips, which were distributed to the roadway system using the trip distribution percentages shown in Figure 3-1 (Section 3.3), were added to Cumulative Year 2042 Without MOB Project traffic volumes. This leads to the results shown in Figures 3-12 and 3-13.

3.9 Impacts

3.9.1 *Segment Capacity Analysis*

Results of the AM and PM peak hour LOS segment analysis along the existing street and highway system are reflected in Table 3-2. Results of the analysis show that all of the study roadway segments meet the minimum acceptable level of service criteria during both the AM and PM peak hour when considering the Existing Plus Project, Near-Term Plus Project, Cumulative Year 2042 Without Project and Cumulative Year 2042 Plus Project scenarios. This is consistent with the General Plan EIR, which concluded that implementation of General Plan policies would result in less than significant impacts to the segments within the City of Fresno and significant and unavoidable impacts to roadways within Fresno County. As a result, this TIS shows that traffic impacts resulting from the MOB Project would be within the impacts analyzed in the General Plan EIR.

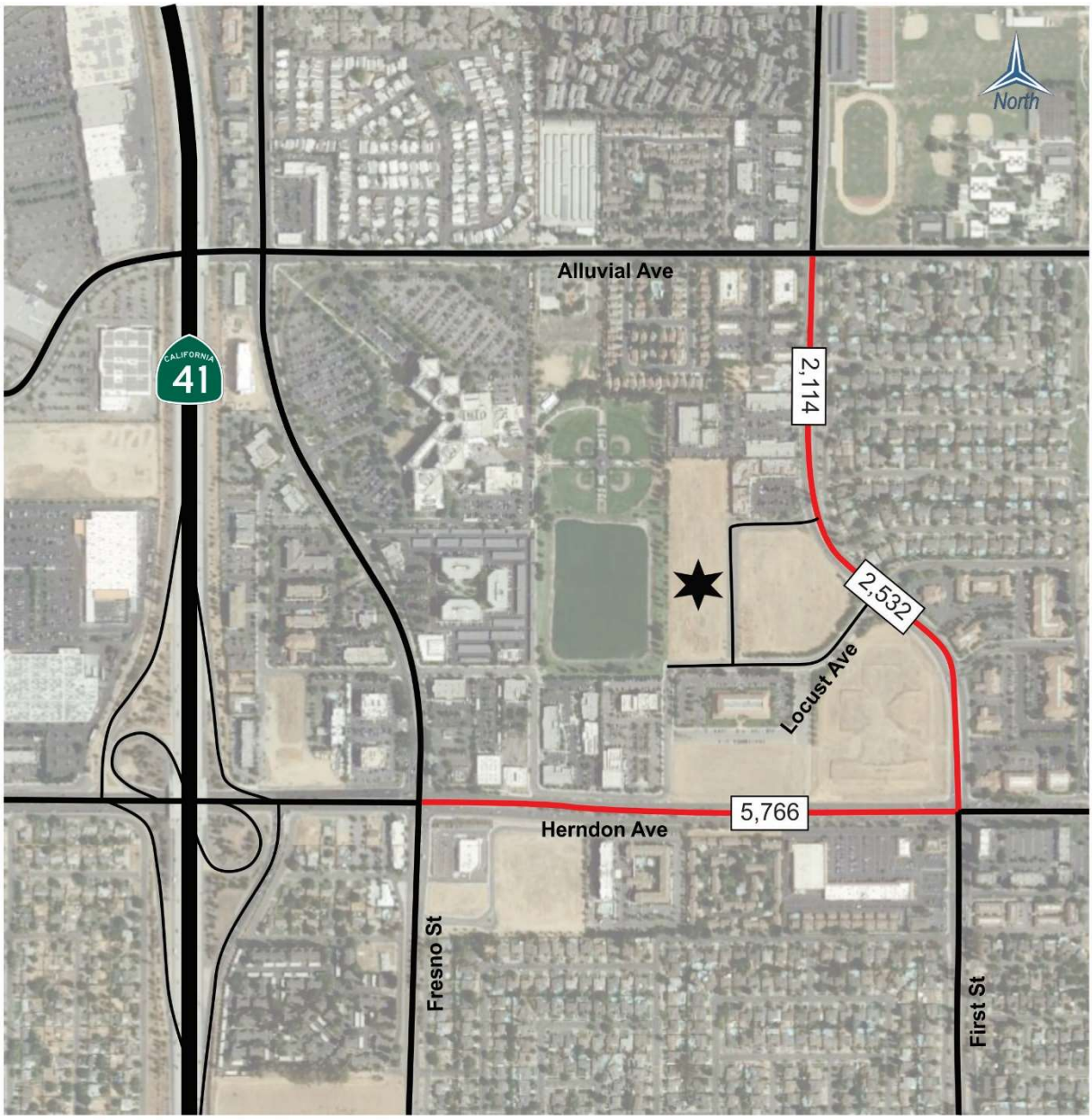
Kaiser Permanente - Fresno Medical Office Building **Figure 3-10**
Cumulative Year 2042 Without Project AM Peak Hour Traffic



Kaiser Permanente - Fresno Medical Office Building **Figure 3-11**
Cumulative Year 2042 Without Project PM Peak Hour Traffic



Kaiser Permanente - Fresno Medical Office Building **Figure 3-12**
Cumulative Year 2042 Plus Project AM Peak Hour Traffic



Kaiser Permanente - Fresno Medical Office Building **Figure 3-13**
Cumulative Year 2042 Plus Project PM Peak Hour Traffic

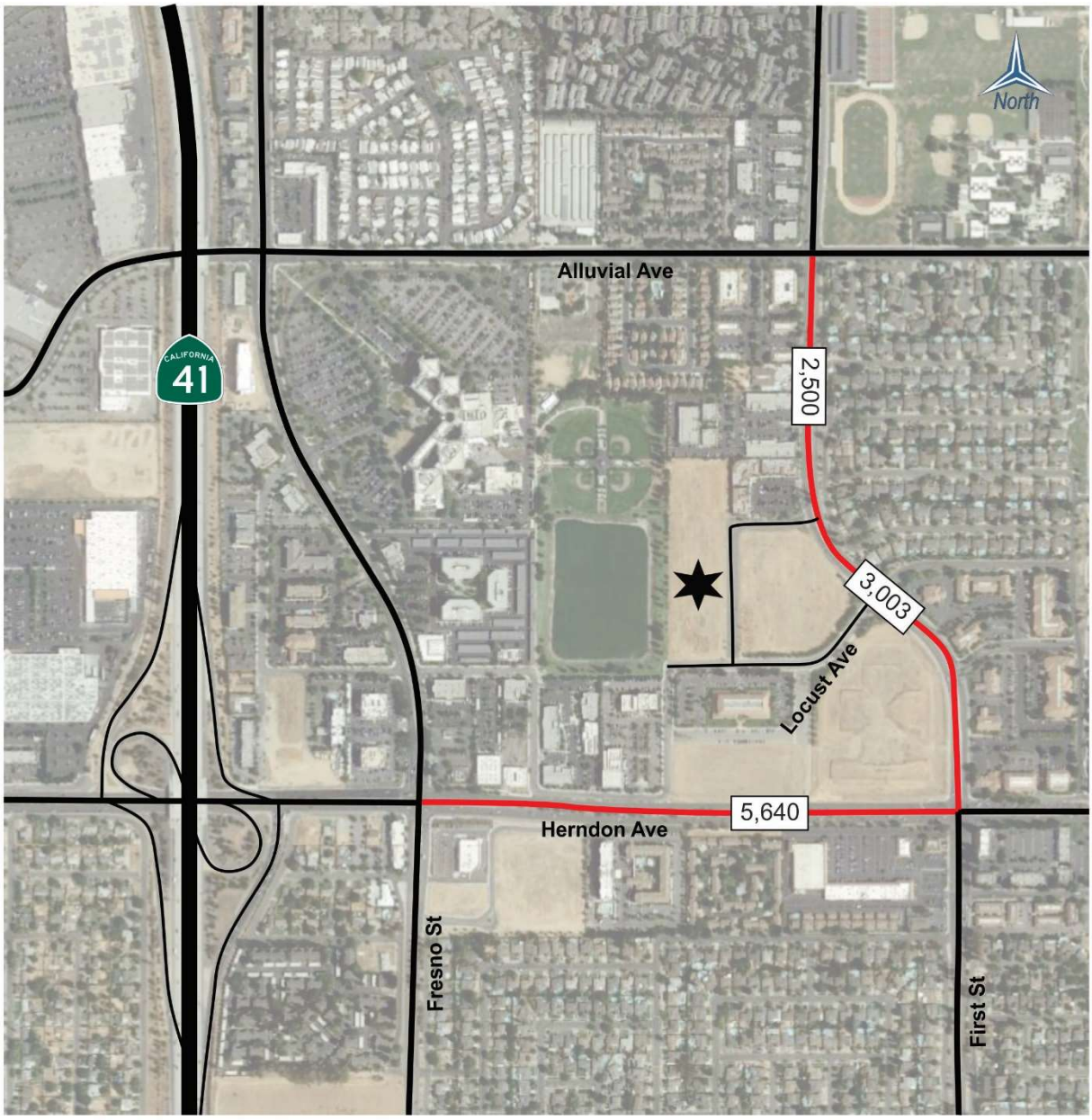


Table 3-2
Segment Operations

STREET SEGMENT	SEGMENT DESCRIPTION	TARGET LOS	PEAK HOUR	EXISTING PLUS PROJECT		NEAR-TERM PLUS PROJECT		CUMULATIVE YEAR 2042 WITHOUT PROJECT		CUMULATIVE YEAR 2042 PLUS PROJECT	
				VOLUME	LOS	VOLUME	LOS	VOLUME	LOS	VOLUME	LOS
Herndon Avenue											
Fresno Street to First Street	6 Lanes Divided (Expressway)	D	AM	4,646	D	4,843	D	5,609	D	5,766	D
			PM	4,744	D	4,939	D	5,444	D	5,640	D
First Street											
Alluvial Avenue to Private Driveway	4 Lanes Divided (Arterial)	D	AM	1365	D	1485	D	2023	D	2114	D
			PM	1739	D	1850	D	2428	D	2500	D
Private Driveway to Herndon Avenue	4 Lanes Divided (Arterial)	D	AM	1,798	D	1,887	D	2,234	D	2,532	D
			PM	2,225	D	2,351	D	2,631	D	3,003	D

LOS = Level of Service / **BOLD** denotes LOS standard has been exceeded

3.10 Senate Bill 743

In the fall of 2013, Senate Bill 743 (SB 743) was passed by the legislature and signed into law by the governor. This legislation changes the way that transportation studies are conducted for environmental documents. As of July 1, 2020, delay-based metrics such as roadway capacity and level of service will no longer be the performance measures used for the determination of the transportation impacts of projects in studies conducted under CEQA. Instead, new performance measures such as vehicle miles travelled (VMT) or other similar measures will be used. Although July 1, 2020 is the statewide implementation date, agencies may opt-in use of new metrics prior to that date. The California Governor's Office of Planning and Research (OPR) has recommended that projects that generate or attract fewer than 110 trips per day generally may be assumed to cause a less than significant transportation impact.

CEQA Guidelines Section 15064.3 establish VMT as the most suitable measure of determining a project's transportation impacts on nearby roadways and intersections in lieu of LOS analysis, and such analysis is required for new projects as of July 1, 2020. It should be noted that City of Fresno Traffic Engineering staff have indicated that the City will still require intersection and roadway level of service analysis to analyze performance of roadways and intersections for planning purposes in addition to the new VMT-based performance measure for CEQA purposes.

3.10.1 *Vehicle Miles Travelled (VMT) Assessment*

As noted previously, the MOB Project consists of the development of an approximately 145,000 square-foot medical office building. The MOB Project's purpose is to alleviate overcrowding at existing Kaiser facilities located at the southeast corner of Alluvial and Fresno Street (Kaiser Permanente Fresno Medical Center) and the southwest corner of Santa Ana Avenue and First Street (Kaiser Permanente First Street Medical Offices). Kaiser Permanente representatives have indicated that health care providers that will operate out of the new approximately

145,000 square-foot medical office building will transfer from the Fresno Medical Center and First Street Medical Offices. Consequently, patients being served by said health care providers will also relocate to the new medical office building. As a result, the MOB Project will not generate 'new' trips to the transportation network but instead, existing provider and patient trips will be rerouted throughout the transportation network.[2] Therefore, the net change in VMT as a result of the MOB Project will be negligible, if any. Therefore, transportation impacts related to VMT resulting from the MOB Project would be less than significant. Accordingly, the MOB Project would not result in any project-specific or site-specific impacts with respect to VMT, and it is consistent with the impacts analyzed in the General Plan EIR.

Additional screening analysis to further demonstrate the MOB Project's consistency with CEQA Guidelines Section 15064.3 is included below.

Greenhouse Gas Plan Consistency

SB 743 requires shifting from LOS to VMT or other similar metrics in order to ensure conformity with the State's goals to reduce greenhouse gas (GHG) emissions, encourage infill development, and improve public health through more active transportation. The City of Fresno GHG Plan, adopted December 2014, is a comprehensive municipal and community strategy to reduce GHG emissions within the City of Fresno and is consistent with the goals and strategies outlined in the California Air Resources Board (CARB) regulations. Pursuant to the GHG Plan, the MOB Project's compliance with applicable City of Fresno General Plan policies and GHG Plan strategies would result in less than significant impacts for greenhouse gas emissions.

The GHG Plan determined that projects within a SCS Plan area that are consistent with the land use and development densities as well as design standards for the project area would be considered to have a less than significant impact on climate change. The MOB Project is consistent with the currently adopted General Plan for the City of Fresno and the adopted 2018 RTP/SCS and is therefore consistent with the population growth and VMT applied in those plan documents.

The MOB Project site falls under the Employment District (E) Office (O) designation which allows for administrative, financial, business, professional, medical, and public offices. The MOB Project includes the development of approximately 145,000 square feet of medical office space which is consistent with the site designation as defined in the *Fresno Municipal Code Chapter 15: Citywide Development Code*, December 2015. Applicable design standards included within the development code have been incorporated into the MOB Project design.

Infill Development

Infill development is the development of vacant or underutilized parcels within an urban

2 It should be noted that the LOS analysis provided in this TIS did not account for the relocation of 'existing' health care providers and patients to the new medical office building. Instead, the traffic analysis conservatively estimated that all trips to the MOB Project site are 'new' trips, which may result in this TIS overestimating the MOB Project's effects on the City's street system.

boundary. Limiting urban sprawl reduces GHG emissions and improves regional air quality by reducing the distance people need to travel. The proposed MOB Project meets the infill development criteria identified in Section 7.2 of the ITE Trip Generation Handbook (3rd Edition) since the MOB Project site exhibits a walkable area, convenient transit service, bicycle accessibility, and a mix of interacting land uses. Figures 2-4 and 2-5 graphically display the bicycle/pedestrian and transit network in the study area. Retail, residential, office, and recreational land uses are present within a quarter mile of the MOB Project site considering aerial photography.

Transit Corridors

CEQA Guidelines Section 15064.3 presumes no significant transportation impacts for land use projects within one-half mile of either an existing major transit stop or a stop along an existing high-quality transit corridor, or land use projects that reduce VMT below existing conditions. A 'major transit stop' is classified as the intersection of two or more major bus routes with a frequency of service interval of 15 minutes or less during the morning an afternoon peak commute periods.[3] While the MOB Project doesn't specifically meet the criteria as described above, the presence of bus routes within one-half mile demonstrates transit accessibility to the MOB Project site.

As shown in Figure 2-5, FAX bus routes 32 and 34 intersect at the Alluvial Avenue at Fresno Street intersection which is located approximately one-half mile northwest of the MOB Project site. In addition, the City of Fresno Bus Rapid Transit (BRT) corridor is located three-quarters of a mile to the west of the MOB Project site. The frequency of BRT service is 15 minutes during the morning and afternoon peak hours while the frequency of FAX bus route 32 and 34 service is 20-30 minutes during the morning and afternoon peak hours.

Based on the assessment above, the MOB Project will not generate significant transportation impacts. The net change in VMT as a result of the MOB Project will be negligible, if any, since the MOB Project will not generate 'new' trips to the transportation network. Moreover, the MOB Project in an infill development project that will be consistent with the GHG Plan and the SCS Plan, further demonstrating that the MOB Project would not result in significant transportation effects related to VMT.

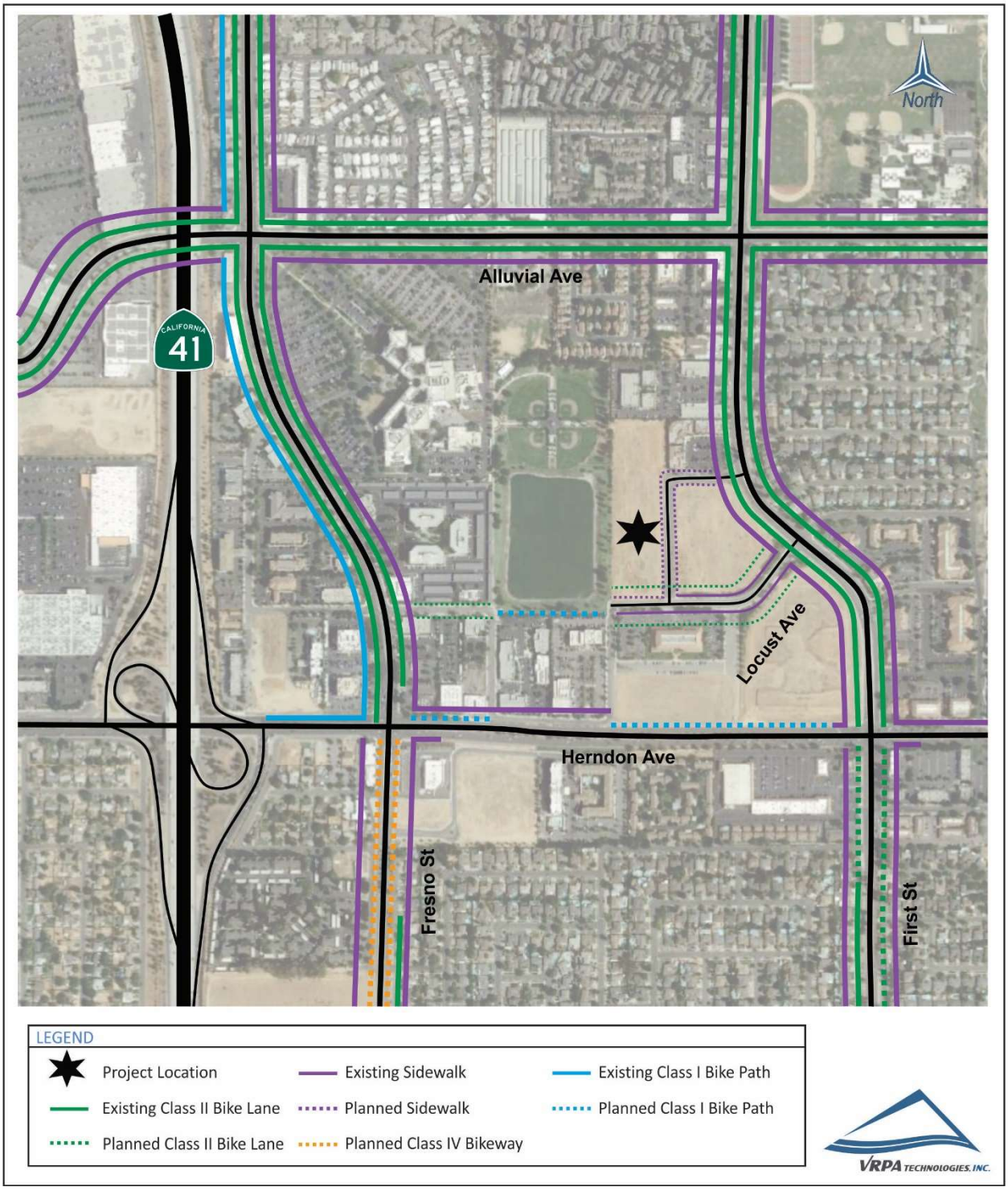
3.11 Bikeway and Pedestrian Facilities

The City of Fresno's Active Transportation Plan (ATP) identifies planned bikeway and pedestrian facilities in the study area. The planned networks in combination with the existing bikeway and pedestrian network in the study area will allow residents in southeast Fresno to travel by bicycle and foot to destinations including the proposed MOB Project. Existing and planned bikeway facilities in the study area are presented in Figure 3-14.

3 Pub. Resources Code, § 21064.3

Kaiser Permanente - Fresno Medical Office Building
Planned Bicycle and Pedestrian Facilities

Figure 3-14



4.0 Intersection LOS Analysis

4.1 Methodology

Although not considered impacts for CEQA purposes, the General Plan establishes LOS performance criteria for intersections within the City. Accordingly, the TIS also analyzed the MOB Project's effect on LOS at key intersections for comparison purposes with the standards identified by the General Plan.

In analyzing intersection capacities, LOS methodologies from the Highway Capacity Manual (HCM) 6th Edition were applied. The City of Fresno LOS standards were applied to quantitatively assess the performance of study area intersections. In addition, safety concerns were considered when determining the need for appropriate transportation improvements resulting from increased traffic near sensitive uses.

4.1.1 *Intersection Analysis*

Intersection LOS analysis was conducted using the Synchro 10 software program. Synchro 10 supports the Highway Capacity Manual (HCM) 6th Edition methodologies and is an acceptable program by City of Fresno staff for assessment of traffic impacts. Levels of service can be determined for both signalized and unsignalized intersections. There are five (5) signalized intersections in the study area and two (2) unsignalized intersections.

Tables 4-1 and 4-2 indicate the ranges in the amounts of average delay for a vehicle at signalized and unsignalized intersections for the various levels of service ranging from LOS "A" to "F".

The signalized LOS standards applied to calculate intersection LOS are in accordance with the current edition of the Highway Capacity Manual (HCM). Intersection turning movement counts and roadway geometrics used to develop LOS calculations were obtained from field review findings and count data provided from the traffic count sources identified in Section 2.1.

When an unsignalized intersection does not meet acceptable LOS standards, the investigation of the need for a traffic signal shall be evaluated. The California Manual on Uniform Traffic Control Devices for Streets and Highways (California MUTCD) introduces standards for determining the need for traffic signals. The California MUTCD indicates that the satisfaction of one or more traffic signal warrants does not in itself require the installation of a traffic signal. In addition to the warrant analysis, an engineering study of the current or expected traffic conditions should be conducted to determine whether the installation of a traffic signal is justified. The California MUTCD Peak Hour Warrant (Warrant 3) was used to determine if a traffic signal is warranted at unsignalized intersections that fall below current LOS standards.

Table 4-1
Signalized Intersections
Level of Service Definitions
(Highway Capacity Manual)

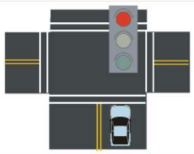
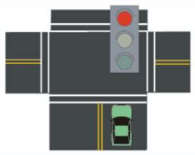
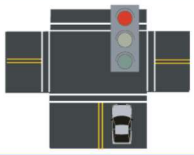
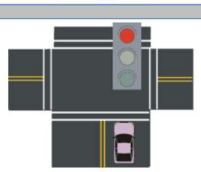
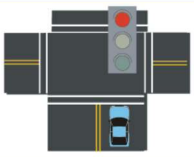
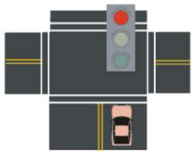
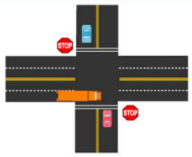
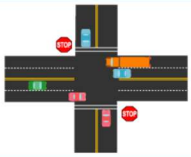
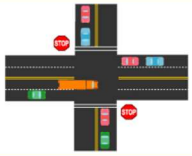
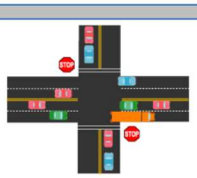
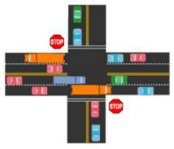
LEVEL OF SERVICE	DEFINITION		AVERAGE TOTAL DELAY (sec/veh)
A	Describes operations with very low delay. This level of service occurs when there is no conflicting traffic for a minor street.		≤ 10.0
B	Describes operations with moderately low delay. This level generally occurs with a small amount of conflicting traffic causing higher levels of average delay.		> 10.0 - 20.0
C	Describes operations with average delays. These higher delays may result from a moderate amount of minor street traffic. Queues begin to get longer.		> 20.0 - 35.0
D	Describes a crowded operation, with below average delays. At level D, the influence of congestion becomes more noticeable. Longer delays may result from shorter gaps on the mainline and an increase of minor street traffic. The queues of vehicles are increasing.		> 35.0 - 55.0
E	Describes operations at or near capacity. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor gaps for the minor street to cross and large queues.		> 55.0 - 80.0
F	Describes operations that are at the failure point. This level, considered to be unacceptable to most drivers, often occurs with over- saturation, that is, when arrival flow rates exceed the capacity of the intersection. Insufficient gaps of suitable size exist to allow minor traffic to cross the intersection safely.		> 80.0

Table 4-2
Unsignalized Intersections
Level of Service Definitions
(Highway Capacity Manual)

LEVEL OF SERVICE	DEFINITION	AVERAGE TOTAL DELAY (sec/veh)
A	No delay for stop-controlled approaches. 	0 - 10.0
B	Describes operations with minor delay. 	> 10.0 - 15.0
C	Describes operations with moderate delays. 	> 15.0 - 25.0
D	Describes operations with some delays. 	> 25.0 - 35.0
E	Describes operations with high delays and long queues. 	> 35.0 - 50.0
F	Describes operations with extreme congestion, with very high delays and long queues unacceptable to most drivers. 	> 50.0

4.1.2 *Study Area*

The following study intersections were determined in consultation with City of Fresno and Caltrans staff and include:

Intersections

- ✓ Herndon Avenue / SR 41 SB Off Ramp
- ✓ Herndon Avenue / SR 41 NB Off Ramp
- ✓ Herndon Avenue / Fresno Street
- ✓ Alluvial Avenue / First Street
- ✓ Private Driveway / First Street
- ✓ Locust Avenue / First Street
- ✓ Herndon Avenue / First Street

4.1.3 *Study Scenarios*

The intersection LOS analysis completed for the proposed MOB Project includes the following traffic scenarios:

- ✓ Existing Conditions
- ✓ Existing Plus Project
- ✓ Near-Term (Opening Year)
- ✓ Cumulative Year 2042 Without Project
- ✓ Cumulative Year 2042 Plus Project

4.1.4 *Policies to Maintain Level of Service*

An important goal is to maintain acceptable levels of service along the highway, street, and road network. To accomplish this, the City of Fresno adopted minimum levels of service in an attempt to control congestion that may result as new development occurs.

The City of Fresno's General Plan (Adopted December 18, 2014), policy number MT-1-n, identifies a peak hour LOS standard of D or better for all roadway areas outside of identified Activity Center and Bus Rapid Transit Corridor districts, unless the City Traffic Engineer determines that transportation improvements to maintain this LOS would be infeasible and/or conflict with the achievement of other General Plan policies.

Based on the 2002 Caltrans *Guide for the Preparation of Traffic Impact Studies*, the LOS for operating State highway facilities is based on Measures of Effectiveness (MOE) identified in the Highway Capacity Manual (HCM). Caltrans endeavors to maintain a target LOS at the transition between LOS “C” and LOS “D” on State highway facilities; however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS. If an existing State highway facility is operating at less

than this target LOS, the existing MOE should be maintained. In general, the region-wide goal for an acceptable LOS on all freeways, roadways segments, and intersections is "D". For undeveloped or not densely developed locations, the goal may be to achieve LOS "C".

4.2 Evaluation of Study Scenarios

As discussed in Section 4.1.3, study intersections were evaluated considering the Existing, Exiting Plus Project, Near-Term Plus Project, Cumulative Year 2042 Without Project, and Cumulative Year 2042 Plus Project scenarios. These study scenarios are consistent with the latest edition (02/02/2009) of the City of Fresno Traffic Impact Study Report Guidelines.

4.2.1 *Existing*

Existing AM and PM peak hour turning movements were collected at each study intersection by National Data and Surveying Services. Intersection turning movement counts were conducted for the peak hour periods of 7:00-9:00 AM and 4:00-6:00 PM for all study intersections on Tuesday, October 22, 2019. Traffic count data worksheets are provided in Appendix B. The day on which counts were taken is representative of typical traffic volumes within the study area. Schools were in session and the weather was mild.

The existing lane geometry at study area intersections is shown in Figure 4-1. There are five (5) signalized intersections in the study area and two (2) unsignalized intersections. Figures 4-2 and 4-3 show existing traffic volumes for the AM and PM peak hours in the study area.

4.2.2 *Existing Plus Project*

MOB Project traffic as shown in Table 3-1 was distributed to the roadway system using the trip distribution percentages shown in Figure 3-1. A graphical representation of the resulting AM and PM peak hour MOB Project trips used is shown in Figures 4-4 and 4-5.

An Existing Plus Project Scenario was analyzed to include existing traffic plus traffic generated by the MOB Project. The resulting traffic is shown in Figures 4-6 and 4-7.

4.2.3 *Near-Term Plus Project*

A Near-Term Scenario was analyzed to include year 2022 traffic (estimated MOB Project Opening-Day) plus traffic generated by the MOB Project plus traffic generated by approved and pending projects. Approved and pending projects in the study area are discussed in Section 3.5. Figure 4-8 shows the AM and PM peak hour trips for approved and pending project traffic.

The 2022 traffic volumes were estimated by utilizing the incremental method and the TurnsW32 program. Interpolating between the 2019 and 2035 segment volumes of the regional travel models determined the 2022 street segment volumes. The TurnsW32 program

calculated the forecasted turning movement volumes for the year 2022 by utilizing these 2022 segment volumes along with the existing traffic volumes for all turning movements. For reference, TurnsW32 worksheets are provided in Appendix F. The resulting traffic is shown in Figures 4-9 and 4-10.

4.2.4 *Cumulative Year 2042 Without Project*

The MOB Project was analyzed considering future traffic conditions, approximately twenty (20) years after the assumed opening day of the MOB Project, or in this case the year 2042. The levels of traffic expected in 2042 relate to the cumulative effect of traffic increases resulting from the implementation of the General Plans of local agencies, including the City of Fresno and Fresno County. Traffic conditions without the MOB Project in the Year 2042 were estimated using the Fresno COG regional travel model. Future traffic forecasts along study area roadway segments were estimated by utilizing the incremental method published by Fresno COG and the TurnsW32 program.

For reference, the Fresno COG model outputs are provided in Appendix E. Traffic conditions resulting from this scenario are shown in Figures 4-11 and 4-12.

4.2.5 *Cumulative Year 2042 Plus Project*

The addition of MOB Project trips, which were distributed to the roadway system using the trip distribution percentages shown in Figure 3-1 (Section 3.3), were added to Cumulative Year 2042 Without MOB Project traffic volumes. This leads to the results shown in Figures 4-13 and 4-14.

4.3 Intersection Capacity Analysis

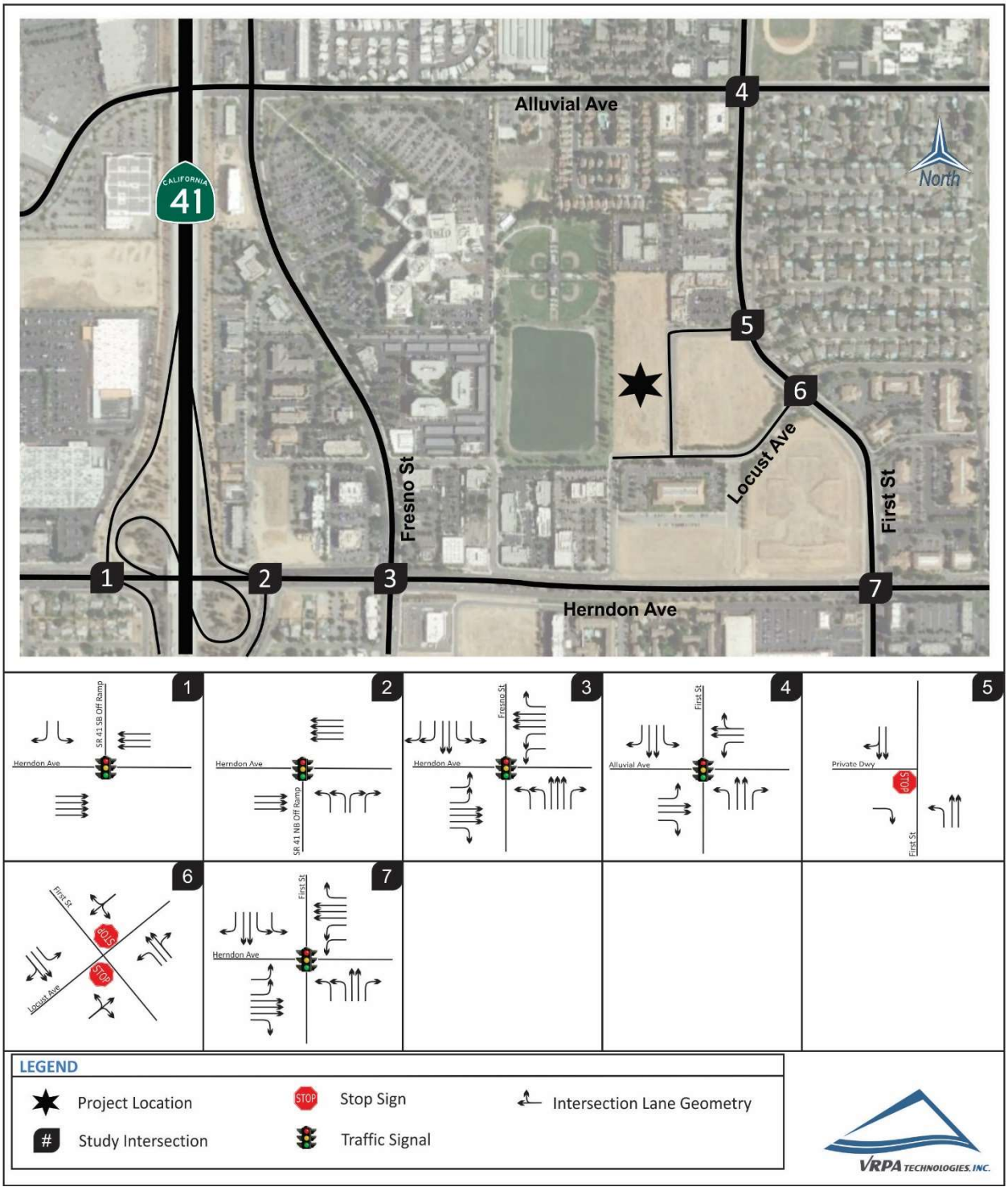
Table 4-3 shows intersections that are expected to fall short of desirable operating conditions for various scenarios. Potential transportation improvements that would alleviate LOS deficiencies in the study area are discussed in Section 4.4 below. Results of the analysis show that the MOB Project will contribute to an unacceptable LOS at all of the study intersections with the exception of the Private Driveway at First Street intersection when comparing the Cumulative Year 2042 scenarios. Synchro 10 (HCM 6th Edition) Worksheets are provided in Appendix F.

4.3.1 *Queuing Analysis*

Table 4-4 provides a queue length summary for left and right turn lanes at study intersections. Queuing analysis was completed using the Synchro software program which provides 95th percentile maximum queue lengths in feet. The queue presented in Table 4-4 represents the approximate queue lengths for the respective lane movements. Results of the queuing analysis show that several movements exceed the existing queue lane storage lengths.

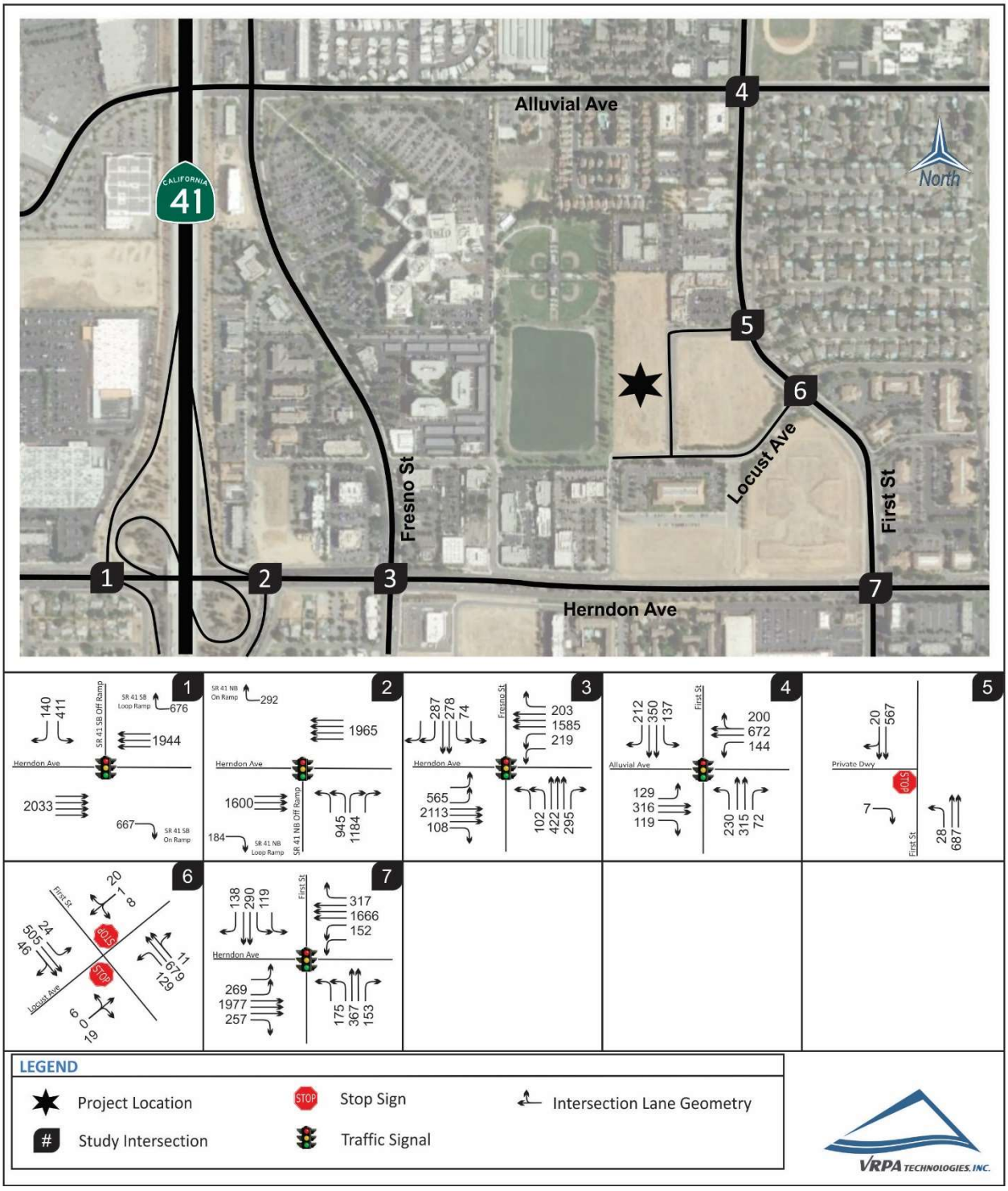
Kaiser Permanente - Fresno Medical Office Building
Existing Lane Geometry

Figure 4-1



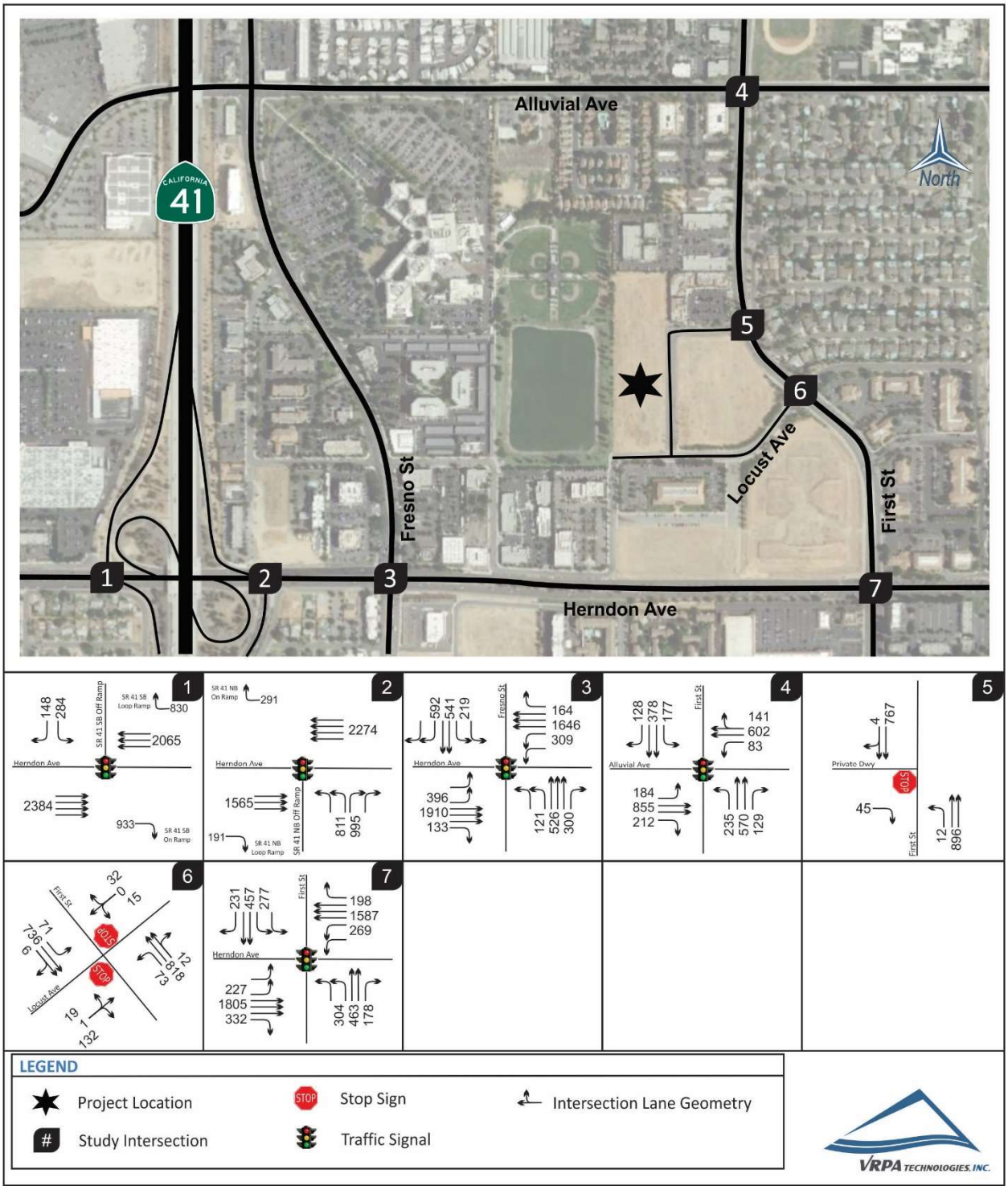
Kaiser Permanente - Fresno Medical Office Building
Existing AM Peak Hour Traffic

Figure 4-2



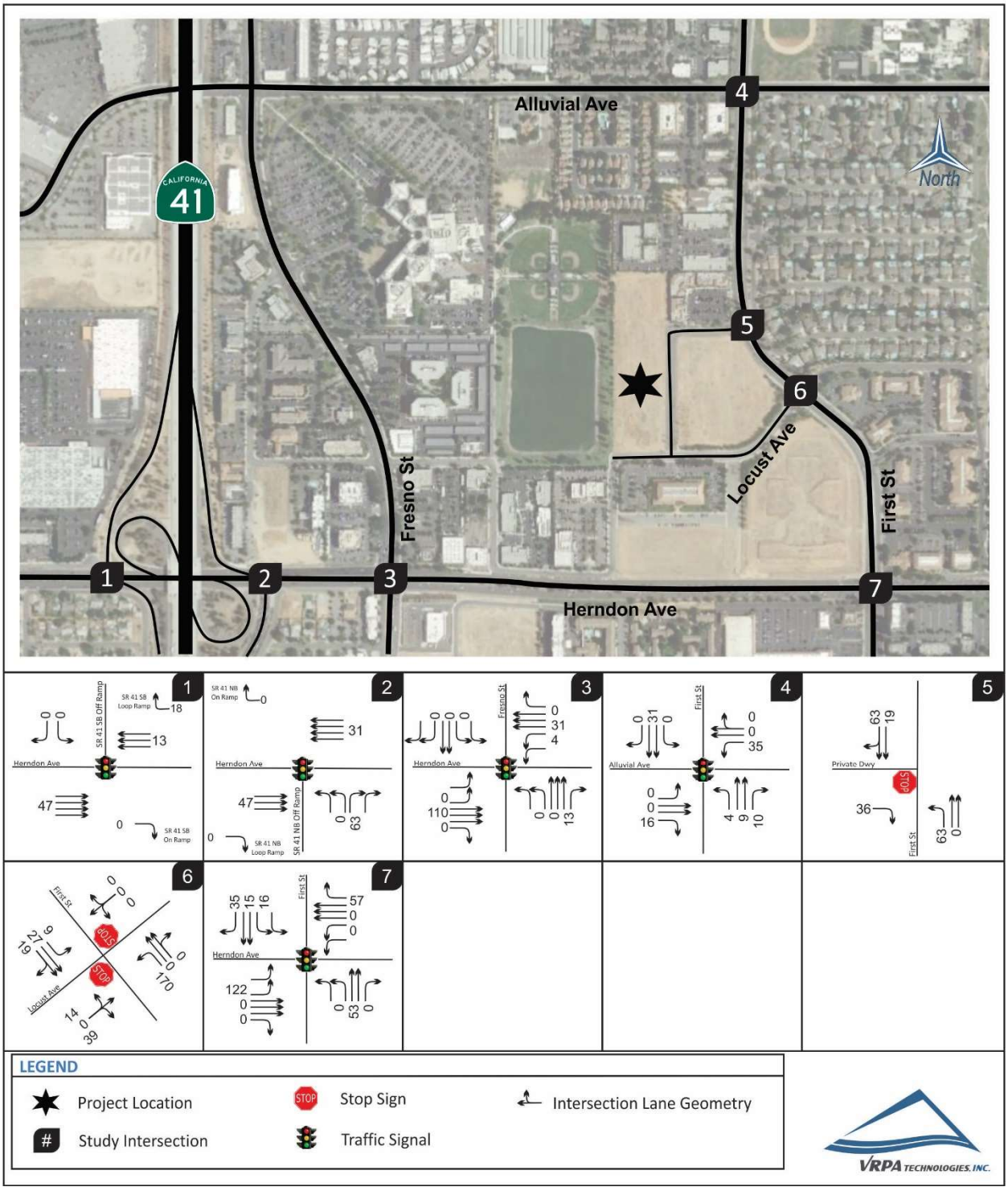
Kaiser Permanente - Fresno Medical Office Building
Existing PM Peak Hour Traffic

Figure 4-3



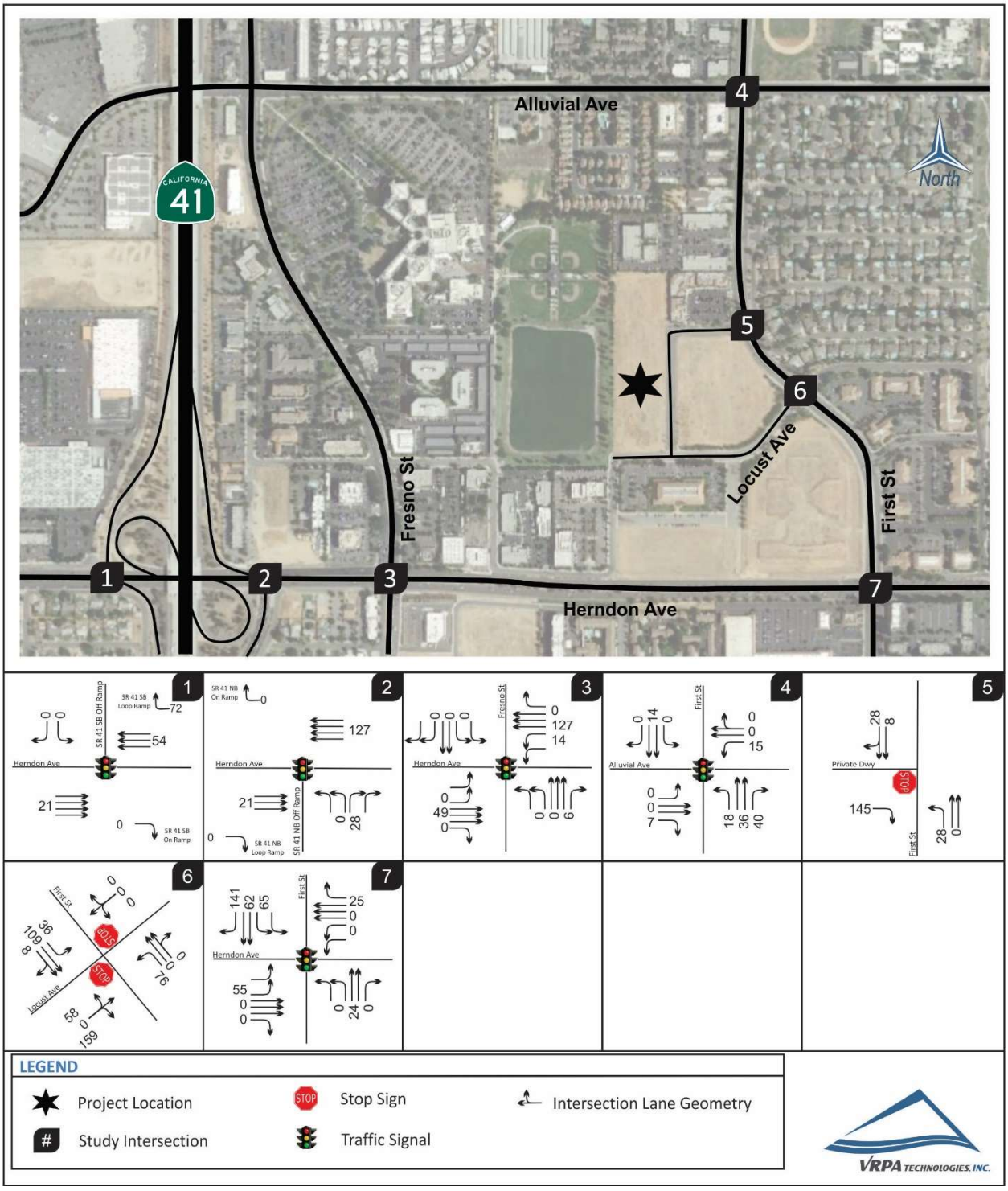
Kaiser Permanente - Fresno Medical Office Building
Project AM Peak Hour Traffic

Figure 4-4



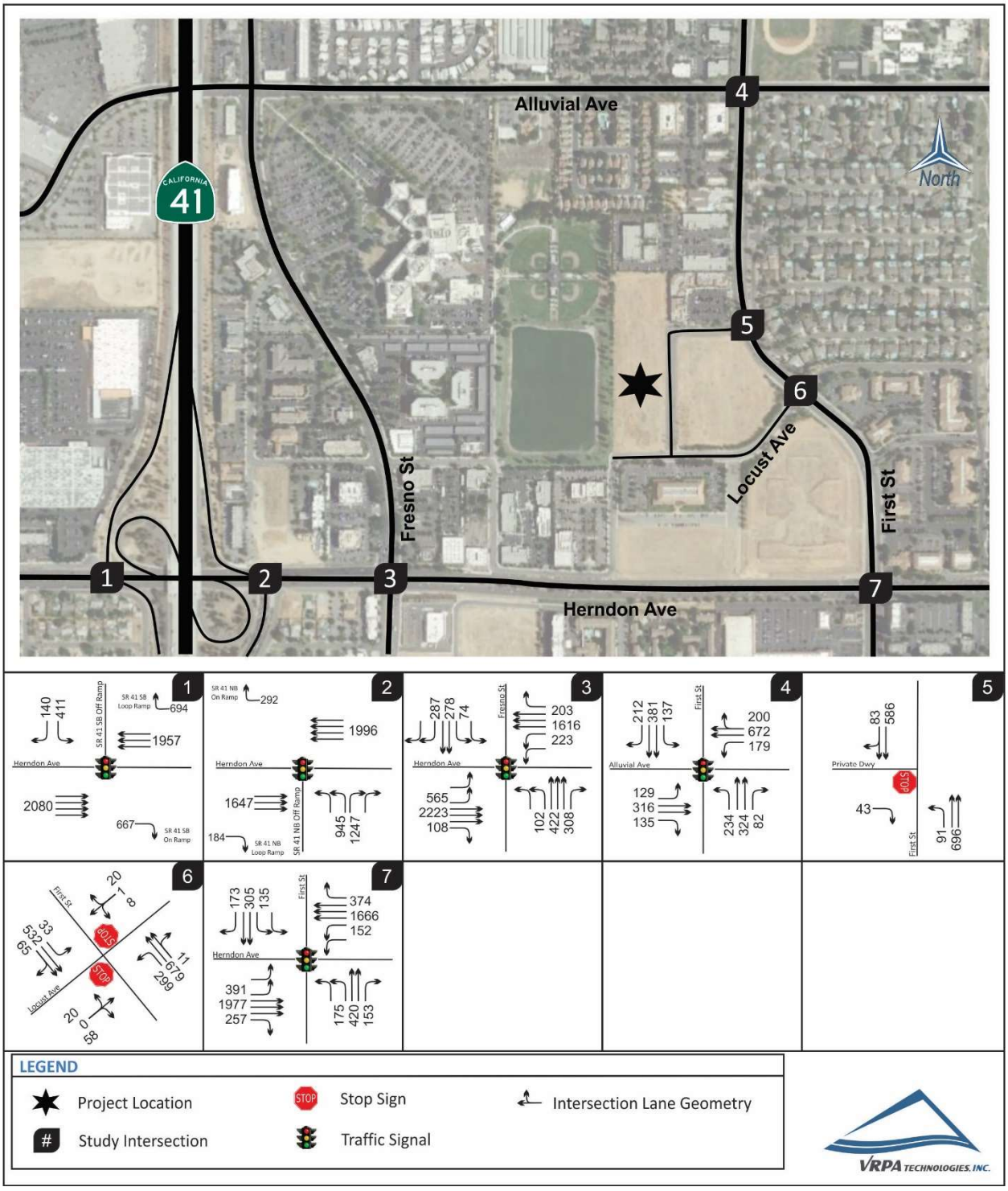
Kaiser Permanente - Fresno Medical Office Building
Project PM Peak Hour Traffic

Figure 4-5



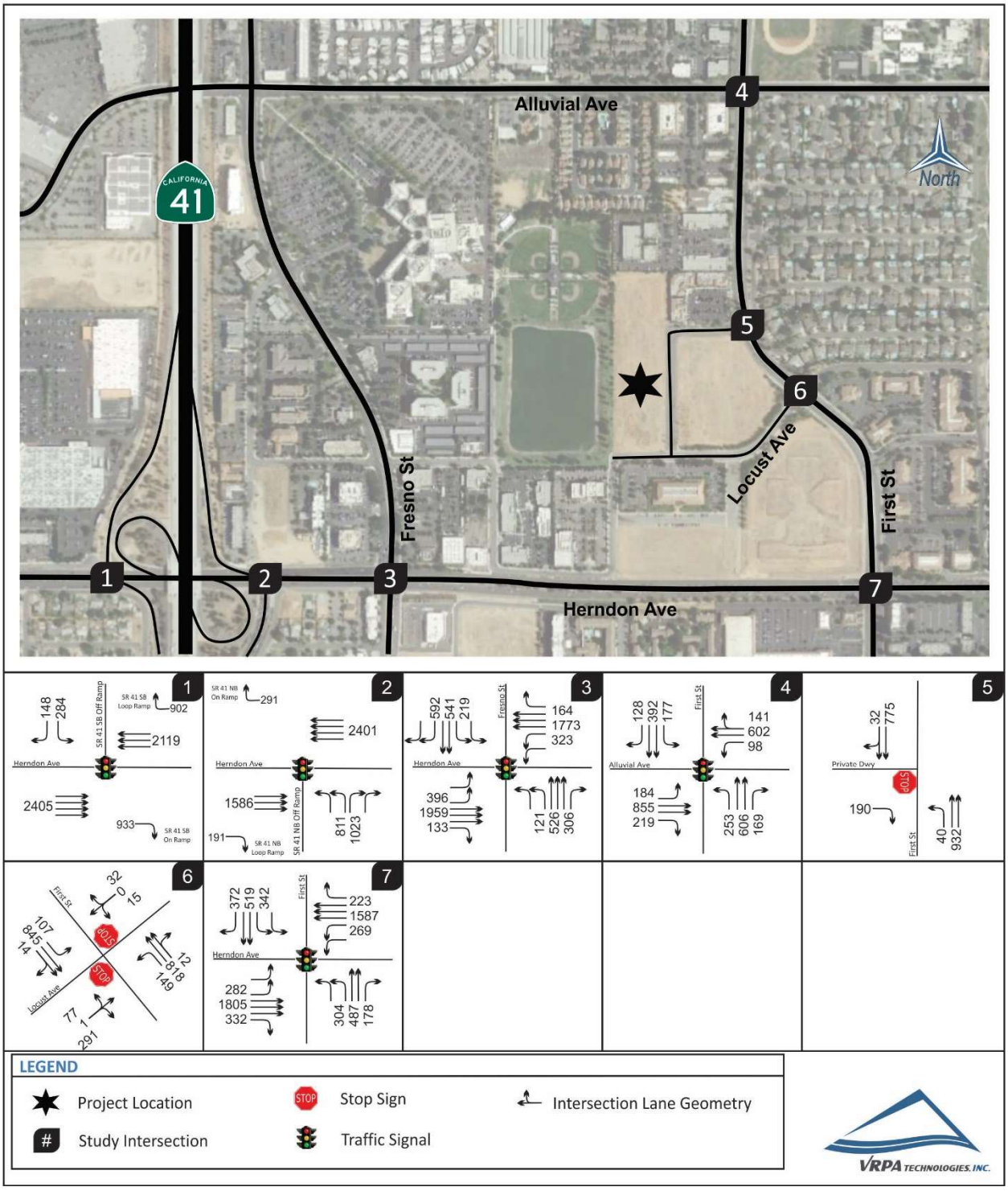
Kaiser Permanente - Fresno Medical Office Building
Existing Plus Project AM Peak Hour Traffic

Figure 4-6



Kaiser Permanente - Fresno Medical Office Building
Existing Plus Project PM Peak Hour Traffic

Figure 4-7



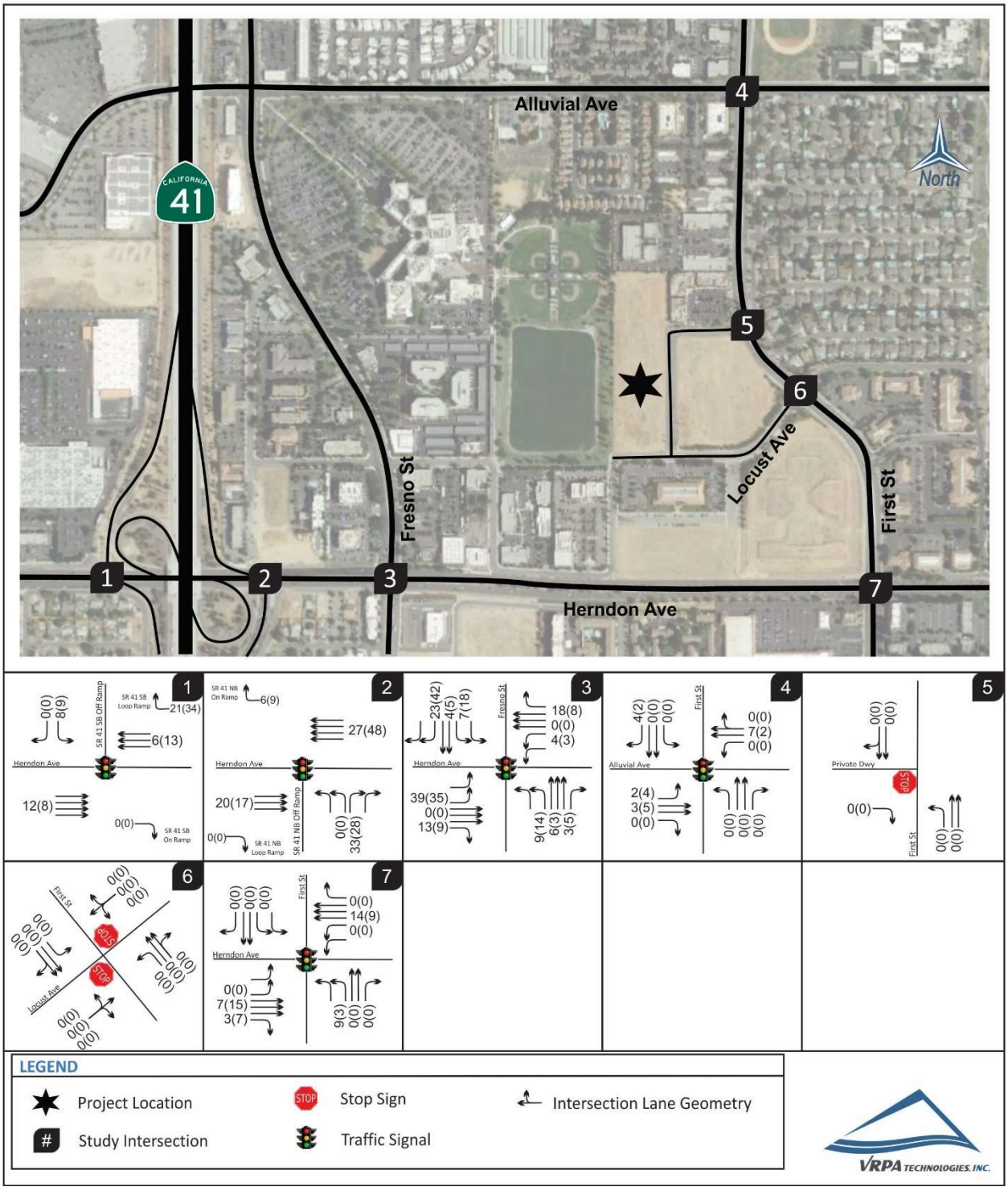
LEGEND

- Project Location
- Study Intersection
- Stop Sign
- Traffic Signal
- Intersection Lane Geometry

VRPA TECHNOLOGIES, INC.

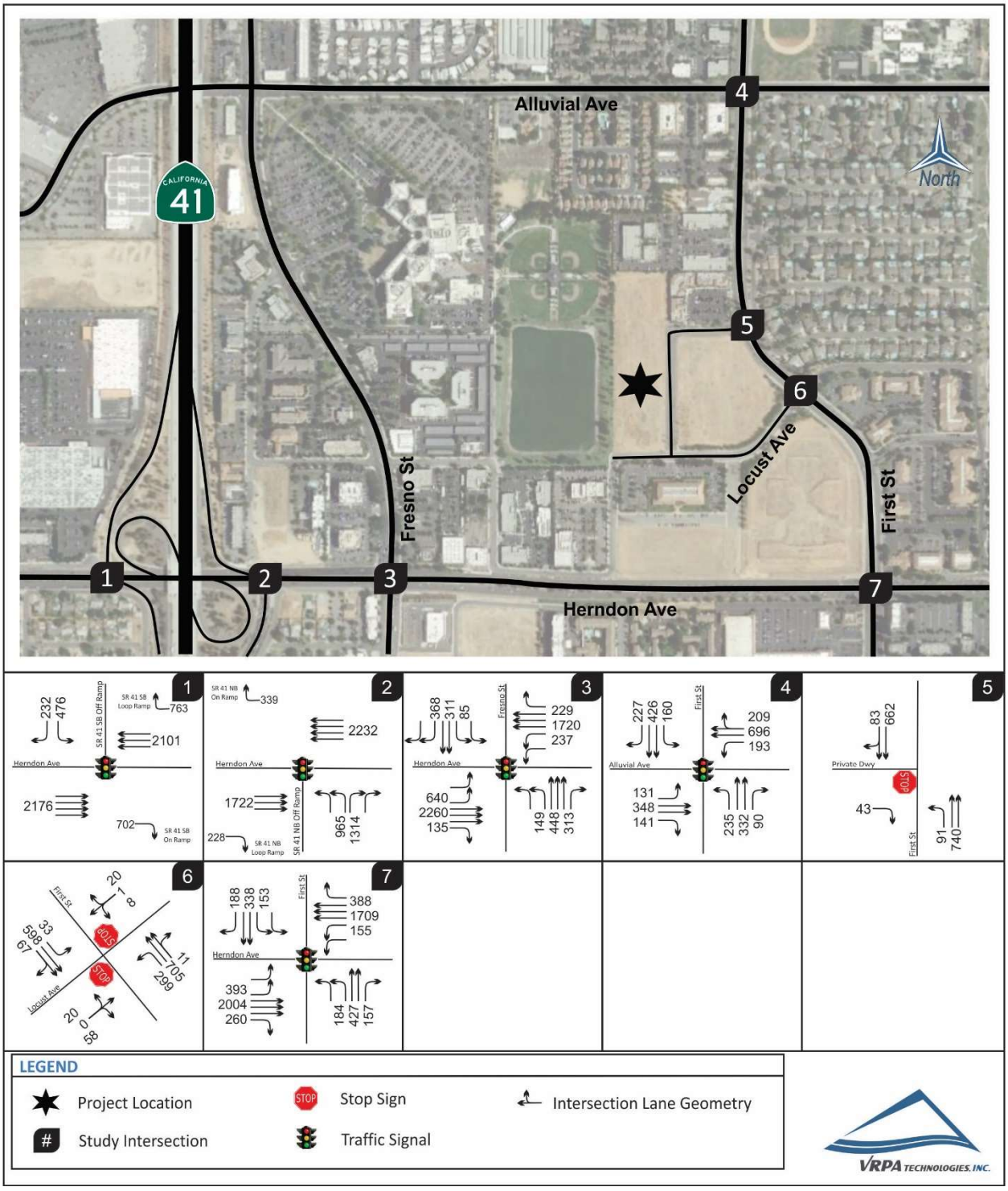
Kaiser Permanente - Fresno Medical Office Building
Approved/Pending Project AM and PM Peak Hour Traffic

Figure 4-8



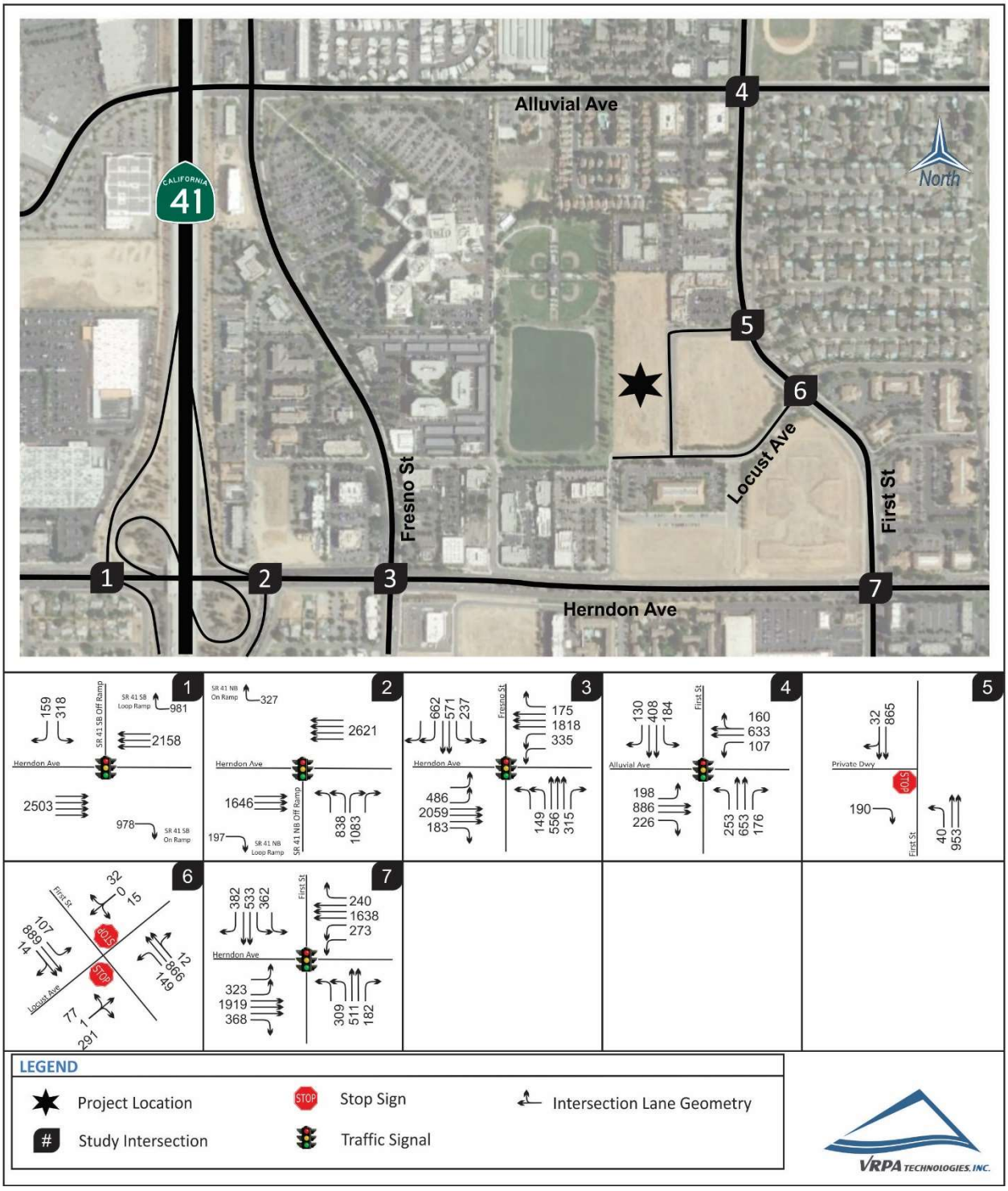
Kaiser Permanente - Fresno Medical Office Building
Near-Term Plus Project AM Peak Hour Traffic

Figure 4-9



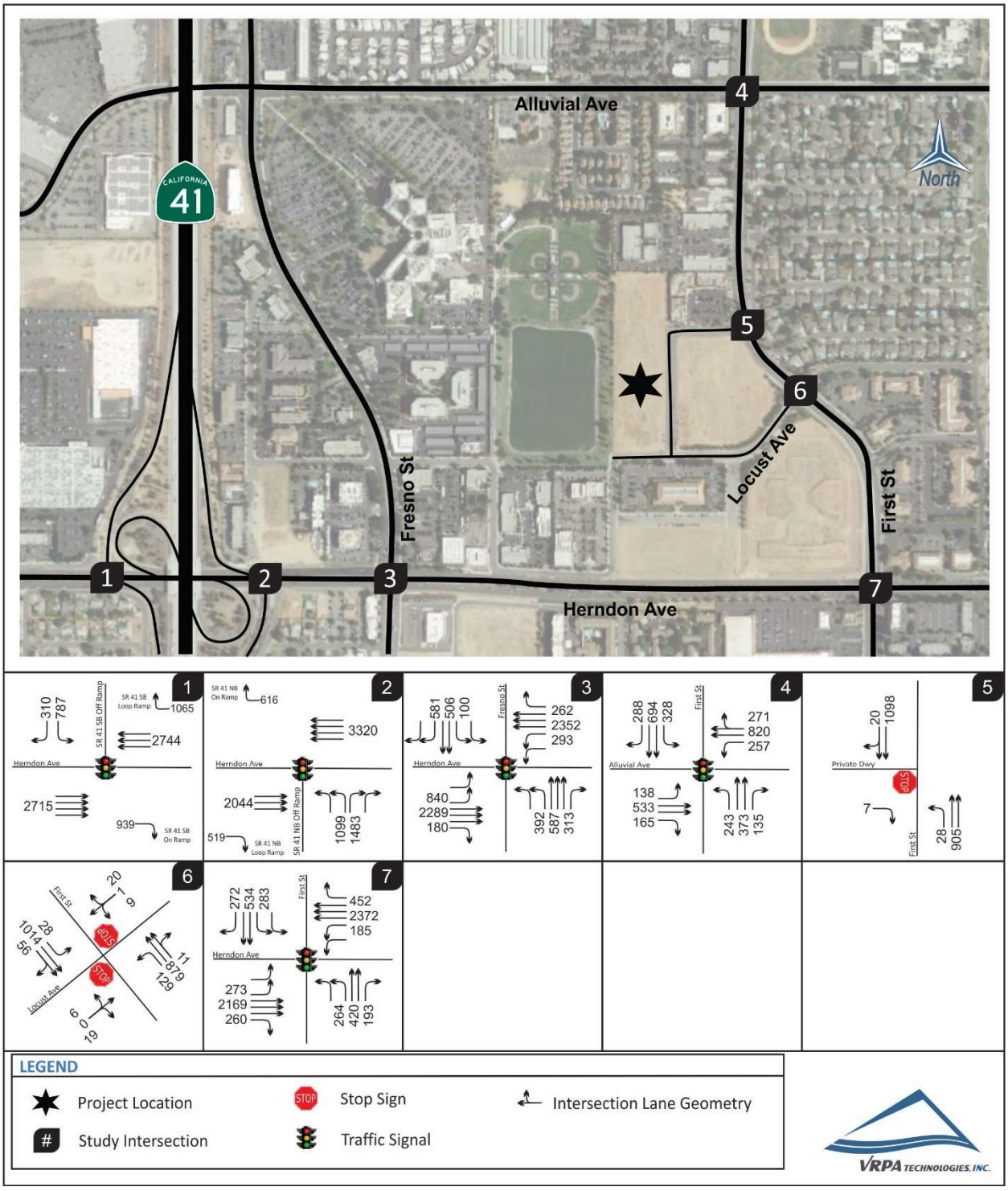
Kaiser Permanente - Fresno Medical Office Building
Near-Term Plus Project PM Peak Hour Traffic

Figure 4-10



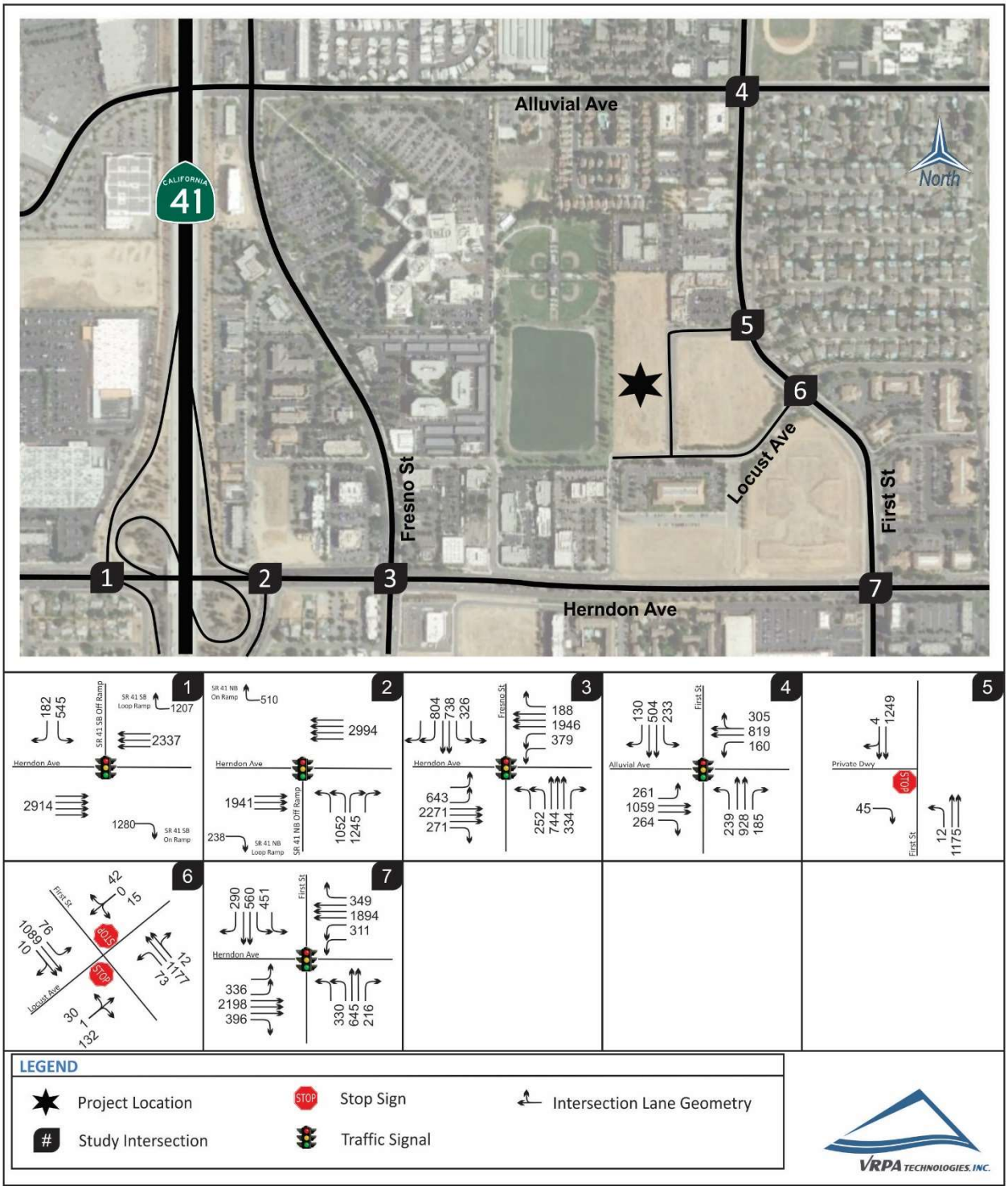
Kaiser Permanente - Fresno Medical Office Building
Cumulative Year 2042 Without Project AM Peak Hour Traffic

Figure 4-11



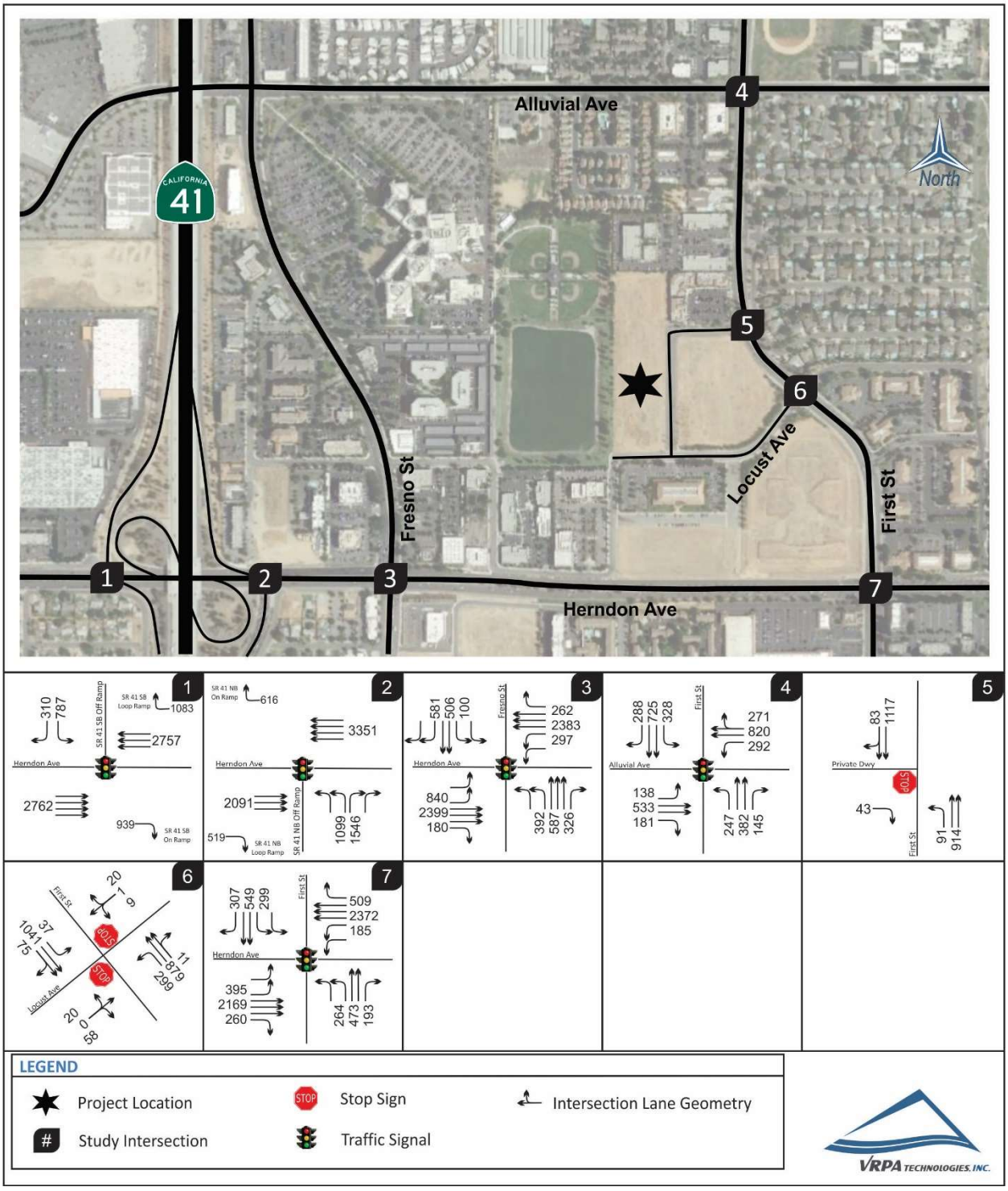
Kaiser Permanente - Fresno Medical Office Building
Cumulative Year 2042 Without Project PM Peak Hour Traffic

Figure 4-12



Kaiser Permanente - Fresno Medical Office Building
Cumulative Year 2042 Plus Project AM Peak Hour Traffic

Figure 4-13



Kaiser Permanente - Fresno Medical Office Building
Cumulative Year 2042 Plus Project PM Peak Hour Traffic

Figure 4-14

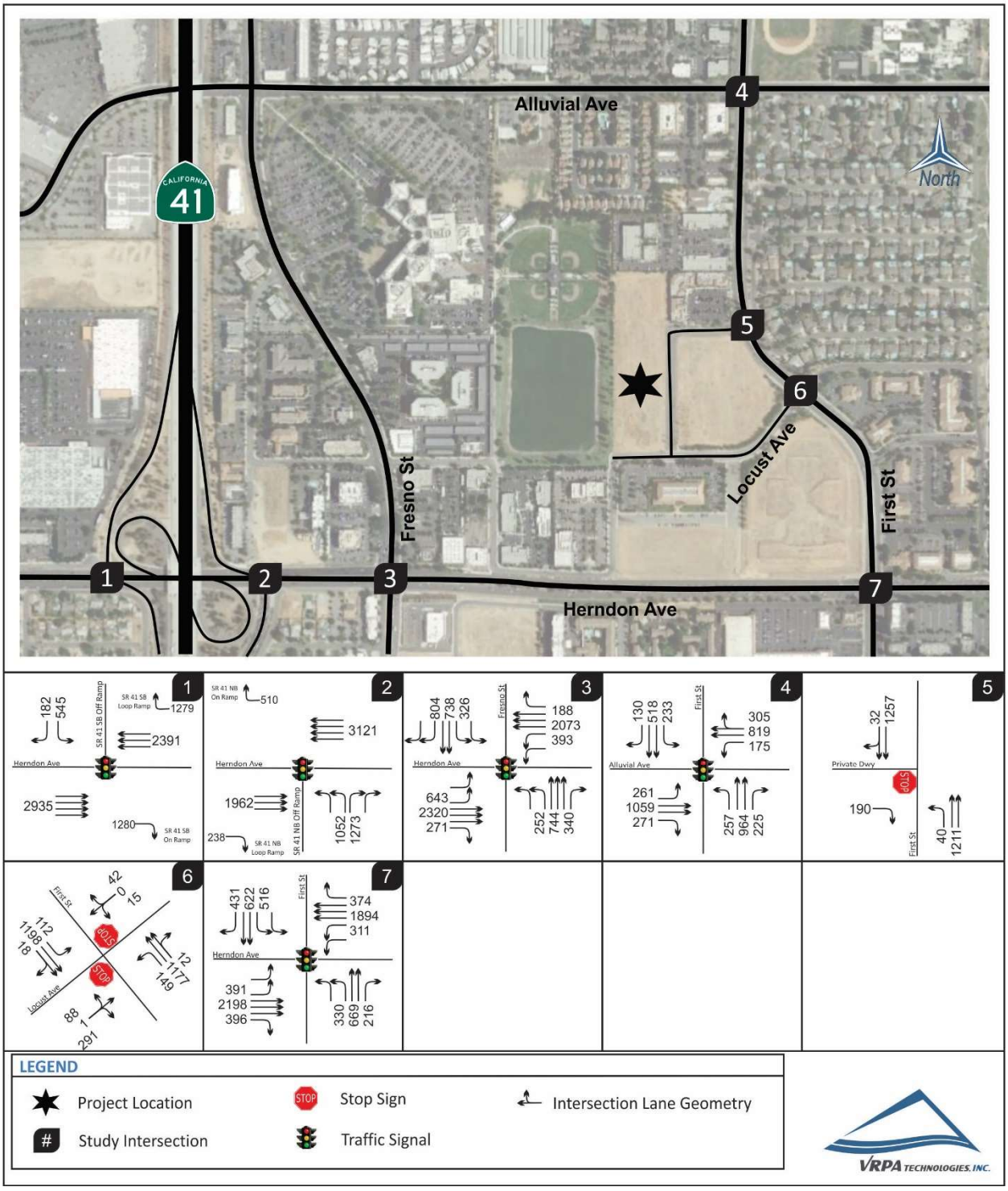


Table 4-3
Intersection Operations

INTERSECTION	CONTROL	TARGET LOS	PEAK HOUR	EXISTING		EXISTING PLUS PROJECT		NEAR-TERM PLUS PROJECT		CUMULATIVE YEAR 2042 WITHOUT PROJECT		CUMULATIVE YEAR 2042 PLUS PROJECT	
				DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS
1. Herdon Avenue / SR 41 SB Off Ramp	Signalized	C *	AM	**87.7**	**F ***	**90.8**	**F**	**131.7**	**F**	**++**	**F**	**++**	**F**
			PM	**90.1**	**F ***	**97.9**	**F**	**125.4**	**F**	**226.9**	**F**	**235.3**	**F**
2. Herndon Avenue / SR 41 NB Off Ramp	Signalized	C *	AM	**115.7**	**F ***	**134.2**	**F**	**170.5**	**F**	**295.5**	**F**	**++**	**F**
			PM	**123.3**	**F ***	**142.0**	**F**	**175.0**	**F**	**221.1**	**F**	**236.2**	**F**
3. Herndon Avenue / Fresno Street	Signalized	D	AM	50.1	D	52.3	D	**58.2**	**E**	**106.2**	**F**	**109.1**	**F**
			PM	54.9	D	**63.9**	**E**	**80.7**	**F**	**106.9**	**F**	**109.9**	**F**
4. Alluvial Avenue / First Street	Signalized	D	AM	53.0	D	53.7	D	54.7	D	**68.9**	**E**	**73.5**	**E**
			PM	45.1	D	46.9	D	50.6	D	**89.0**	**F**	**93.3**	**F**
5. Private Driveway / First Street	One-Way Stop Sign	D	AM	10.7	B	12.1	B	12.7	B	13.4	B	15.0	C
			PM	12.5	B	20.9	C	24.2	C	15.5	C	25.3	D
6. Locust Avenue / First Street	Two-Way Stop Sign	D	AM	28.1	D	**272.2**	**F**	**++**	**F**	**70.4**	**F**	**++**	**F**
			PM	**194.8**	**F +**	**++**	**F +**	**++**	**F +**	**++**	**F +**	**++**	**F +**
7. Herndon Avenue / First Street	Signalized	D	AM	**75.0**	**E**	**81.9**	**F**	**84.3**	**F**	**89.9**	**F**	**101.2**	**F**
			PM	**65.0**	**E**	**75.5**	**E**	**83.8**	**F**	**96.4**	**F**	**103.1**	**F**

DELAY is measured in seconds

LOS = Level of Service / **BOLD** denotes LOS standard has been exceeded

For signalized intersections, delay results show the average for the entire intersection. For one-way and two-way stop controlled intersections, delay results show the delay for the worst movement.

* Existing State highway facility is operating at less than the target LOS; the existing MOE shall be maintained.

+ Meets peak hour signal warrants.

++ Calculated value exceeds software limitations.

Table 4-4
Queuing Operations

INTERSECTION	EXISTING QUEUE STORAGE LENGTH (ft)		EXISTING CONDITIONS		EXISTING PLUS PROJECT		NEAR-TERM PLUS PROJECT		CUMULATIVE YEAR 2042 WITHOUT PROJECT		CUMULATIVE YEAR 2042 PLUS PROJECT	
			AM Queue	PM Queue	AM Queue	PM Queue	AM Queue	PM Queue	AM Queue	PM Queue	AM Queue	PM Queue
Herndon Avenue / SR 41 SB Off Ramp	SB Left	1250	585	416	585	416	692	465	1235	837	1235	837
	SB Right	275	152	176	152	177	257	186	**383**	205	**383**	205
Herndon Avenue / SR 41 NB Off Ramp	NB Left	2 @ 825	449	453	442	453	457	488	681	648	671	658
	NB Right	2 @ 825	**860**	775	**914**	804	**981**	**877**	**1242**	**1006**	**1296**	**1044**
Herndon Avenue / Fresno Street	NB Left	2 @ 175	87	94	87	94	131	112	**282**	**197**	**282**	**197**
	NB Right	175	**228**	161	**245**	168	**255**	**178**	**251**	**260**	**268**	**269**
	SB Left	2 @ 225	68	223	68	223	75	**246**	87	**329**	87	**329**
	SB Right	150	84	**203**	84	**207**	113	**242**	**180**	**300**	**180**	**300**
	EB Left	2 @ 250	**486**	**352**	**486**	**364**	**573**	**471**	**834**	**622**	**834**	**622**
	EB Right	50	20	41	20	**71**	41	**120**	**77**	**214**	**77**	**214**
	WB Left	2 @ 250	219	**285**	224	**302**	241	**317**	**307**	**386**	**312**	**402**
	WB Right	150	77	72	77	105	106	115	**176**	133	**176**	133
Alluvial Avenue / First Street	NB Left	225	**345**	**325**	**353**	**360**	**355**	**360**	**370**	**400**	**378**	**434**
	NB Right	100	6	46	13	80	20	88	58	97	63	**138**
	SB Left	225	174	**249**	174	**249**	205	**265**	**517**	**397**	**517**	**397**
	SB Right	100	53	48	65	48	87	50	**200**	52	**206**	52
	EB Left	200	**202**	**277**	**202**	**277**	**206**	**308**	**244**	**444**	**244**	**444**
	EB Right	100	32	**114**	32	**122**	41	**128**	89	**165**	97	**172**
	WB Left	150	**223**	141	**297**	**173**	**328**	**191**	**422**	**280**	**492**	**310**
Private Driveway / First Street	NB Left	175	25	25	25	25	25	25	25	25	25	25
Locust Avenue / First Street	NB Left	175	25	25	50	25	50	50	25	25	100	50
	SB Left	250	25	25	25	25	25	25	25	25	25	25
Herdon Avenue / First Street	NB Left	2 @ 200	140	**262**	140	**262**	150	**279**	**230**	**297**	**230**	**297**
	NB Right	150	34	54	34	54	38	57	65	85	65	85
	SB Left	2 @ 200	84	**230**	97	**296**	117	**316**	**249**	**404**	**264**	**456**
	SB Right	175	23	97	40	**249**	42	**258**	139	155	**176**	**313**
	EB Left	2 @ 250	237	197	**338**	247	**341**	**289**	243	**298**	**357**	**354**
	EB Right	175	136	**216**	136	**216**	139	**254**	136	**293**	136	**297**
	WB Left	2 @ 250	117	234	117	234	120	238	151	**274**	151	**274**
	WB Right	200	170	80	**214**	104	**229**	120	**328**	**213**	**399**	**237**

Queue is measured in feet / **BOLD** denotes exceedance

4.4 Recommended Transportation Improvements

This section describes potential transportation improvements to alleviate level of service deficiencies at study intersections as described above.

INTERSECTIONS

✓ Herndon Avenue / SR 41 SB Off Ramp
Recommended transportation improvements to achieve acceptable levels of service:
- Existing Plus Project, Near-Term Plus Project, and Cumulative Year 2042 Plus Project scenarios:
  - Widen the southbound approach to 2 left turn lanes and 1 right turn lane (adding 1 left turn lane)

The improvements identified above for the Existing Plus Project and Near-Term Plus Project scenarios are sufficient to meet the existing Measures of Effectiveness (MOE) at the intersection. As noted in Table 4-3 above, the existing delay/LOS in the AM peak hour is 87.7/F and 90.1/F for the PM peak hour.

The improvements identified above for the Cumulative Year 2042 Plus Project scenario are not sufficient to meet the existing MOE at the intersection. It should be noted that Herndon Avenue is at its ultimate configuration of six (6) travel lanes (3 in each direction). Accommodating additional travel lanes along Herndon Avenue and at the SR 41 SB Off Ramp and Herndon Avenue intersection is not possible due to the presence of residential and office development that currently exists along Herndon Avenue and the reconstruction/ lengthening of the SR 41 bridge structure. Caltrans has previously identified improvements at the interchange which consist of an auxiliary lane to the SR 41 SB Off Ramp. The Project will be required to pay applicable Caltrans fees as noted below.

✓ Herndon Avenue / SR 41 NB Off Ramp
Recommended transportation improvements to achieve acceptable levels of service:
- Existing Plus Project, Near-Term Plus Project, and Cumulative Year 2042 Plus Project scenarios:
  - Widen the northbound approach to 2 left turn lanes and 3 right turn lanes (adding 1 right turn lane)

The improvements identified above for the Existing Plus Project scenario are sufficient to meet the existing MOE at the intersection. As noted in Table 4-3 above, the existing delay/LOS in the AM peak hour is 115.7/F and 123.3/F for the PM peak hour.

The improvements identified above for the Near-Term and Cumulative Year 2042 Plus Project scenarios are not sufficient to meet the existing MOE at the intersection. It should be noted that Herndon Avenue is at its ultimate configuration of six (6) travel lanes (3 in

each direction). Accommodating additional travel lanes along Herndon Avenue and at the SR 41 NB Off Ramp and Herndon Avenue intersection is not possible due to the presence of residential and office development that currently exists along Herndon Avenue and the reconstruction/ lengthening of the SR 41 bridge structure. Caltrans has previously identified improvements at the interchange which consist of an additional ramp lane and auxiliary lane to the SR 41 NB Off Ramp. The Project will be required to pay applicable Caltrans fees as noted below.

✓ Herndon Avenue at Fresno Street
No transportation improvements Recommended.

The Herndon Avenue at Fresno Street intersection is currently at its ultimate configuration per City of Fresno staff. Furthermore, accommodating additional travel lanes along Herndon Avenue and Fresno Street is not possible due to the presence of residential and office development that currently exists along Herndon Avenue and Fresno Street.

✓ Alluvial Avenue / First Street
Recommended transportation improvements to achieve acceptable levels of service:

- Cumulative Year 2042 Plus Project scenario:
  - Widen the westbound approach to 1 left turn lane, 2 through lanes, and 1 right turn lane (adding 1 right turn lane)

The improvements identified above for the Cumulative Year 2042 Plus Project scenario are not sufficient to meet the City of Fresno's level of service criteria. The improvements identified above will achieve LOS 'E' for the AM and PM peak hour under the Cumulative Year 2042 Plus Project scenario. However, the improvements will reduce the average delay to less than the average delay shown under Cumulative Year 2042 Without Project conditions as shown in Table 4-3.

Accommodating additional travel lanes along Alluvial Avenue and First Street would encroach upon existing bicycle and pedestrian facilities along the roadway. The City of Fresno's General Plan (Adopted December 18, 2014), policy number MT-1-n, identifies a peak hour LOS standard of D or better for all roadway areas outside of identified Activity Centers and Bus Rapid Transit Corridor districts, unless the City Traffic Engineer determines that transportation improvements to maintain this LOS would be infeasible and/or conflict with the achievement of other General Plan policies. Providing additional travel lanes along Alluvial Avenue and First Street would conflict with the achievement of policy number E-1-j, E-1-k, and E-1-I.

✓ Locust Avenue / First Street
Recommended transportation improvements to achieve acceptable levels of service:

- Existing Plus Project, Near-Term Plus Project, and Cumulative Year 2042 Plus Project scenarios:

- Install Traffic Signal

The improvements identified above for the Existing Plus Project, Near-Term Plus Project, and Cumulative Year 2042 Plus Project scenarios are sufficient to meet the City of Fresno's minimum level of service criteria.

✓ Herndon Avenue at First Street
No transportation improvements Recommended.

The Herndon Avenue at First Street intersection is currently at its ultimate configuration per City of Fresno staff. Furthermore, accommodating additional travel lanes along Herndon Avenue and Fresno Street is not possible due to the presence of residential and office development that currently exists along Herndon Avenue and First Street.

LEVEL OF SERVICE RESULTING FROM TRANSPORTATION IMPROVEMENTS

The level of service resulting from the transportation improvements identified above is shown in Table 4-5 for study area intersections. The resulting Cumulative Year 2042 lane geometry is shown in Figure 4-15.

Table 4-6 identifies left turn and right turn lane pocket lengths required for the Cumulative Year 2042 scenario. Although the need for extended turn lane pockets would occur at some locations prior to the Cumulative Year 2042 scenario, this scenario provides the maximum length needed and therefore these lengths would also provide for projected traffic volumes under the Existing Plus Project and Near-Term Plus Project scenarios.

Table 4-5
Intersection Operations with Transportation Improvements

INTERSECTION	CONTROL	PEAK HOUR	EXISTING PLUS PROJECT		NEAR-TERM PLUS PROJECT		CUMULATIVE YEAR 2042 PLUS PROJECT	
			DELAY	LOS	DELAY	LOS	DELAY	LOS
1. Herdon Avenue / SR 41 SB Off Ramp	Signalized	AM	34.6	C	63.5	E	**197.7**	**F**
		PM	45.6	D	57.8	E	57.8	E
2. Herndon Avenue / SR 41 NB Off Ramp	Signalized	AM	84.1	F	115.3	F	**257.6**	**F**
		PM	102.0	F	**134.8**	**F**	**207.2**	**F**
3. Herndon Avenue / Fresno Street	Signalized	AM	52.3	D	**58.2**	**E**	**109.1**	**F**
		PM	**63.9**	**E**	**80.7**	**F**	**109.9**	**F**
4. Alluvial Avenue / First Street	Signalized	AM					**57.4**	**E**
		PM					**70.0**	**E**
6. Locust Avenue / First Street	Signalized	AM	12.7	B	13.1	B	16.4	B
		PM	34.4	C	36.8	D	29.6	C
7. Herndon Avenue / First Street	Signalized	AM	**81.9**	**F**	**84.3**	**F**	**101.2**	**F**
		PM	**75.5**	**E**	**83.8**	**F**	**103.1**	**F**

DELAY is measured in seconds
LOS = Level of Service / **BOLD** denotes LOS standard has been exceeded
For signalized intersections, delay results show the average for the entire intersection.

Kaiser Permanente - Fresno Medical Office Building
Cumulative Year 2042 Lane Geometry

Figure 4-15

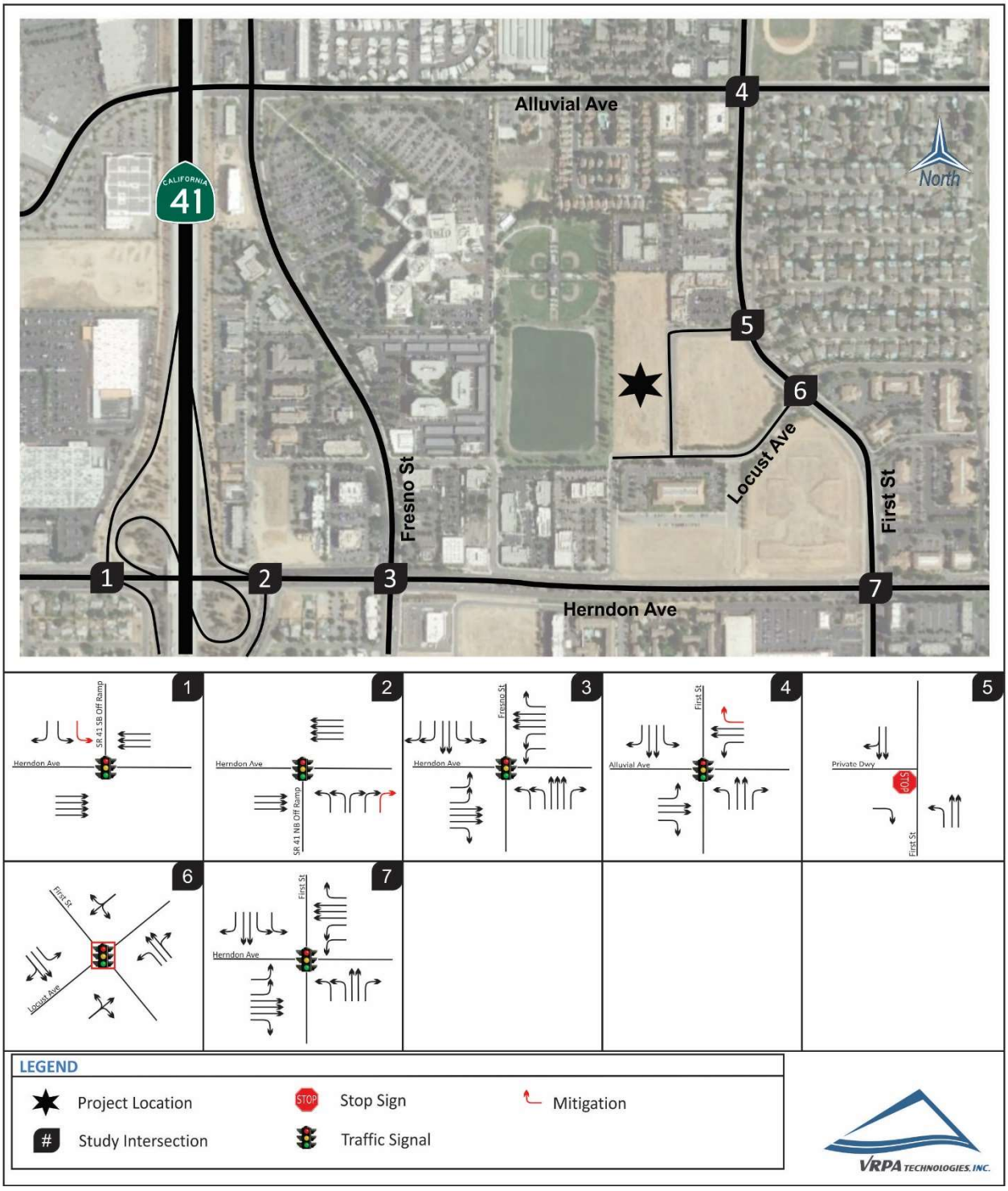


Table 4-6
Left Turn and Right Turn Storage Requirements

INTERSECTION	EXISTING QUEUE STORAGE LENGTH (ft)		CUMULATIVE YEAR 2042 RECOMMENDED STORAGE LENGTH (ft)
Herndon Avenue / SR 41 SB Off Ramp	SB Left	1250	**2 @ 1250**
	SB Right	275	**500**
Herndon Avenue / SR 41 NB Off Ramp	NB Left	2 @ 825	2 @ 825
	NB Right	2 @ 825	**3 @ 825**
Herndon Avenue / Fresno Street	NB Left	2 @ 175	2 @ 175
	NB Right	175	175
	SB Left	2 @ 225	2 @ 225
	SB Right	150	150
	EB Left	2 @ 250	2 @ 250
	EB Right	50	50
	WB Left	2 @ 250	**2 @ 400**
	WB Right	150	**175**
Alluvial Avenue / First Street	NB Left	225	**375**
	NB Right	100	**150**
	SB Left	225	**300**
	SB Right	100	**200**
	EB Left	200	200
	EB Right	100	100
	WB Left	150	**350**
	WB Right	--	**200**
Private Driveway / First Street	NB Left	175	175
Locust Avenue / First Street	NB Left	175	175
	SB Left	250	250
Herdon Avenue / First Street	NB Left	2 @ 200	2 @ 200
	NB Right	150	150
	SB Left	2 @ 200	2 @ 200
	SB Right	175	175
	EB Left	2 @ 250	**2 @ 350**
	EB Right	175	**300**
	WB Left	2 @ 250	2 @ 250
	WB Right	200	200

BOLD denotes change in storage length

4.5 Project Onsite Circulation

As mentioned previously, site access will be provided at the existing intersections of Locust Avenue and First Street and Private Driveway (north of Locust Avenue) and First Street. The Locust Avenue and First Street intersection will provide left-in/left-out and right-in/right out access while the Private Driveway and First street intersection provides left-in and right-in/right-out access only.

Results of the level of service analysis show that the Locust Avenue and First Street intersection warrants a traffic signal under the Existing Plus Project, Near-Term Plus Project, and Cumulative Year 2042 Plus Project scenarios. Installation of a traffic signal would achieve acceptable levels of service for the Locust Avenue and First Street intersection. Results of the level of service analysis also shows that the Private Driveway at First Street intersection will meet the City of Fresno acceptable level of service criteria for all study scenarios. It is anticipated that site access will not be a concern given the level of service analysis at main access points. The design of all Project site driveways must adhere to City of Fresno Design Standards.

4.6 Equitable Share Responsibility

The signalization of the Locust Avenue and First Street intersection is included in the City of Fresno's Traffic Signal Mitigation Impact Fees (TSMI Fee). The City of Fresno Master Fee Schedule was used to determine the TSMI Fee for the Project. The TSMI Fee shown in Table 4-7 was calculated using the charge rate of $1,802 per 1,000 square feet of medical/dental office.

Table 4-7
Traffic Signal Mitigation Impact Fee

INTERSECTIONS	RATE MEDICAL/DENTAL OFFICE (per 1,000 sq.ft)	PROJECT BUILDING SQUARE FOOTAGE (KSF)	TSMI FEE
Locust Avenue / First Street	$1,802	145	$261,290.00

Caltrans has previously identified improvements at the SR 41 NB and SB Off Ramps. Table 4-8 identifies the number of MOB Project trips that will impact Caltrans' facilities and the corresponding fee the MOB Project is responsible for. The MOB Project's trip distribution was used to identify Project trips at the interchange. The trip distribution is based upon a select zone run prepared by the Fresno Council of Governments (Fresno COG), as well as engineering judgement, prevailing traffic patterns in the study area, complementary land uses, major routes, and population centers. Results of the trip distribution show that no MOB Project trips will impact the SR 41 Southbound Off-Ramp at the Herndon Avenue interchange. Figures 4-4 and 4-5 display the Projects trip distribution to the SR 41 and Herndon Avenue interchange.

Table 4-8
Project Fair Share Cost to Caltrans Facilities

IMPROVEMENT	IMPROVEMENT COST	COST PER TRIP	PROJECT TRIPS	PROJECT IMPROVEMENT FEE
SR 41 NB Off-Ramp to Herndon Avenue - Add ramp lane and auxiliary lane	$5,078,900	$500	63	$31,500.00
SR 41 SB Off-Ramp to Herndon Avenue - Auxiliary lane	$7,783,000	$1,700	0	$0.00

The MOB Project will be required to contribute a fair share towards the costs of improvements that are identified for the Cumulative Year 2042 scenarios. The intent of determining the equitable responsibility for the improvements identified above for the Cumulative Year 2042 scenarios, is to provide a starting point for early discussions to address traffic improvement equitability and to calculate the equitable share for reducing traffic impacts.

The formula used to calculate the equitable share responsibility to City of Fresno and Caltrans facilities is as follows:

Equitable Share = (Project Trips)/(Future Year Plus Approved Project Traffic - Existing Traffic)

Table 4-9 shows the equitable share responsibility to City of Fresno and Caltrans Facilities. The equitable share responsibility shown in Table 4-9 is the result of LOS enhancements related to capacity.

Table 4-9
Equitable Share Responsibility

INTERSECTION	PEAK HOUR	EXISTING	PROJECT TRIPS	CUMULATIVE YEAR 2042 PLUS PROJECT	FAIR SHARE PERCENTAGE
Herndon Avenue / SR 41 SB Off Ramp (Additional SB Left Turn Only)	AM	5,871	78	8,638	2.8%
	PM	6,644	148	8,613	7.5%
Alluvial Avenue / First Street	AM	2,896	105	4,350	7.2%
	PM	3,694	130	5,217	8.5%

APPENDIX A

City of Fresno Roadway Functional Class
and Peak Hour Level of Service Thresholds

5.14 - Transportation and Traffic

5.14.1 - Introduction

This section describes potential impacts to the transportation system associated with adoption of the City of Fresno General Plan Update. The impact analysis examines the roadway, transit, bicycle, pedestrian, rail, and aviation components of the transportation system in the City of Fresno. To provide a context for the impact analysis, this section begins with a description of the environmental setting, which describes the existing physical and operational conditions of the transportation system. Following the environmental setting is the relevant regulatory framework, which influences the transportation system and provides the basis for impact significance thresholds that are used in the impact analysis findings and recommended mitigation measures.

5.14.2 - Environmental Setting

Study Area for Project Impacts

The study area for project impacts regarding transportation and traffic is the Planning Area and the immediate surrounding County of Fresno, City of Clovis, and surrounding Counties areas because potential development under the project could affect areas inside and outside the Planning Area.

Study Area for Cumulative Impacts

The study area for the analysis of cumulative transportation and traffic impacts is similar to the study area for project impacts. The study area for cumulative transportation and traffic impacts is the Planning Area and the immediate surrounding County of Fresno, City of Clovis, and surrounding Counties areas because cumulative development in the areas immediately surrounding the Planning Area could combine with development under the proposed project and result in cumulative transportation and traffic impacts.

Setting

The City of Fresno is the fifth largest city in California with a population of about 500,100 in 2011. Fresno County has a population of 940,220 people making it the tenth largest county in the state and is expected to reach 1.1 million people by 2020 (City of Fresno 2012). Located in California's San Joaquin Valley, Fresno is equidistance from the major population centers in Northern and Southern California with easy access to the California Central Coast and Sierra Nevada.

The 2000-2001 California Household Travel Survey provides information on residents travel patterns including the purpose and method of travel in Fresno County. For convenience, travel survey responses are grouped into the following three general categories:

- **Home-Based Work:** Trips may begin or end at a residence and represent travel between a residence and place of work.
- **Home-Based Other:** Trips may begin or end at a residence and include school trips, shopping trips, or trips for recreation.

- **Non-Home-Based:** Trips do not begin or end at a residence. These trips would include a trip from work to a restaurant during lunch.

According to the 2000-2001 California Household Travel Survey, Home-Based Work trips account for 20 percent of trips. In general, Home-Based Work trips occur during the morning and evening commute periods and are predominately made by automobile. There is less flexibility in the departure and arrival time for work trips, due to traditional work schedules. Other trip purposes account for about 80 percent of travel and are more evenly distributed throughout the day.

Most residents traveled from home to work by automobile (about 98 percent) with about 15 percent of those being shared ride (i.e., carpool) trips. Shared ride, transit, walk, and bike trips were significantly higher for non-work trips (Home-Based Other and Non-Home-Based purposes).

The average weekday person trip length for Home-Based Work was about 20 minutes compared to Home-Based Other trips (15 minutes), and Non-Home-Based trips (16 minutes). On average, non-work trips are about 30 percent shorter than work trips and have a higher percentage of transit walk and bike use. This is reasonable given trip purpose, trip scheduling flexibility, and proximity of trip origin and trip destination.

The 2000-2001 California Household Travel Survey also shows that about 12 percent of Fresno County households did not have access to a vehicle and therefore are dependent on transit, walking, and bicycling for mobility.

Roadway Network

The roadway network in the City is generally a traditional grid-based network of north/south and east/west streets, except for significant portions of the Downtown Planning Area, whose grid-based network of streets are angled consistent with the northwest/southeast railroad alignment. Nearly every major street in the Fresno metropolitan area is regularly spaced at half-mile intervals. The grid system provides high levels of accessibility (i.e., travel choices) for residents. Some of the roadways in Fresno are super arterials, which are similar to expressways. Super arterials have limited access and function like expressways to move large volumes of vehicles where freeways are absent. Appendix H-1 includes an exhibit that shows the existing study roadway functional classification and the operational hierarchy of the roadway system. This roadway hierarchy is shown in Table 5.14-1. Freeways are under the jurisdiction of the State, outside the control of the City. They have been assessed for the purposes of this General Plan due to their location within the Planning Area for the General Plan.

Table 5.14-1: City of Fresno Roadway Hierarchy

Roadway Type	Number of Lanes	Bike Lanes	Pedestrian Facilities	On-Street Parking	Median
Expressway	4 to 6	No	Trail	No	Yes
Superarterial	4 to 6	Yes	Sidewalks1	No	Yes

Roadway Type	Number of Lanes	Bike Lanes	Pedestrian Facilities	On-Street Parking	Median
Arterial	4 to 6	Yes	Sidewalks1	Possible	Yes
Collector	2 to 4	Yes	Sidewalks	Yes	Possible
Connector	2 to 3	Possible (or Trail)	Sidewalks	Yes	No
Local	2 to 3	Possible (or Trail)	Sidewalks	Yes	Possible

Notes: [1]Where called for the General Plan, a trail maybe required instead of a sidewalk.
Source: Fehr & Peers. 2011.

Physical Conditions

Exhibit 5.14-1 shows the number of lanes on major city roadways (See Appendix H-2 for detail). The state highway network radiates from Downtown Fresno and serves inter-city and inter-regional travel. The grid street network provides primary local and inter-city travel.

State Facilities

The state facilities in the City of Fresno are listed below and are full access-controlled freeways, which are operated and maintained by Caltrans.

- **SR-41** serves as a principal north/south route connecting north Fresno with the Central Business District (CBD), generally paralleling the Blackstone Avenue corridor within the City. Regionally, SR-41 extends from Yosemite National Park in Madera County, through Fresno County, and to Kettleman City in Kings County near Interstate 5 (I-5). From I-5, SR-41 continues west and connects to US Highway 101 and SR-1 on the Central Coast.
- **SR-99** is a principal north/south route in Fresno County that links Bakersfield in Kern County to the Stockton and Sacramento metropolitan areas in the Northern San Joaquin and Sacramento Valleys. SR-99 is a major goods movement corridor with significant truck volumes. Within Fresno, SR-99 connects northwest Fresno with Downtown and has freeway-to-freeway interchanges with SR-180 and SR-41.
- **SR-168** connects Downtown Fresno with northeast Fresno and the City of Clovis. SR-168 begins at a freeway-to-freeway interchange with SR-180 about 1.5 miles east of SR-41. East of the City of Clovis, SR-168 transitions to a two-lane conventional highway and provides access to the Sierra Nevada.
- **SR-180** travels east/west and connects southeast and southwest Fresno with Downtown Fresno. It also has freeway-to-freeway interchanges at SR-41, SR-99, and SR-168. East of Fresno, SR-180 provides access to Kings Canyon and Sequoia National Parks. West of Fresno, SR-180 transitions to a two-lane conventional highway and connects to SR-145 in Kerman and SR-33 in Mendota.

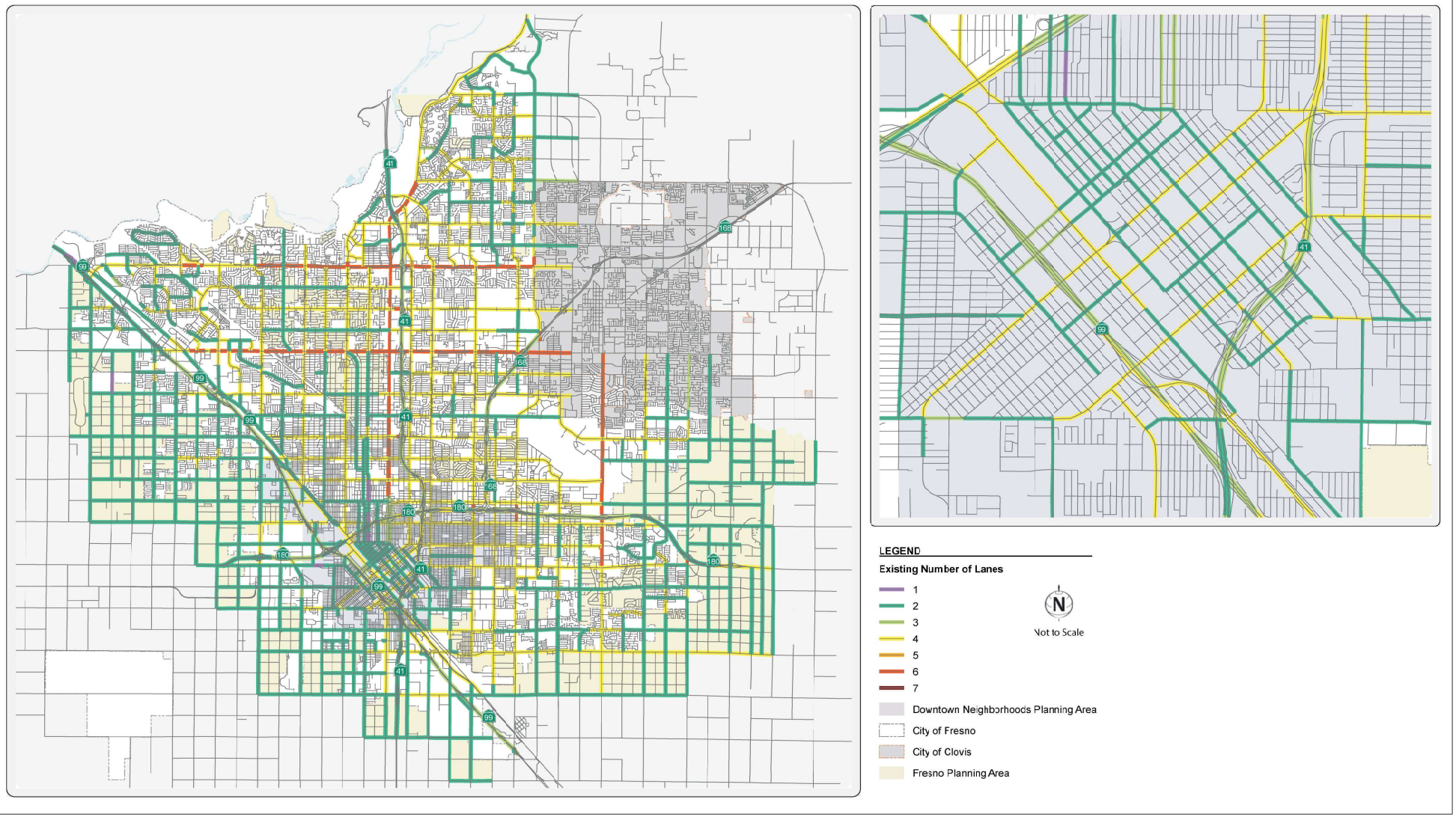
Traffic Operations

The analysis of traffic operations was conducted based on roadway segments representative of the City's overall transportation network. Traffic volumes on the selected roadway segments are used to determine the overall usage and congestion. Note that the roadway segment analysis is based on traffic counts taken at a single location or link, which was intended to be representative of the entire segment. A link connects two intersections; a segment is a series of links. The segments used in this analysis were developed based on where a series of links had common physical and traffic conditions.

Traffic operations on the study roadway segments were measured using a qualitative measure called level of service (LOS). LOS is a general measure of traffic operating conditions whereby a letter grade, from A (the best) to F (the worst), is assigned. These grades represent the perspective of drivers and are an indication of the comfort and convenience associated with driving, as well as speed, travel time, traffic interruptions, and freedom to maneuver. The LOS grades are generally defined as follows:

- **LOS A** represents free-flow travel with an excellent level of comfort and convenience and the freedom to maneuver.
- **LOS B** has stable operating conditions, but the presence of other road users causes a noticeable, though slight, reduction in comfort, convenience, and maneuvering freedom.
- **LOS C** has stable operating conditions, but the operation of individual users is substantially affected by the interaction with others in the traffic stream.
- **LOS D** represents high-density, but stable flow. Users experience severe restriction in speed and freedom to maneuver, with poor levels of comfort and convenience.
- **LOS E** represents operating conditions at or near capacity. Speeds are reduced to a low but relatively uniform value. Freedom to maneuver is difficult with users experiencing frustration and poor comfort and convenience. Unstable operation is frequent, and minor disturbances in traffic flow can cause breakdown conditions.
- **LOS F** is used to define forced or breakdown conditions. This condition exists wherever the volume of traffic exceeds the capacity of the roadway. Long queues can form behind these bottleneck points with queued traffic traveling in a stop-and-go fashion.

The LOS was calculated for each major roadway segment in the City roadway system to evaluate the quality of traffic conditions. Traffic counts used for this analysis represent year 2012 conditions. LOS was determined by comparing traffic volumes for selected roadway segments with peak hour LOS capacity thresholds. These thresholds are shown in Table 5.14-2 and were calculated based on the methodology contained in the Highway Capacity Manual (HCM) (Transportation Research Board 2000). The HCM methodology is the prevailing measurement standard used throughout the United States.



Source: FEHR & PEERS, 2014.

FirstCarbon SOLUTIONS

Exhibit 5.14-1
Existing Roadway Number of Lanes

It should be noted that this traditional methodology used to analyze the roadway system does not consider the potential impact on walking, bicycling, and transit. Pedestrians, bicyclists, and transit riders are all users of the roadway system but may not be fully recognized in the traffic operations analysis and the calculation of LOS. The LOS thresholds in Table 5.14-2 are based on driver's comfort and convenience. Identifying the need for roadway improvements based on the resulting roadway LOS can have unintended impacts to other modes such as increasing the walking time for pedestrians. In evaluating the roadway system, a lower vehicle LOS may be desired when balanced against other community values related to resource protection, social equity, economic development, and consideration of pedestrians, bicyclists, and transit users.

Table 5.14-2: Roadway Functional Class and Peak Hour Level-of-Service Thresholds

Functional Class	Median	Lanes	Peak Hour Level of Service Capacity Threshold				
			A	B	C	D	E
Freeway	N/A[1]	4	2,720	4,460	6,630	7,720	8,630
		3+Aux[2]	2,360	3,860	5,640	6,730	7,530
		3	2,000	3,270	4,660	5,740	6,430
		2+Aux	1,650	2,700	3,850	4,760	5,340
		2	1,300	2,130	3,050	3,790	4,260
State Expressway	Divided	6	2,410	3,960	5,730	7,450	8,450
		4	1,610	2,650	3,810	4,960	5,630
		2	810	1,340	1,890	2,470	2,810
City Expressway	Raised Median	6			1,860	6,170	6,520
		5			1,520	5,110	5,430
		4			1,180	4,050	4,340
		2			520	1,910	2,160
Super Arterial	Raised Median	6				4,910	6,240
		5				4,040	5,195
		4				3,170	4,150
Arterial	Raised Median	8			2,120	7,070	7,490
		6			1,560	5,270	5,610
		5			1,280	4,370	4,670
		4			1,000	3,470	3,730
		3			720	2,555	2,795
		2			440	1,640	1,860
	TWLTL[3]	4			940	3,290	3,550
		2			420	1,550	1,760

Functional Class	Median	Lanes	Peak Hour Level of Service Capacity Threshold				
			A	B	C	D	E
	Undivided	4			770	2,740	2,980
		2			340	1,270	1,480
Collector	TWLTL	4			940	3,290	3,550
		2			420	1,550	1,760
	Undivided	4			770	2,740	2,980
		2			340	1,270	1,480
One-Way	Undivided	3		1,960	2,240	2,430	2,610
		2		1,250	1,490	1,620	1,740
		1		550	740	800	870
Rural State Highway	Undivided	2	310	570	1,020	1,730	2,470
Rural Arterial	Divided	4			1,950	3,580	3,780
	Undivided	2			570	1,230	1,310
Rural Collector/Local	Undivided	2			700	930	1,000

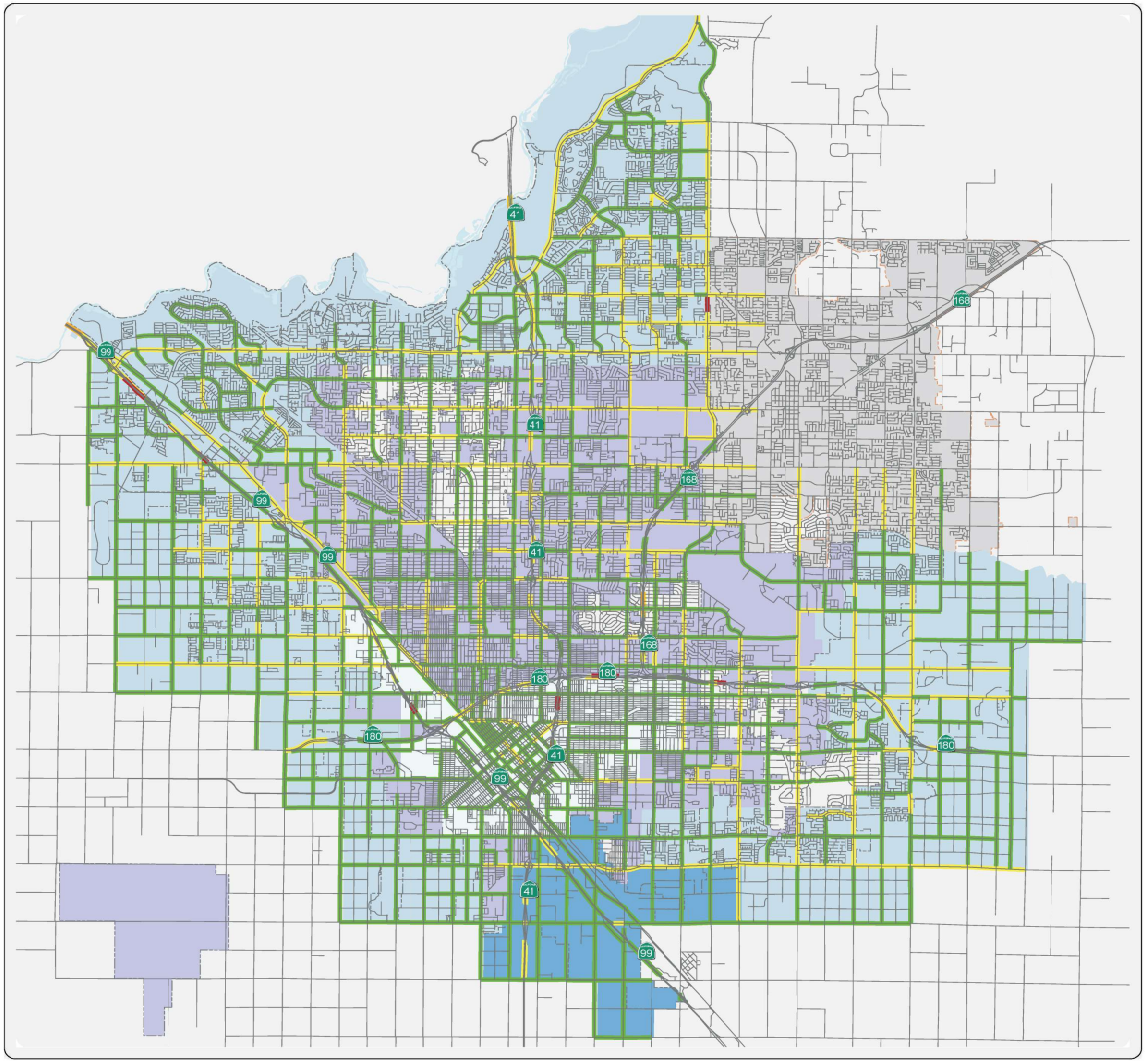
Notes:
[1] N/A - Not applicable for operational class
[2] Aux - Auxiliary Lane
[3] TWLTL – Two-way Left-turn Lane
- LOS is not achievable because of type of facility.
Source: Fehr & Peers 2012.

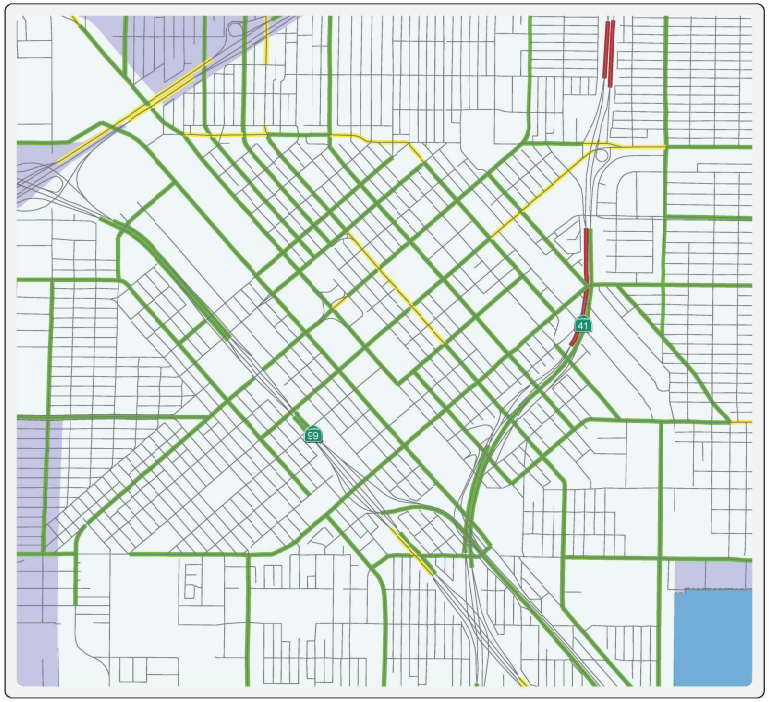
Exhibit 5.14-2 shows existing AM peak hour traffic volumes (two-way total) and LOS (See Appendix H-3 for detail) and Exhibit 5.14-3 shows existing PM peak hour traffic volumes (two-way total) and LOS (See Appendix H-4 for detail). Exhibit 5.14-4 illustrates the planned roadway number of lanes.

Most roadways operate at LOS D or better during the AM and PM peak hours, except for the following, which operate at LOS E and F:

City of Fresno

- Willow Avenue – Copper to Behymer Avenue (LOS E during the PM peak hour)
- Willow Avenue – Behymer Avenue to Shepherd Avenue (LOS F during the PM peak hour)
- Golden State Boulevard – Shaw Avenue to Swift Avenue (LOS F during the PM peak hour)
- Golden State Boulevard – Motel Drive to Ashlan Avenue (LOS E during the PM peak hour)
- Nees Avenue – Jordan Avenue to Paula Avenue (LOS E during the PM peak hour)
- Cornelia Avenue – Ashlan Avenue to Griffith Way (LOS E during the PM peak hour)
- Marks Avenue – Dakota Avenue to Weber Avenue (LOS E during the PM peak hour)
- Clinton Avenue – Valentine Avenue to Marks Avenue (LOS F during the PM peak hour)





DOWNTOWN VIEW

LEGEND

Level of Service
- A thru C
- D
- E
- F

- TZ-I
- TZ-II
- TZ-III
- TZ-IV

- City of Fresno
- Downtown Neighborhoods Planning Area
- City of Clovis

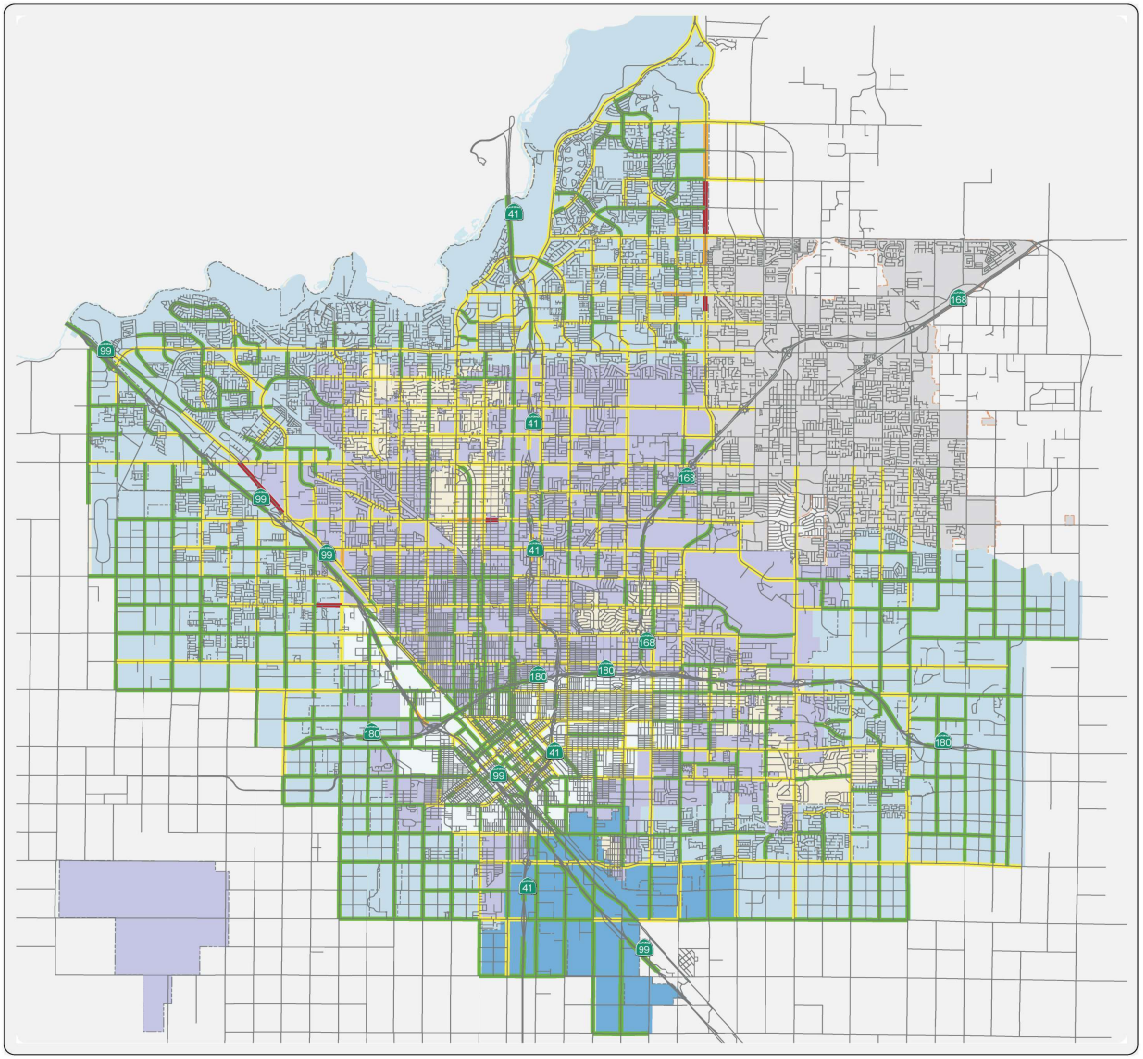
N

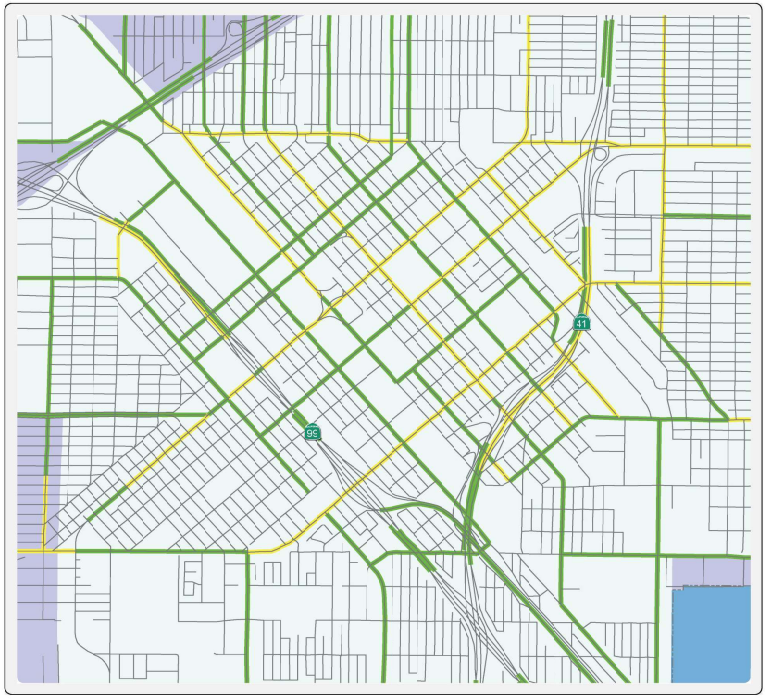
Not to Scale

Source: FEHR & PEERS, 2014.

FirstCarbon SOLUTIONS

Exhibit 5.14-2
AM Peak Hour LOS-Base Year Conditions





DOWNTOWN VIEW

LEGEND

Level of Service
- A thru C
- D
- E
- F

- TIZ-I
- TIZ-II
- TIZ-III
- TIZ-IV

- City Limits
- Downtown Neighborhoods Planning Area
- City of Clovis
- Fresno Planning Area

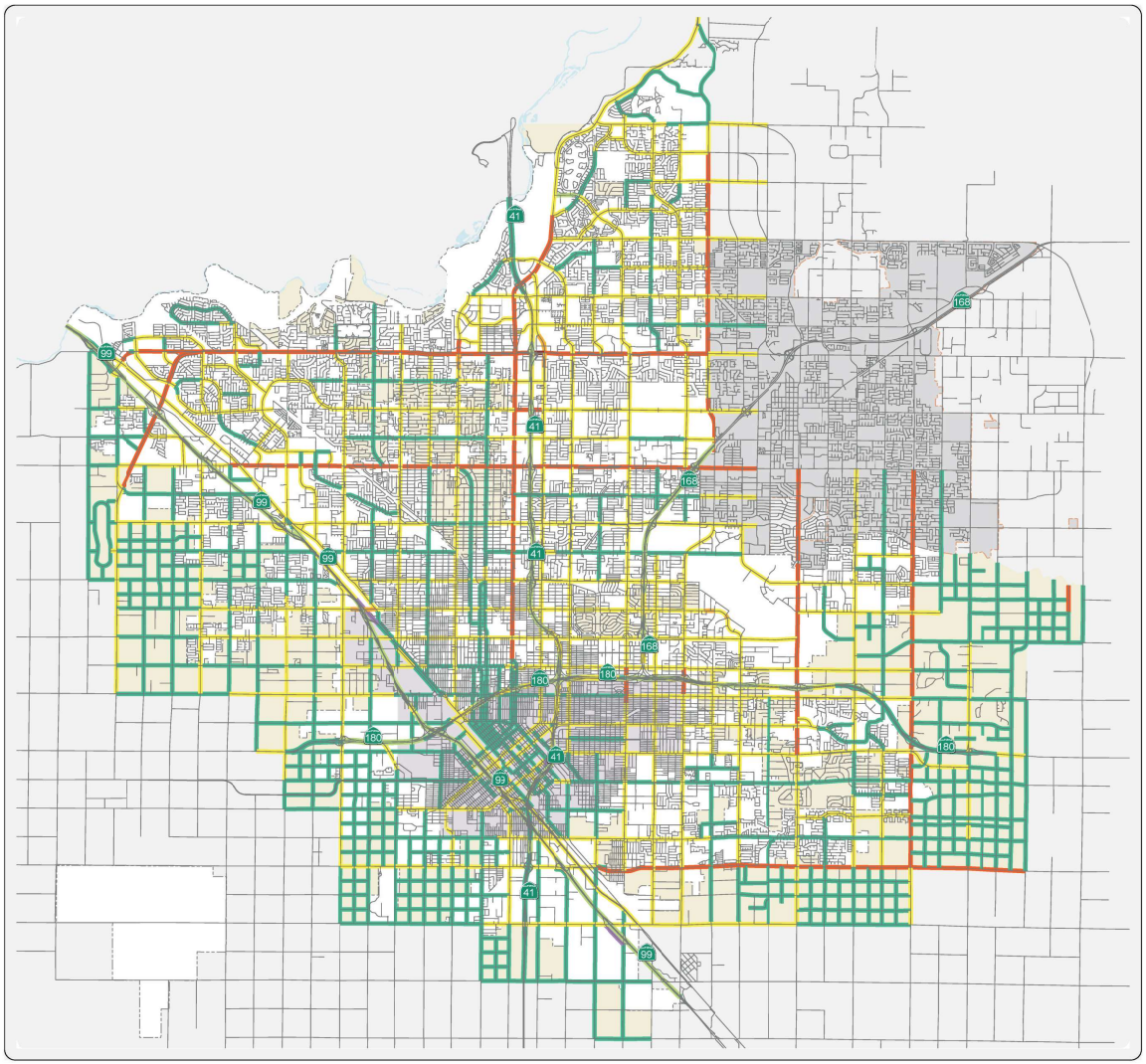
N

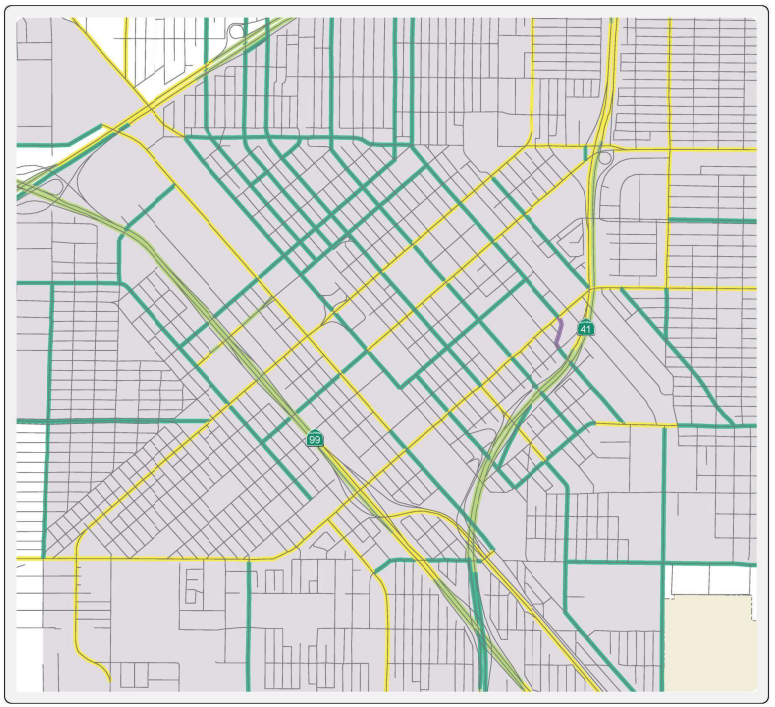
Not to Scale

Source: FEHR & PEERS, 2014.

FirstCarbon SOLUTIONS

Exhibit 5.14-3
PM Peak Hour LOS-Existing Conditions





DOWNTOWN VIEW

LEGEND

Number of Lanes

- 1
- 2
- 3
- 4
- 5
- 6
- 7

Downtown Neighborhoods Planning Area

City of Fresno

City of Clovis

Fresno Planning Area

N

Not to Scale

Source: FEHR & PEERS, 2014.

FirstCarbon SOLUTIONS

Exhibit 5.14-4
Planned Roadway Number of Lanes

City of Fresno/Unincorporated Fresno County

- Willow Avenue – Shepherd Avenue to Teague Avenue (LOS E during the PM peak hour)
- Ashlan Avenue – Palm Avenue to Maroa Avenue (LOS E during the PM peak hour)
- Ashlan Avenue – Maroa Avenue to Del Mar Avenue (LOS F during the PM peak hour)

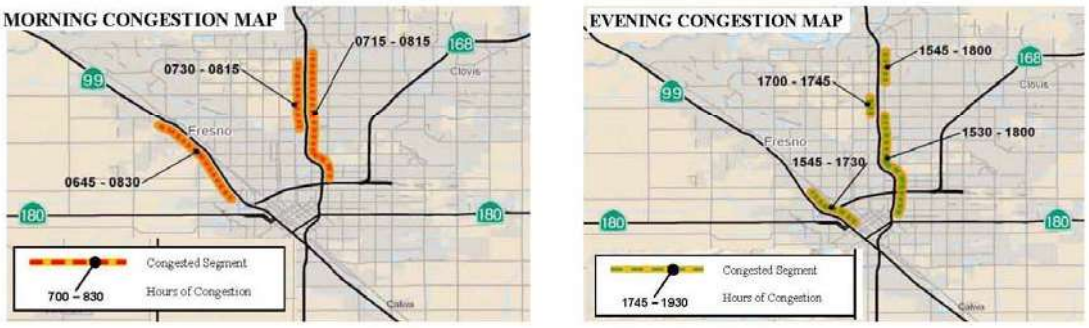
City of Fresno/City of Clovis

- Nees Avenue to Decatur Avenue (LOS F during the AM and PM peak hours)

Caltrans

- SR-41 Southbound - Bullard Avenue to Shaw Avenue (LOS E during the AM peak hour)
- SR-41 Northbound - Shaw Avenue to Ashlan Avenue (LOS E during the PM peak hour)
- SR-41 Northbound - Shields Avenue to McKinley Avenue (LOS E during the PM peak hour)

SR-99 Northbound - SR-180 to Belmont Avenue (LOS E during the PM peak hour)Congestion data presented in the 2008 State Highway Congestion Monitoring Program (HICOMP) Annual Data Compilation (September 2009) indicate recurrent congestion during the morning and evening peak hour on segments of SR-99 and SR-41 in the City. The images below show these congested locations.



The HICOMP defines recurrent congestion as a condition lasting for at least 15 minutes when travel demand exceeds freeway capacity and vehicle speeds are 35 mile per hour or less on a typical incident-free weekday. Note that an auxiliary lane was recently added to northbound SR-41 between the Bullard Avenue and Herndon Avenue interchanges to improve these conditions. These locations may not be captured by the roadway segment capacity analysis presented above, since it cannot capture the operational aspects of vehicle merging, diverging and weaving that is a key contributor to the recurrent congestion shown on the maps above. The freeway segment analysis summarized above is similar to but not as severe as the HICOMP congestion data.

Traffic Safety

Appendix H-12 includes an exhibit that shows recorded automobile collisions since 2009 based on Statewide Integrated Traffic Records System (SWITERS) data. For that period, there were about 3,100 collisions. The top ten collision locations are shown and all were on or at interchanges with SR-41 and SR-180. The highest number of reported collisions (89) occurred on SR-41 near the Sierra Avenue overcrossing and all were rear end and sideswipe, indicative of collisions due to stop-and-go conditions and on- and off-ramp merge movements. An auxiliary lane was recently added to

northbound SR-41 between the Bullard Avenue and Herndon Avenue interchanges and braided ramps were constructed between SR-41 and SR-180 to improve these conditions.

Public Transportation

- Public transportation in the City consists of the following services and facilities:
- Public bus service
- Express bus service
- Demand-response paratransit
- Passenger rail service

Fresno Area Express (FAX), a department of the City of Fresno, is the predominant transit provider in the City. FAX provides 17,600,000 annual passenger boardings, averaging 48,000 passenger trips per day. The entire FAX system runs about 1,000 bus operations per day. Ridership trends in recent years have shown an increase in the number of people using transit, which may be attributable to poor economic conditions and the rising cost of travel. Appendix H-12 provides the bus routes in the City. The routes typically follow most of the Fresno arterial street network, which are generally spaced on the mile and provide good coverage to most of the City.

Handy Ride is a demand-response service for seniors and persons with disabilities, as required by the Americans with Disabilities Act. This paratransit service serves up to 12,500 eligible individuals in the FAX service area and provided 238,707 passenger rides in fiscal year 2010.

The Fresno County Rural Transit Agency (FCRTA) and Amtrak also provide services for regional travel outside of the Fresno-Clovis Metropolitan Area. FCRTA provides service to many of the unincorporated communities in Fresno County such as Coalinga and Mendota (FCRTA 2012). The San Joaquin Line is one of Amtrak's passenger rail services with connections between the San Joaquin Valley, the Sacramento Valley, the San Francisco Bay Area, and Los Angeles. Greyhound provides similar (more frequent) bus service to these regions.

Bicycle and Pedestrian Circulation

The City is generally flat, which provides a favorable environment for bicycling and walking as a mode of transportation. The City of Fresno Bicycle, Pedestrian, and Trails Master Plan (BPTMP), which was completed in October 2010, provides guidance to expansion and maintenance of the City of Fresno bicycle and pedestrian circulation system. Although the BPTMP is a separate document not part of this Plan, the General Plan recognizes the BPTMP identifies more detailed implementation strategies with cost estimates and prospective funding sources, evaluates priorities of prospective improvements, and identifies a complete inventory of both short and long-range bicycle improvements.

Bicycling

The City of Fresno has approximately 167 miles of on-street striped bike lanes and 17 miles of trails or paths within the City limits, many of which are shown in Appendix H-12. The bicycling facilities are broken down into three classifications, which are each identified below.

- **Class I**: Bicycle or multi-use (bicycle-pedestrian) path that is completely separated from vehicle traffic and typically a 10- to 12-foot wide concrete/asphalt-concrete paved surface with two-foot wide shoulders.
- **Class II**: Designated on-street bicycle lane that is identified with painted pavement striping and singing and is typically at least five feet in width.
- **Class III**: On-street bicycle route that is designated by signs and markings and utilizes the paved surface shared with a low volume of motorized vehicles.

Since the completion of the City of Fresno Bicycle, Pedestrian, and Trails Master Plan in 2010, several facilities have been added to the network, which are identified below:

- Divisadero Street - R Street to H Street
- M Street - San Joaquin Street to Ventura Street
- P Street - Fresno Street to Divisadero Street
- H Street - Divisadero Street to Tulare Street
- Tuolumne Street - Divisadero Street to Broadway Street
- Stanislaus Street - Divisadero Street to Broadway Street

Bicycle Ridership

Data from the U.S. Census revealed a 0.9 percent bicycle mode split for the City of Fresno in 2000, slightly higher than California's statewide average of 0.8 percent. The state's goal is to have 2.8 percent of trips to work be made by bicycle. It is important to note that these numbers likely underestimate the percent of individuals who bicycle because it does not include those who bicycle to work one or two days per week, or those who bicycle for recreation or other purposes. Regardless, the City of Fresno's 0.9 percent bicycle mode share means that 2,700 people in the workforce (in the year 2000) used a bicycle as their primary mode of transportation to and from work.

Pedestrians

The street environment in the City is currently focused around the automobile with sidewalks being absent or incomplete in many areas. However, some older neighborhoods have more pleasant pedestrian environments. For years, the City of Fresno required a park strip in between sidewalks and street curbs to allow for the planting of street trees. As a result, trees were planted in many neighborhoods and are now old, mature trees providing sun relief in the hot summer months. The City began addressing this problem with the "No Neighborhood Left Behind" program in 2005, which brought sidewalks to many neighborhoods throughout Fresno. Although these projects have been completed, the City currently has a program focused on installing the missing sidewalk curb ramps on street corners where ramps are needed.

Rail/Highway Freight

The city is served by two rail corridors: the Burlington Northern Santa Fe (BNSF) rail corridor has one track and travels through northwest Fresno and the middle of Downtown while the Union Pacific

Railroad (UPRR) corridor has two tracks and generally runs parallel to SR-99. According to the 2007 City of Fresno Downtown Transportation and Infrastructure Study, about 50 freight trains pass through the two rail corridors daily as they travel through Downtown. SR-99 and the UPRR are both international trade facilities. Peak shipping months in the San Joaquin Valley are May through October. Appendix H-12 includes an exhibit that shows existing goods movement and aviation facilities.

High Speed Rail

The California High Speed Rail Authority (Authority) is proposing to construct, operate, and maintain an electric-powered high-speed train system in California. In August 2011, the Authority released the Draft Environmental Impact Report (DEIR) for the Merced to Fresno and Fresno to Bakersfield project sections. The DEIR identified several roadway network changes in the City, including road closures, new grade separations, and road realignments.

As of January 2013, the Authority had secured Federal and State funding for an initial construction section in the Fresno area, and was receiving bids from design-build contractor teams to begin construction. This initial construction segment includes the high-speed rail (HSR) trackway through the City, from Madera County through Downtown Fresno.

The Authority Board of Directors, on May 7, 2014, certified the Final Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the Fresno to Bakersfield project section of the high-speed rail program and approved a high-speed rail alignment within the Fresno to Bakersfield project section

Aviation

The City of Fresno manages the Fresno Yosemite International Airport (FYI). The airport is located in northeast Fresno just southwest of Clovis in between Highways 168 and 180. There are two runways, each of which is 7,205 feet long and 100 feet wide. There are 174 aircraft based at FYI with an average of 371 daily aircraft operations in 2012. In 2011, the two runways served about 1.2 million passengers and airport officials expect that number to grow in the future. There are also two other general aviation airports (i.e., Chandler and Sierra Sky Park) and four heliports, including McCarthy Ranch, Community Regional Medical Center, Valley Medical Center, and PG&E Service Center in the City (AirNav 2012).

5.14.3 - Regulatory Setting

This section summarizes the transportation policies, laws, and regulations that apply to the proposed project. This information provides context for the impact discussion related to the project's consistency with applicable regulatory conditions. Further, this study identifies impacts to traffic operations by comparing roadway LOS analysis results against LOS policies set forth by the City of Fresno and Caltrans.

Federal Plans, Policies, Regulations, Laws

No federal plans, policies, regulations or laws pertaining to transportation are applicable.

APPENDIX B

Traffic Count Data Worksheets

National Data & Surveying Services

Intersection Turning Movement Count

Location: SR-41 SB Ramps & Herndon Ave
City: Fresno
Control: Signalized

Project ID: 19-07396-006
Date: 10/22/2019

Total

NS/EW Streets:	SR-41 SB Ramps				SR-41 SB Ramps				Herndon Ave				Herndon Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	1	0	1	0	0	3.5	0.5	0	0	2.5	1.5	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	68	0	19	0	0	247	185	0	0	276	164	0	959
7:15 AM	0	0	0	0	90	0	22	0	0	309	193	0	0	406	175	0	1195
7:30 AM	0	0	0	0	129	0	43	0	0	328	190	0	0	497	179	0	1366
7:45 AM	0	0	0	0	119	0	52	0	0	367	133	0	0	568	162	0	1401
8:00 AM	0	0	0	0	73	0	23	0	0	362	151	0	0	473	160	0	1242
8:15 AM	0	0	0	0	97	0	33	0	0	298	159	0	0	435	138	0	1160
8:30 AM	0	0	0	0	83	1	23	0	0	364	192	0	0	412	170	0	1245
8:45 AM	0	0	0	0	93	1	21	0	0	275	168	0	0	481	130	0	1169
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	752	2	236	0	0	2550	1371	0	0	3548	1278	0	9737
APPROACH %'s :					75.96%	0.20%	23.84%	0.00%	0.00%	65.03%	34.97%	0.00%	0.00%	73.52%	26.48%	0.00%	
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	0	0	0	0	411	0	140	0	0	1366	667	0	0	1944	676	0	5204
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.797	0.000	0.673	0.000	0.000	0.931	0.864	0.000	0.000	0.856	0.944	0.000	0.929
					0.801				0.981				0.897				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	1	0	1	0	0	3.5	0.5	0	0	2.5	1.5	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	73	0	42	0	0	275	206	0	0	528	174	0	1298
4:15 PM	0	0	0	0	71	1	32	0	0	325	207	0	0	551	195	0	1382
4:30 PM	0	0	0	0	66	0	41	0	0	349	247	0	0	562	177	0	1442
4:45 PM	0	0	0	0	57	1	29	0	0	351	235	0	0	521	195	0	1389
5:00 PM	0	0	0	0	101	0	39	0	0	318	206	0	0	416	210	0	1290
5:15 PM	0	0	0	0	59	0	39	0	0	433	245	0	0	566	248	0	1590
5:30 PM	0	0	0	0	71	0	43	0	0	370	215	0	0	468	200	0	1367
5:45 PM	0	0	0	0	69	0	33	0	0	323	186	0	0	503	179	0	1293
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	567	2	298	0	0	2744	1747	0	0	4115	1578	0	11051
APPROACH %'s :					65.40%	0.23%	34.37%	0.00%	0.00%	61.10%	38.90%	0.00%	0.00%	72.28%	27.72%	0.00%	
PEAK HR :	04:30 PM - 05:30 PM																TOTAL
PEAK HR VOL :	0	0	0	0	283	1	148	0	0	1451	933	0	0	2065	830	0	5711
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.700	0.250	0.902	0.000	0.000	0.838	0.944	0.000	0.000	0.912	0.837	0.000	0.898
					0.771				0.879				0.889				

National Data & Surveying Services

Intersection Turning Movement Count

Location: SR-41 NB Ramps & Herndon Ave
City: Fresno
Control: Signalized

Project ID: 19-07396-005
Date: 10/22/2019

Total

NS/EW Streets:	SR-41 NB Ramps				SR-41 NB Ramps				Herndon Ave				Herndon Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	2	0	2	0	0	0	0	0	0	3	1	0	0	3.5	0.5	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	136	0	167	0	0	0	0	0	0	270	31	0	0	290	72	0	966
7:15 AM	182	1	244	0	0	0	0	0	0	361	42	0	0	401	94	0	1325
7:30 AM	248	0	251	0	0	0	0	0	0	381	37	0	0	457	66	0	1440
7:45 AM	264	1	297	0	0	0	0	0	0	481	54	0	0	454	89	0	1640
8:00 AM	212	0	314	0	0	0	0	0	0	374	50	0	0	394	64	0	1408
8:15 AM	220	0	322	0	0	0	0	0	0	364	43	0	0	368	73	0	1390
8:30 AM	167	0	278	0	0	0	0	0	0	387	40	0	0	401	63	0	1336
8:45 AM	237	0	308	0	0	0	0	0	0	386	22	0	0	381	48	0	1382
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	1666	2	2181	0	0	0	0	0	0	3004	319	0	0	3146	569	0	10887
APPROACH %'s :	43.28%	0.05%	56.66%	0.00%					0.00%	90.40%	9.60%	0.00%	0.00%	84.68%	15.32%	0.00%	
PEAK HR :	07:30 AM - 08:30 AM																TOTAL
PEAK HR VOL :	944	1	1184	0	0	0	0	0	0	1600	184	0	0	1673	292	0	5878
PEAK HR FACTOR :	0.894	0.250	0.919	0.000	0.000	0.000	0.000	0.000	0.000	0.832	0.852	0.000	0.000	0.915	0.820	0.000	0.896
	0.947								0.834				0.905				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	2	0	2	0	0	0	0	0	0	3	1	0	0	3.5	0.5	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	215	0	286	0	0	0	0	0	0	316	51	0	0	501	58	0	1427
4:15 PM	190	0	266	0	0	0	0	0	0	349	46	0	0	534	80	0	1465
4:30 PM	248	0	208	0	0	0	0	0	0	371	45	0	0	493	72	0	1437
4:45 PM	218	0	205	0	0	0	0	0	0	335	57	0	0	486	64	0	1365
5:00 PM	191	0	268	0	0	0	0	0	0	344	44	0	0	470	72	0	1389
5:15 PM	190	0	200	0	0	0	0	0	0	487	50	0	0	604	83	0	1614
5:30 PM	214	0	247	0	0	0	0	0	0	367	51	0	0	463	73	0	1415
5:45 PM	216	0	280	0	0	0	0	0	0	367	46	0	0	446	63	0	1418
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	1682	0	1960	0	0	0	0	0	0	2936	390	0	0	3997	565	0	11530
APPROACH %'s :	46.18%	0.00%	53.82%	0.00%					0.00%	88.27%	11.73%	0.00%	0.00%	87.62%	12.38%	0.00%	
PEAK HR :	05:00 PM - 06:00 PM																TOTAL
PEAK HR VOL :	811	0	995	0	0	0	0	0	0	1565	191	0	0	1983	291	0	5836
PEAK HR FACTOR :	0.939	0.000	0.888	0.000	0.000	0.000	0.000	0.000	0.000	0.803	0.936	0.000	0.000	0.821	0.877	0.000	0.904
	0.910								0.818				0.828				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Fresno St & Herndon Ave
City: Fresno
Control: Signalized

Project ID: 19-07396-004
Date: 10/22/2019

Total

NS/EW Streets:	Fresno St				Fresno St				Herndon Ave				Herndon Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	2 NL	3 NT	1 NR	0 NU	2 SL	2 ST	2 SR	0 SU	2 EL	3 ET	1 ER	0 EU	2 WL	3 WT	1 WR	0 WU	TOTAL
7:00 AM	18	38	34	0	10	29	60	0	68	323	28	0	26	301	14	0	949
7:15 AM	22	57	49	0	10	28	61	1	111	477	19	0	41	407	28	1	1312
7:30 AM	24	71	75	0	18	74	97	1	112	472	22	0	47	419	45	0	1477
7:45 AM	26	110	68	1	16	66	57	0	126	641	28	0	64	438	49	0	1690
8:00 AM	21	122	80	1	16	61	73	0	163	489	33	0	58	342	49	0	1508
8:15 AM	27	119	72	2	21	77	60	2	164	511	25	0	50	386	60	0	1576
8:30 AM	24	94	55	1	25	61	69	2	162	482	26	0	38	344	40	1	1424
8:45 AM	16	111	78	1	24	68	85	2	162	488	37	2	48	317	54	1	1494
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	178	722	511	6	140	464	562	8	1068	3883	218	2	372	2954	339	3	11430
APPROACH %'s :	12.56%	50.95%	36.06%	0.42%	11.93%	39.52%	47.87%	0.68%	20.65%	75.09%	4.22%	0.04%	10.14%	80.53%	9.24%	0.08%	
PEAK HR :	07:30 AM - 08:30 AM																TOTAL
PEAK HR VOL :	98	422	295	4	71	278	287	3	565	2113	108	0	219	1585	203	0	6251
PEAK HR FACTOR :	0.907	0.865	0.922	0.500	0.845	0.903	0.740	0.375	0.861	0.824	0.818	0.000	0.855	0.905	0.846	0.000	0.925
	0.914				0.841				0.876				0.911				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	2 NL	3 NT	1 NR	0 NU	2 SL	2 ST	2 SR	0 SU	2 EL	3 ET	1 ER	0 EU	2 WL	3 WT	1 WR	0 WU	TOTAL
4:00 PM	28	112	60	1	55	107	121	3	156	427	39	1	68	405	47	0	1630
4:15 PM	29	116	78	3	42	103	135	4	109	462	43	0	55	434	45	1	1659
4:30 PM	31	125	69	2	44	121	152	5	120	441	38	0	48	389	42	1	1628
4:45 PM	35	137	69	1	60	148	138	7	84	403	28	0	69	398	46	1	1624
5:00 PM	26	126	83	4	59	124	183	3	110	489	22	0	86	347	33	2	1697
5:15 PM	25	133	72	0	42	149	150	3	82	545	46	0	82	486	40	1	1856
5:30 PM	29	130	76	1	40	120	121	5	120	473	37	0	64	415	45	4	1680
5:45 PM	22	130	63	1	37	106	105	0	85	501	41	0	54	367	38	2	1552
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	225	1009	570	13	379	978	1105	30	866	3741	294	1	526	3241	336	12	13326
APPROACH %'s :	12.38%	55.53%	31.37%	0.72%	15.21%	39.25%	44.34%	1.20%	17.67%	76.32%	6.00%	0.02%	12.78%	78.76%	8.17%	0.29%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	115	526	300	6	201	541	592	18	396	1910	133	0	301	1646	164	8	6857
PEAK HR FACTOR :	0.821	0.960	0.904	0.375	0.838	0.908	0.809	0.643	0.825	0.876	0.723	0.000	0.875	0.847	0.891	0.500	0.924
	0.978				0.916				0.906				0.870				

National Data & Surveying Services

Intersection Turning Movement Count

Location: 1st St & Alluvial Ave
City: Fresno
Control: Signalized

Project ID: 19-07396-001
Date: 10/22/2019

Total

NS/EW Streets:	1st St				1st St				Alluvial Ave				Alluvial Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1	2	1	0	1	2	1	0	1	2	1	0	1	2	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	28	32	9	3	9	55	23	4	23	33	20	0	17	84	10	0	350
7:15 AM	33	81	12	3	17	54	44	7	49	49	19	0	17	111	66	0	562
7:30 AM	50	98	19	5	53	97	82	10	50	88	27	0	34	152	67	0	832
7:45 AM	61	74	20	10	26	92	53	2	23	109	46	0	56	200	36	0	808
8:00 AM	60	62	21	8	20	107	33	2	7	70	27	0	37	209	31	0	694
8:15 AM	55	62	13	8	10	81	41	4	15	59	29	0	21	149	12	0	559
8:30 AM	43	66	13	5	15	76	23	4	6	65	24	0	21	135	12	0	508
8:45 AM	41	51	10	6	11	60	25	2	15	57	19	0	26	126	17	0	466
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	371	526	117	48	161	622	324	35	188	530	211	0	229	1166	251	0	4779
APPROACH %'s :	34.93%	49.53%	11.02%	4.52%	14.10%	54.47%	28.37%	3.06%	20.24%	57.05%	22.71%	0.00%	13.91%	70.84%	15.25%	0.00%	
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	204	315	72	26	116	350	212	21	129	316	119	0	144	672	200	0	2896
PEAK HR FACTOR :	0.836	0.804	0.857	0.650	0.547	0.818	0.646	0.525	0.645	0.725	0.647	0.000	0.643	0.804	0.746	0.000	0.870
	0.897				0.722				0.792				0.870				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1	2	1	0	1	2	1	0	1	2	1	0	1	2	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	49	102	14	8	17	80	26	17	33	143	38	0	20	140	37	0	724
4:15 PM	54	132	21	5	25	65	26	18	35	120	47	0	13	116	40	0	717
4:30 PM	44	114	26	1	24	88	25	21	37	145	57	0	23	160	25	0	790
4:45 PM	45	129	25	2	34	91	39	12	37	149	42	0	25	130	29	0	789
5:00 PM	63	144	33	2	36	98	31	11	44	259	65	0	18	159	32	0	995
5:15 PM	64	177	33	3	37	104	27	10	59	204	50	0	16	156	33	0	973
5:30 PM	50	132	41	4	44	81	35	7	44	213	51	1	27	151	36	0	917
5:45 PM	46	117	22	3	22	95	35	10	36	179	46	0	22	136	40	0	809
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	415	1047	215	28	239	702	244	106	325	1412	396	1	164	1148	272	0	6714
APPROACH %'s :	24.34%	61.41%	12.61%	1.64%	18.51%	54.38%	18.90%	8.21%	15.23%	66.17%	18.56%	0.05%	10.35%	72.47%	17.17%	0.00%	
PEAK HR :	05:00 PM - 06:00 PM																TOTAL
PEAK HR VOL :	223	570	129	12	139	378	128	38	183	855	212	1	83	602	141	0	3694
PEAK HR FACTOR :	0.871	0.805	0.787	0.750	0.790	0.909	0.914	0.864	0.775	0.825	0.815	0.250	0.769	0.947	0.881	0.000	0.928
	0.843				0.959				0.850				0.965				

National Data & Surveying Services

Intersection Turning Movement Count

Location: 1st St & Available Pirie Dwy
City: Fresno
Control: 1-Way Stop (EB)

Project ID: 19-07396-007
Date: 10/22/2019

Total

NS/EW Streets:	1st St				1st St				Available Pirie Dwy				Available Pirie Dwy				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1	2	0	0	0	2	0	0	0	0	1	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	5	76	0	1	0	76	2	0	0	0	0	0	0	0	0	0	160
7:15 AM	3	132	0	0	0	83	1	0	0	0	2	0	0	0	0	0	221
7:30 AM	8	195	0	1	0	147	3	0	0	0	3	0	0	0	0	0	357
7:45 AM	8	194	0	0	0	167	5	0	0	0	0	0	0	0	0	0	374
8:00 AM	4	150	0	1	0	138	8	0	0	0	0	0	0	0	0	0	301
8:15 AM	5	148	0	1	0	115	4	0	0	0	4	0	0	0	0	0	277
8:30 AM	6	138	0	1	0	114	1	0	0	0	1	0	0	0	0	0	261
8:45 AM	5	110	0	0	0	99	2	0	0	0	1	0	0	0	0	0	217
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	44	1143	0	5	0	939	26	0	0	0	11	0	0	0	0	0	2168
APPROACH %'s :	3.69%	95.89%	0.00%	0.42%	0.00%	97.31%	2.69%	0.00%	0.00%	0.00%	100.00%	0.00%					
PEAK HR :	07:30 AM - 08:30 AM																TOTAL
PEAK HR VOL :	25	687	0	3	0	567	20	0	0	0	7	0	0	0	0	0	1309
PEAK HR FACTOR :	0.781	0.881	0.000	0.750	0.000	0.849	0.625	0.000	0.000	0.000	0.438	0.000	0.000	0.000	0.000	0.000	0.875
		0.876				0.853				0.438							

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1	2	0	0	0	2	0	0	0	0	1	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	3	201	0	2	0	144	1	0	0	0	6	0	0	0	0	0	357
4:15 PM	2	194	0	0	0	146	1	0	0	0	6	0	0	0	0	0	349
4:30 PM	1	192	0	1	0	184	1	0	0	0	5	0	0	0	0	0	384
4:45 PM	3	184	0	1	0	179	1	0	0	0	7	0	0	0	0	0	375
5:00 PM	1	220	0	2	0	219	3	0	0	0	19	0	0	0	0	0	464
5:15 PM	1	273	0	1	0	194	0	0	0	0	6	0	0	0	0	0	475
5:30 PM	1	219	0	2	0	175	0	0	0	0	13	0	0	0	0	0	410
5:45 PM	1	190	0	1	0	170	0	0	0	0	5	0	0	0	0	0	367
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	13	1673	0	10	0	1411	7	0	0	0	67	0	0	0	0	0	3181
APPROACH %'s :	0.77%	98.64%	0.00%	0.59%	0.00%	99.51%	0.49%	0.00%	0.00%	0.00%	100.00%	0.00%					
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	6	896	0	6	0	767	4	0	0	0	45	0	0	0	0	0	1724
PEAK HR FACTOR :	0.500	0.821	0.000	0.750	0.000	0.876	0.333	0.000	0.000	0.000	0.592	0.000	0.000	0.000	0.000	0.000	0.907
		0.825				0.868				0.592							

National Data & Surveying Services

Intersection Turning Movement Count

Location: 1st St & Locust Ave
City: Fresno
Control: 2-Way Stop (EB/WB)

Project ID: 19-07396-002
Date: 10/22/2019

Total

NS/EW Streets:	1st St				1st St				Locust Ave				Locust Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1	2	0	0	1	2	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	5	79	1	3	2	73	1	0	0	0	1	0	3	0	2	0	170
7:15 AM	12	137	3	6	2	78	8	0	0	0	1	0	4	0	3	0	254
7:30 AM	21	193	4	8	2	141	5	4	0	0	2	0	1	0	6	0	387
7:45 AM	23	197	3	5	7	147	12	1	2	0	3	0	2	0	4	0	406
8:00 AM	31	150	3	1	3	119	16	0	1	0	5	0	2	1	2	0	334
8:15 AM	35	139	1	5	5	98	13	2	3	0	9	0	3	0	8	0	321
8:30 AM	27	139	3	7	5	92	17	2	0	0	7	0	1	1	3	0	304
8:45 AM	26	109	3	7	4	83	11	1	3	0	6	0	3	0	4	0	260
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	180	1143	21	42	30	831	83	10	9	0	34	0	19	2	32	0	2436
APPROACH %'s :	12.99%	82.47%	1.52%	3.03%	3.14%	87.11%	8.70%	1.05%	20.93%	0.00%	79.07%	0.00%	35.85%	3.77%	60.38%	0.00%	
PEAK HR :	07:30 AM - 08:30 AM																TOTAL
PEAK HR VOL :	110	679	11	19	17	505	46	7	6	0	19	0	8	1	20	0	1448
PEAK HR FACTOR :	0.786	0.862	0.688	0.594	0.607	0.859	0.719	0.438	0.500	0.000	0.528	0.000	0.667	0.250	0.625	0.000	0.892
	0.898				0.861				0.521				0.659				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1	2	0	0	1	2	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	8	189	1	14	6	135	4	6	1	1	22	0	1	0	7	0	395
4:15 PM	12	183	5	9	2	142	3	3	6	0	27	0	2	1	5	0	400
4:30 PM	3	176	5	8	4	178	5	4	3	0	33	0	1	0	4	0	424
4:45 PM	4	174	5	6	5	165	3	11	4	0	25	0	6	0	4	0	412
5:00 PM	5	183	4	17	4	220	1	18	4	1	52	0	3	0	14	0	526
5:15 PM	5	258	1	15	7	175	1	12	6	0	35	0	3	0	7	1	526
5:30 PM	4	203	2	17	8	176	1	6	5	0	20	0	2	0	7	0	451
5:45 PM	4	180	2	6	6	168	2	4	3	0	10	0	2	0	5	0	392
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	45	1546	25	92	42	1359	20	64	32	2	224	0	20	1	53	1	3526
APPROACH %'s :	2.63%	90.52%	1.46%	5.39%	2.83%	91.52%	1.35%	4.31%	12.40%	0.78%	86.82%	0.00%	26.67%	1.33%	70.67%	1.33%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	18	818	12	55	24	736	6	47	19	1	132	0	14	0	32	1	1915
PEAK HR FACTOR :	0.900	0.793	0.600	0.809	0.750	0.836	0.500	0.653	0.792	0.250	0.635	0.000	0.583	0.000	0.571	0.250	0.910
	0.809				0.836				0.667				0.691				

National Data & Surveying Services

Intersection Turning Movement Count

Location: 1st St & Herndon Ave
City: Fresno
Control: Signalized

Project ID: 19-07396-003
Date: 10/22/2019

Total

NS/EW Streets:	1st St				1st St				Herndon Ave				Herndon Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	2 NL	2 NT	1 NR	0 NU	2 SL	2 ST	1 SR	0 SU	2 EL	3 ET	1 ER	0 EU	2 WL	3 WT	1 WR	0 WU	TOTAL
7:00 AM	29	36	21	0	14	38	33	1	41	284	30	0	15	270	35	0	847
7:15 AM	44	52	21	0	9	41	39	0	53	404	48	0	24	414	61	0	1210
7:30 AM	47	94	39	0	31	56	48	0	81	468	50	4	29	435	81	0	1463
7:45 AM	42	105	40	2	36	96	29	1	78	560	65	0	39	435	88	0	1616
8:00 AM	38	90	34	0	25	77	32	3	61	479	57	2	44	393	70	2	1407
8:15 AM	46	78	40	0	23	61	29	0	43	470	85	0	36	403	78	2	1394
8:30 AM	44	85	32	1	17	60	36	0	53	446	64	2	23	326	58	1	1248
8:45 AM	46	55	36	0	19	48	27	1	40	476	67	2	52	354	58	0	1281
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	336	595	263	3	174	477	273	6	450	3587	466	10	262	3030	529	5	10466
APPROACH %'s :	28.07%	49.71%	21.97%	0.25%	18.71%	51.29%	29.35%	0.65%	9.97%	79.48%	10.33%	0.22%	6.85%	79.19%	13.83%	0.13%	
PEAK HR :	07:30 AM - 08:30 AM																TOTAL
PEAK HR VOL :	173	367	153	2	115	290	138	4	263	1977	257	6	148	1666	317	4	5880
PEAK HR FACTOR :	0.920	0.874	0.956	0.250	0.799	0.755	0.719	0.333	0.812	0.883	0.756	0.375	0.841	0.957	0.901	0.500	0.910
	0.919				0.844				0.890				0.950				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	2 NL	2 NT	1 NR	0 NU	2 SL	2 ST	1 SR	0 SU	2 EL	3 ET	1 ER	0 EU	2 WL	3 WT	1 WR	0 WU	TOTAL
4:00 PM	62	92	38	1	43	84	43	0	59	460	60	0	54	388	31	2	1417
4:15 PM	50	111	49	2	44	90	62	2	60	414	55	3	46	380	54	3	1425
4:30 PM	67	108	43	0	60	88	59	0	60	458	80	0	46	388	42	0	1499
4:45 PM	69	98	45	3	56	105	47	1	59	419	83	1	59	390	37	1	1473
5:00 PM	80	113	44	1	79	139	85	2	42	431	80	2	76	378	45	0	1597
5:15 PM	56	113	43	2	69	108	46	1	69	545	88	0	76	456	75	1	1748
5:30 PM	93	139	46	0	69	105	53	0	53	410	81	1	56	363	41	0	1510
5:45 PM	56	85	48	2	48	103	34	0	58	532	85	4	43	341	32	2	1473
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	533	859	356	11	468	822	429	6	460	3669	612	11	456	3084	357	9	12142
APPROACH %'s :	30.30%	48.83%	20.24%	0.63%	27.13%	47.65%	24.87%	0.35%	9.68%	77.21%	12.88%	0.23%	11.67%	78.96%	9.14%	0.23%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	298	463	178	6	273	457	231	4	223	1805	332	4	267	1587	198	2	6328
PEAK HR FACTOR :	0.801	0.833	0.967	0.500	0.864	0.822	0.679	0.500	0.808	0.828	0.943	0.500	0.878	0.870	0.660	0.500	0.905
	0.850				0.791				0.842				0.845				

APPENDIX C

Collision Data Worksheets

Print (PDF)

Collision Details for: Case ID 7161616

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	10/19/2015 20:45
Location (Intersection)	E Alluvial Av & N Fresno St
Dist. & Dir. from Intersection	90.00 ft West
State Highway	No
Latidude & Longitude	36.84467327, -119.78417734

Type of Collision	C - Rear End
Motor Vehicle Involved With	G - Bicycle
Collision Severity	3 - Injury (Other Visible)
PCF Violation Category	14 - Lights
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	Yes
Motorcycle Accident	No	**Truck Accident**	No

Parties: 2

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	4 - Bicyclist	L - Bicycle	Yes	-	B - Proceeding Straight
2	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	No	East	B - Proceeding Straight

Victims: 1

Party Number	Victim Role	Victim Gender	Victim Age	Victim Degree of Injury
1	4 - Bicyclist	M - Male	69	6 - Suspected Minor Injury

Print (PDF)

Collision Details for: Case ID 7163186

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	05/10/2014 22:44
Location (Intersection)	N Fresno St & E Alluvial Av
Dist. & Dir. from Intersection	0.00 ft East
State Highway	No
Latidude & Longitude	36.8446701, -119.78386986

Type of Collision	B - Sideswipe
Motor Vehicle Involved With	G - Bicycle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	12 - Traffic Signals and Signs
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	Yes
Motorcycle Accident	No	**Truck Accident**	No

Parties: 2

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	4 - Bicyclist	L - Bicycle	Yes	South	B - Proceeding Straight
2	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	No	East	B - Proceeding Straight

Victims: 1

Party Number	Victim Role	Victim Gender	Victim Age	Victim Degree of Injury
1	4 - Bicyclist	M - Male	36	7 - Possible Injury

Print (PDF)

Collision Details for: Case ID 7168681

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	09/22/2015 22:15
Location (Intersection)	N Fresno St & E Alluvial Av
Dist. & Dir. from Intersection	438.00 ft East
State Highway	No
Latidude & Longitude	36.84467, -119.78387

Type of Collision	G - Vehicle/Pedestrian
Motor Vehicle Involved With	B - Pedestrian
Collision Severity	2 - Injury (Severe)
PCF Violation Category	11 - Pedestrian Violation
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	Yes	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 2

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	2 - Pedestrian	N - Pedestrian	Yes	South	- - Not Stated
2	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	No	East	B - Proceeding Straight

Victims: 1

Party Number	Victim Role	Victim Gender	Victim Age	Victim Degree of Injury
1	3 - Pedestrian	F - Female	17	5 - Suspected Serious Injury

Print (PDF)

Collision Details for: Case ID 7156785

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	02/10/2014 22:44
Location (Intersection)	N Fresno St & E Alluvial Av
Dist. & Dir. from Intersection	0.00 ft East
State Highway	No
Latidude & Longitude	36.8446701, -119.78386986

Type of Collision	B - Sideswipe
Motor Vehicle Involved With	G - Bicycle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	12 - Traffic Signals and Signs
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	Yes
Motorcycle Accident	No	**Truck Accident**	No

Parties: 2

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	4 - Bicyclist	L - Bicycle	Yes	South	B - Proceeding Straight
2	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	No	East	B - Proceeding Straight

Victims: 1

Party Number	Victim Role	Victim Gender	Victim Age	Victim Degree of Injury
1	4 - Bicyclist	M - Male	36	7 - Possible Injury

Print (PDF)

Collision Details for: Case ID 7143311

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	07/15/2014 17:43
Location (Intersection)	N Fresno St & E Alluvial Av
Dist. & Dir. from Intersection	105.00 ft South
State Highway	No
Latidude & Longitude	36.84438179, -119.78387

Type of Collision	C - Rear End
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	03 - Unsafe Speed
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 2

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	Yes	North	A - Stopped
2	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	No	North	A - Stopped

Victims: 1

Party Number	Victim Role	Victim Gender	Victim Age	Victim Degree of Injury

Print (PDF)

Collision Details for: Case ID 7168761

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	07/29/2015 12:53
Location (Intersection)	Alluvial Av & Fresno St
Dist. & Dir. from Intersection	165.00 ft East
State Highway	No
Latidude & Longitude	36.84467001, -119.78330649

Type of Collision	D - Broadside
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	09 - Automobile Right of Way
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 2

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	D - Pickup or Panel Truck	Yes	South	L - Entering Traffic
2	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	No	West	B - Proceeding Straight

Victims: 1

Party Number	Victim Role	Victim Gender	Victim Age	Victim Degree of Injury

Print (PDF)

Collision Details for: Case ID 7162237

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	01/25/2014 06:45
Location (Intersection)	E Alluvial Av & N Fresno St
Dist. & Dir. from Intersection	1320.00 ft East
State Highway	No
Latidude & Longitude	36.84467, -119.77936189

Type of Collision	C - Rear End
Motor Vehicle Involved With	G - Bicycle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	- - Not Stated
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	Yes
Motorcycle Accident	No	**Truck Accident**	No

Parties: 2

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	Yes	East	B - Proceeding Straight
2	4 - Bicyclist	L - Bicycle	No	East	- - Not Stated

Victims: 1

Party Number	Victim Role	Victim Gender	Victim Age	Victim Degree of Injury
2	4 - Bicyclist	M - Male	53	7 - Possible Injury

Print (PDF)

Collision Details for: Case ID 7143251

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	06/02/2014 15:14
Location (Intersection)	Alluvial Av & 1st St
Dist. & Dir. from Intersection	173.00 ft West
State Highway	No
Latidude & Longitude	36.84468001, -119.77539083

Type of Collision	D - Broadside
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	09 - Automobile Right of Way
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 2

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	Yes	North	E - Making Left Turn
2	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	No	East	B - Proceeding Straight

Victims: 3

Party Number	Victim Role	Victim Gender	Victim Age	Victim Degree of Injury

Print (PDF)

Collision Details for: Case ID 7187128

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	06/20/2014 21:56
Location (Intersection)	N 1st St & E Alluvial
Dist. & Dir. from Intersection	0.00 ft East
State Highway	No
Latidude & Longitude	36.84468006, -119.77479993

Type of Collision	A - Head-On
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	12 - Traffic Signals and Signs
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 2

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	Yes	-	E - Making Left Turn
2	1 - Driver (including Hit and Run)	D - Pickup or Panel Truck	No	-	B - Proceeding Straight

Victims: 1

Party Number	Victim Role	Victim Gender	Victim Age	Victim Degree of Injury

Print (PDF)

Collision Details for: Case ID 7168638

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	09/03/2015 13:11
Location (Intersection)	1st St & Locust Av
Dist. & Dir. from Intersection	0.00 ft East
State Highway	No
Latidude & Longitude	36.84013005, -119.77359998

Type of Collision	D - Broadside
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	09 - Automobile Right of Way
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 2

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	- - Not Stated	Yes	West	B - Proceeding Straight
2	1 - Driver (including Hit and Run)	- - Not Stated	No	South	B - Proceeding Straight

Victims: 1

Party Number	Victim Role	Victim Gender	Victim Age	Victim Degree of Injury

Print (PDF)

Collision Details for: Case ID 7162121

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	03/03/2015 07:51
Location (Intersection)	1st & Early California
Dist. & Dir. from Intersection	0.00 ft East
State Highway	No
Latidude & Longitude	36.8391901, -119.77226999

Type of Collision	D - Broadside
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	3 - Injury (Other Visible)
PCF Violation Category	09 - Automobile Right of Way
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 2

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	Yes	North	F - Making U-Turn
2	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	No	South	B - Proceeding Straight

Victims: 3

Party Number	Victim Role	Victim Gender	Victim Age	Victim Degree of Injury

Print (PDF)

Collision Details for: Case ID 7142981

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	01/27/2014 13:15
Location (Intersection)	N 1st St & Early California
Dist. & Dir. from Intersection	0.00 ft East
State Highway	No
Latidude & Longitude	36.8391901, -119.77226999

Type of Collision	D - Broadside
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	09 - Automobile Right of Way
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 2

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	Yes	North	F - Making U-Turn
2	1 - Driver (including Hit and Run)	D - Pickup or Panel Truck	No	South	B - Proceeding Straight

Victims: 1

Party Number	Victim Role	Victim Gender	Victim Age	Victim Degree of Injury

Print (PDF)

Collision Details for: Case ID 8014173

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	04/28/2015 11:32
Location (Intersection)	First St & Herndon
Dist. & Dir. from Intersection	8.00 ft North
State Highway	No
Latidude & Longitude	36.83722194, -119.7723589

Type of Collision	B - Sideswipe
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	08 - Improper Turning
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 2

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	Yes	North	D - Making Right Turn
2	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	No	North	E - Making Left Turn

Victims: 2

Party Number	Victim Role	Victim Gender	Victim Age	Victim Degree of Injury

Print (PDF)

Collision Details for: Case ID 7143275

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	06/13/2014 15:11
Location (Intersection)	Herndon Av & 1st St
Dist. & Dir. from Intersection	0.00 ft East
State Highway	No
Latidude & Longitude	36.83720011, -119.77235996

Type of Collision	C - Rear End
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	03 - Unsafe Speed
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 3

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	Yes	East	B - Proceeding Straight
2	1 - Driver (including Hit and Run)	- - Not Stated	No	East	A - Stopped
3	1 - Driver (including Hit and Run)	E - Pickup or Panel Truck with Trailer	No	South	B - Proceeding Straight

Victims: 1

Print (PDF)

Collision Details for: Case ID 7163181

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	02/25/2014 18:25
Location (Intersection)	East Herndon Av & N 1st St
Dist. & Dir. from Intersection	603.00 ft West
State Highway	No
Latidude & Longitude	36.8372, -119.77441917

Type of Collision	C - Rear End
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	03 - Unsafe Speed
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 3

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	Yes	East	B - Proceeding Straight
2	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	No	East	A - Stopped
3	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	No	East	A - Stopped

Victims: 2

Print (PDF)

Collision Details for: Case ID 7143136

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	05/20/2014 14:34
Location (Intersection)	East Herndon Av & N Fresno St
Dist. & Dir. from Intersection	627.00 ft East
State Highway	No
Latidude & Longitude	36.83746523, -119.77915169

Type of Collision	C - Rear End
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	03 - Unsafe Speed
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 2

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	Yes	West	B - Proceeding Straight
2	1 - Driver (including Hit and Run)	I - Other Bus	No	West	H - Slowing/Stopping

Victims: 1

Party Number	Victim Role	Victim Gender	Victim Age	Victim Degree of Injury

Print (PDF)

Collision Details for: Case ID 7143213

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	05/09/2014 12:39
Location (Intersection)	East Herndon Av & N Fresno St
Dist. & Dir. from Intersection	441.00 ft East
State Highway	No
Latidude & Longitude	36.83749275, -119.77978594

Type of Collision	C - Rear End
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	03 - Unsafe Speed
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 3

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	Yes	West	B - Proceeding Straight
2	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	No	West	A - Stopped
3	1 - Driver (including Hit and Run)	D - Pickup or Panel Truck	No	West	H - Slowing/Stopping

Victims: 1

Print (PDF)

Collision Details for: Case ID 7143367

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	10/14/2015 15:54
Location (Intersection)	Herndon Av & Fresno St
Dist. & Dir. from Intersection	318.00 ft East
State Highway	No
Latidude & Longitude	36.83751088, -119.78020537

Type of Collision	C - Rear End
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	03 - Unsafe Speed
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 3

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	Yes	West	B - Proceeding Straight
2	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	No	West	A - Stopped
3	1 - Driver (including Hit and Run)	D - Pickup or Panel Truck	No	West	A - Stopped

Victims: 4

Print (PDF)

Collision Details for: Case ID 7187325

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	10/24/2014 19:12
Location (Intersection)	Fresno St & Herndon Av
Dist. & Dir. from Intersection	40.00 ft North
State Highway	No
Latidude & Longitude	36.8376598, -119.78129

Type of Collision	- - Not Stated
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	2 - Injury (Severe)
PCF Violation Category	01 - Driving or Bicycling Under the Influence of Alcohol or Drug
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 2

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	Yes	North	B - Proceeding Straight
2	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	No	South	A - Stopped

Victims: 2

Party Number	Victim Role	Victim Gender	Victim Age	Victim Degree of Injury

Print (PDF)

Collision Details for: Case ID 7162322

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	08/14/2015 09:14
Location (Intersection)	Herdon Av & Fresno St
Dist. & Dir. from Intersection	0.00 ft East
State Highway	No
Latidude & Longitude	36.83755007, -119.78128992

Type of Collision	D - Broadside
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	12 - Traffic Signals and Signs
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 2

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	Yes	West	B - Proceeding Straight
2	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	No	South	B - Proceeding Straight

Victims: 1

Party Number	Victim Role	Victim Gender	Victim Age	Victim Degree of Injury

Print (PDF)

Collision Details for: Case ID 7202942

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	01/20/2014 06:55
Location (Intersection)	Herndon Av & Fresno St
Dist. & Dir. from Intersection	200.00 ft West
State Highway	No
Latidude & Longitude	36.83755, -119.78197298

Type of Collision	C - Rear End
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	21 - Unsafe Starting or Backing
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 2

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	Yes	East	B - Proceeding Straight
2	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	No	East	B - Proceeding Straight

Victims: 1

Party Number	Victim Role	Victim Gender	Victim Age	Victim Degree of Injury

Print (PDF)

Collision Details for: Case ID 90205042

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	06/15/2016 11:00
Location (Intersection)	Sr-41 N/B To Herndon Ave & Herndon Ave E/B
Dist. & Dir. from Intersection	100.00 ft South
State Highway Info	**Route Number** 41 **Side of Hwy** N **Postmile** N/A **Location Type** R - Ramp(or Collector)
Latidude & Longitude	36.83731, -119.78357

Type of Collision	C - Rear End
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	03 - Unsafe Speed
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 2

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	Yes	North	J - Changing Lanes

Print (PDF)

Collision Details for: Case ID 90204031

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	06/15/2016 13:00
Location (Intersection)	Sr-41 N/B To Herndon Ave & Herndon Ave
Dist. & Dir. from Intersection	105.00 ft South
State Highway Info	**Route Number** 41 **Side of Hwy** N **Postmile** N/A **Location Type** R - Ramp(or Collector)
Latidude & Longitude	36.83709, -119.78357

Type of Collision	C - Rear End
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	18 - Other Than Driver (or Pedestrian)
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 3

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	D - Pickup or Panel Truck	No	North	B - Proceeding Straight

Print (PDF)

Collision Details for: Case ID 90300142

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	10/21/2016 10:38
Location (Intersection)	Sr-41 N/B To Herndon Avenue & Herndon Ave
Dist. & Dir. from Intersection	225.00 ft South
State Highway Info	**Route Number** 41 **Side of Hwy** N **Postmile** N/A **Location Type** R - Ramp(or Collector)
Latidude & Longitude	36.8369, -119.78358

Type of Collision	C - Rear End
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	03 - Unsafe Speed
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 3

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	D - Pickup or Panel Truck	Yes	North	B - Proceeding Straight

Print (PDF)

Collision Details for: Case ID 90519918

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	08/04/2017 10:19
Location (Intersection)	Sr-41 N/B To Herndon Ave & Herndon Ave
Dist. & Dir. from Intersection	800.00 ft South
State Highway Info	**Route Number** 41 **Side of Hwy** N **Postmile** N/A **Location Type** R - Ramp(or Collector)
Latidude & Longitude	36.8362, -119.7839

Type of Collision	C - Rear End
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	03 - Unsafe Speed
Weather	B - Cloudy
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 5

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	Yes	North	B - Proceeding Straight

Print (PDF)

Collision Details for: Case ID 90376969

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	01/12/2017 10:30
Location (Intersection)	Sr-41 N/B From Herndon Ave. W/B & Herndon Ave.
Dist. & Dir. from Intersection	200.00 ft North
State Highway Info	**Route Number** 41 **Side of Hwy** N **Postmile** N/A **Location Type** R - Ramp(or Collector)
Latidude & Longitude	36.83815, -119.78455

Type of Collision	E - Hit Object
Motor Vehicle Involved With	I - Fixed Object
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	08 - Improper Turning
Weather	B - Cloudy
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 1

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	Yes	West	R - Other

Print (PDF)

Collision Details for: Case ID 90193106

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	05/24/2016 23:35
Location (Intersection)	Sr-41 S/B From Herndon Ave W/B & Herndon Ave
Dist. & Dir. from Intersection	152.00 ft North
State Highway Info	**Route Number** 41 **Side of Hwy** S **Postmile** N/A **Location Type** R - Ramp(or Collector)
Latidude & Longitude	36.83802, -119.78528

Type of Collision	D - Broadside
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	2 - Injury (Severe)
PCF Violation Category	08 - Improper Turning
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 2

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	Yes	South	R - Other

Print (PDF)

Collision Details for: Case ID 90384232

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	02/01/2017 15:55
Location (Intersection)	Sr-41 S/B To Herndon Ave. & Herndon Ave
Dist. & Dir. from Intersection	30.00 ft North
State Highway Info	**Route Number** 41 **Side of Hwy** S **Postmile** N/A **Location Type** R - Ramp(or Collector)
Latidude & Longitude	36.8377, -119.7864

Type of Collision	C - Rear End
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	03 - Unsafe Speed
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

Parties: 2

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	Yes	South	B - Proceeding Straight

Print (PDF)

Collision Details for: Case ID 90494767

Collision Information

County	Fresno
City	Fresno
Date & Time (M/D/Y HH:MM)	06/28/2017 10:30
Location (Intersection)	Sr-41 S/B To Herndon Avenue & Herndon Avenue
Dist. & Dir. from Intersection	50.00 ft North
State Highway Info	**Route Number: 41** **Side of Hwy: S** **Postmile: N/A** **Location Type: R - Ramp(or Collector)**
Latidude & Longitude	36.8378, -119.78645

Type of Collision	C - Rear End
Motor Vehicle Involved With	C - Other Motor Vehicle
Collision Severity	4 - Injury (Complaint of Pain)
PCF Violation Category	21 - Unsafe Starting or Backing
Weather	A - Clear
Alcohol Involved	No

Pedestrian Accident	No	**Bicycle Accident**	No
Motorcycle Accident	No	**Truck Accident**	No

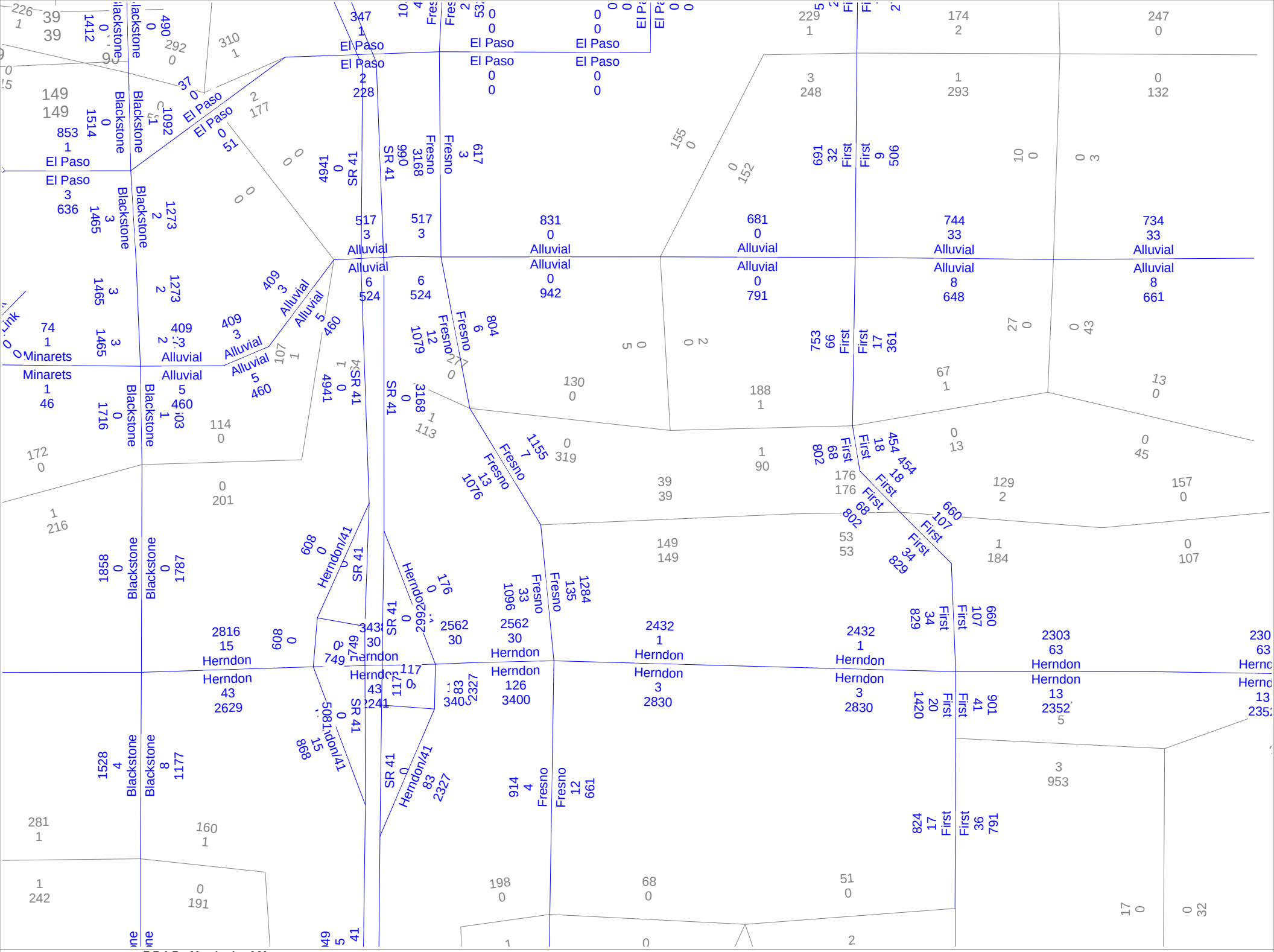
Parties: 2

Party Number	Party Type	Statewide Vehicle Type	At Fault	Party Direction	Movement Preceding Collision
1	1 - Driver (including Hit and Run)	D - Pickup or Panel Truck	Yes	South	B - Proceeding Straight
2	1 - Driver (including Hit and Run)	A - Passenger Car/Station Wagon	No	South	A - Stopped

Victims: 1

APPENDIX D

Fresno COG Travel Model Outputs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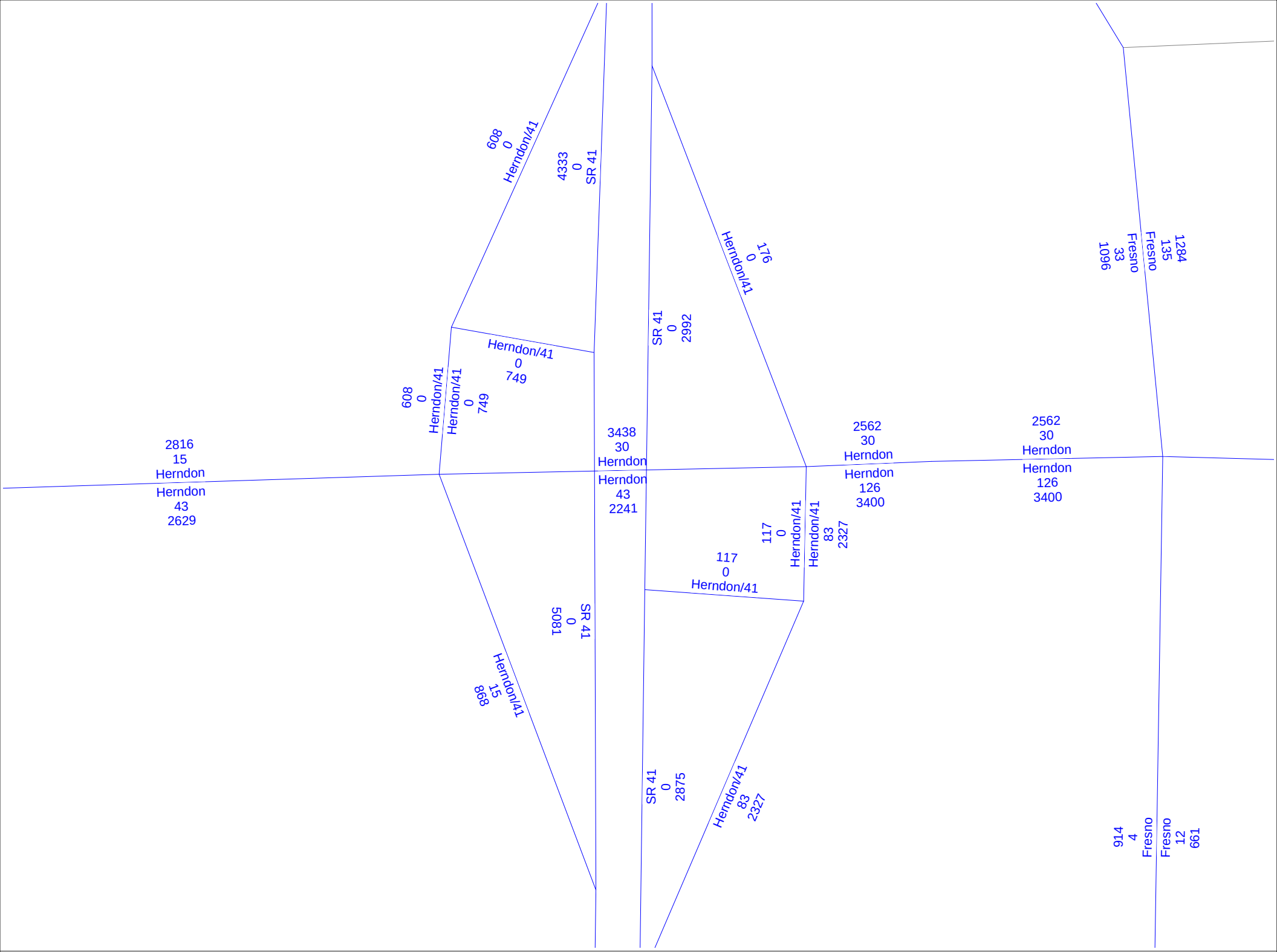
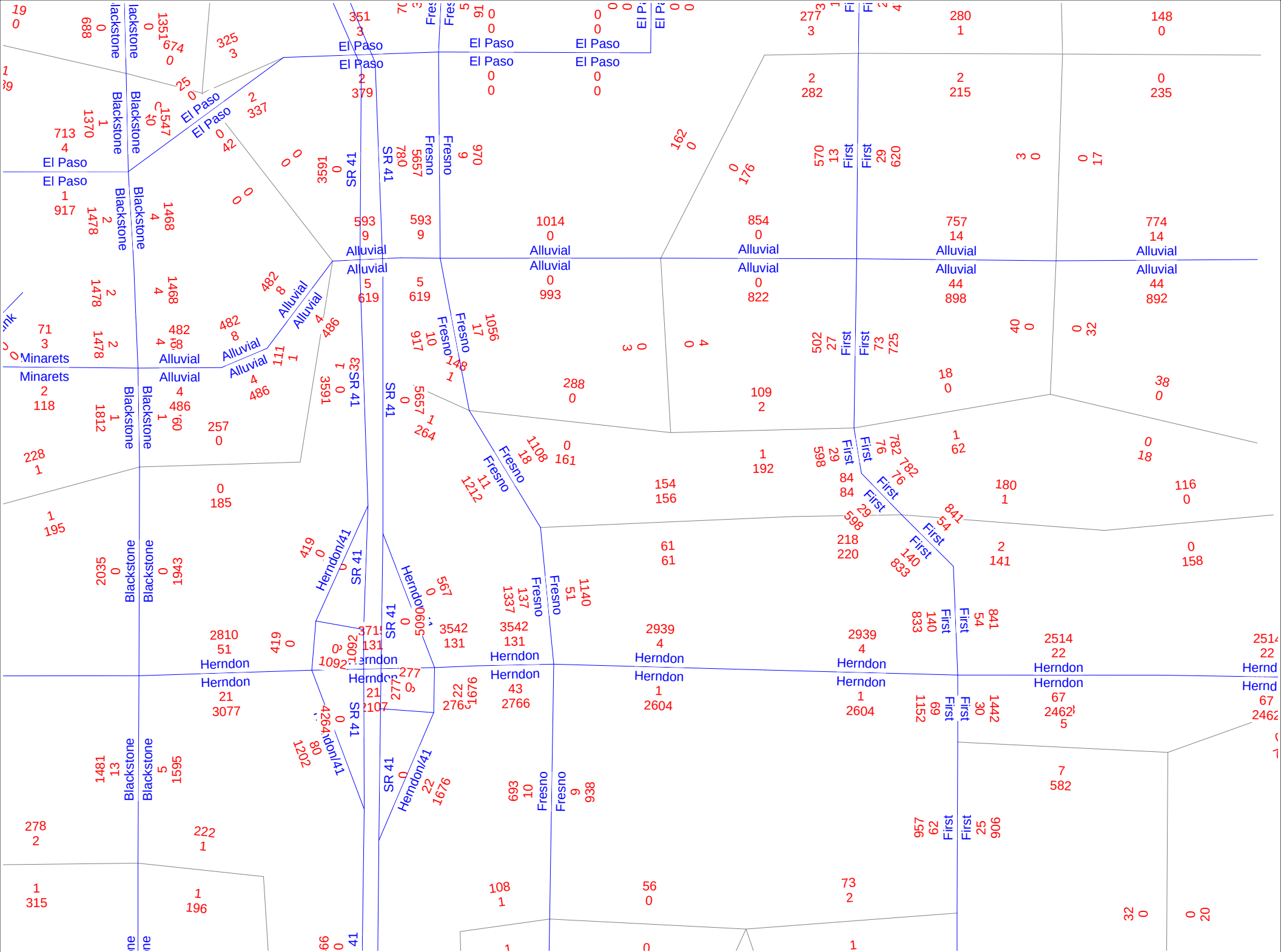
Blackstone
Minarets
Alluvial
Fresno
SR 41
Herndon
First
Herndon/41
2019 Model AM
Licensed to VRPA Technologies



Licensed to VRPA Technologies



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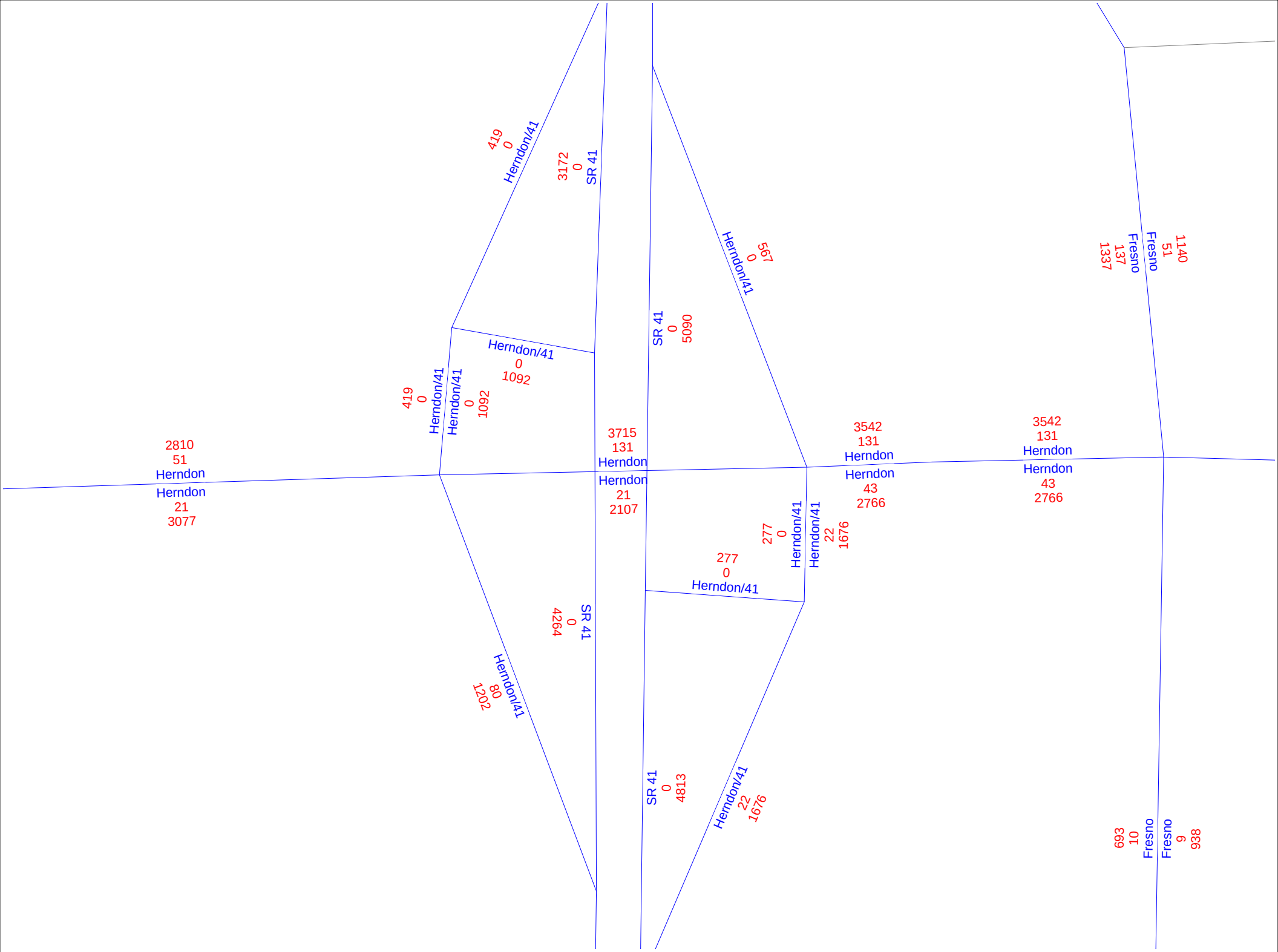

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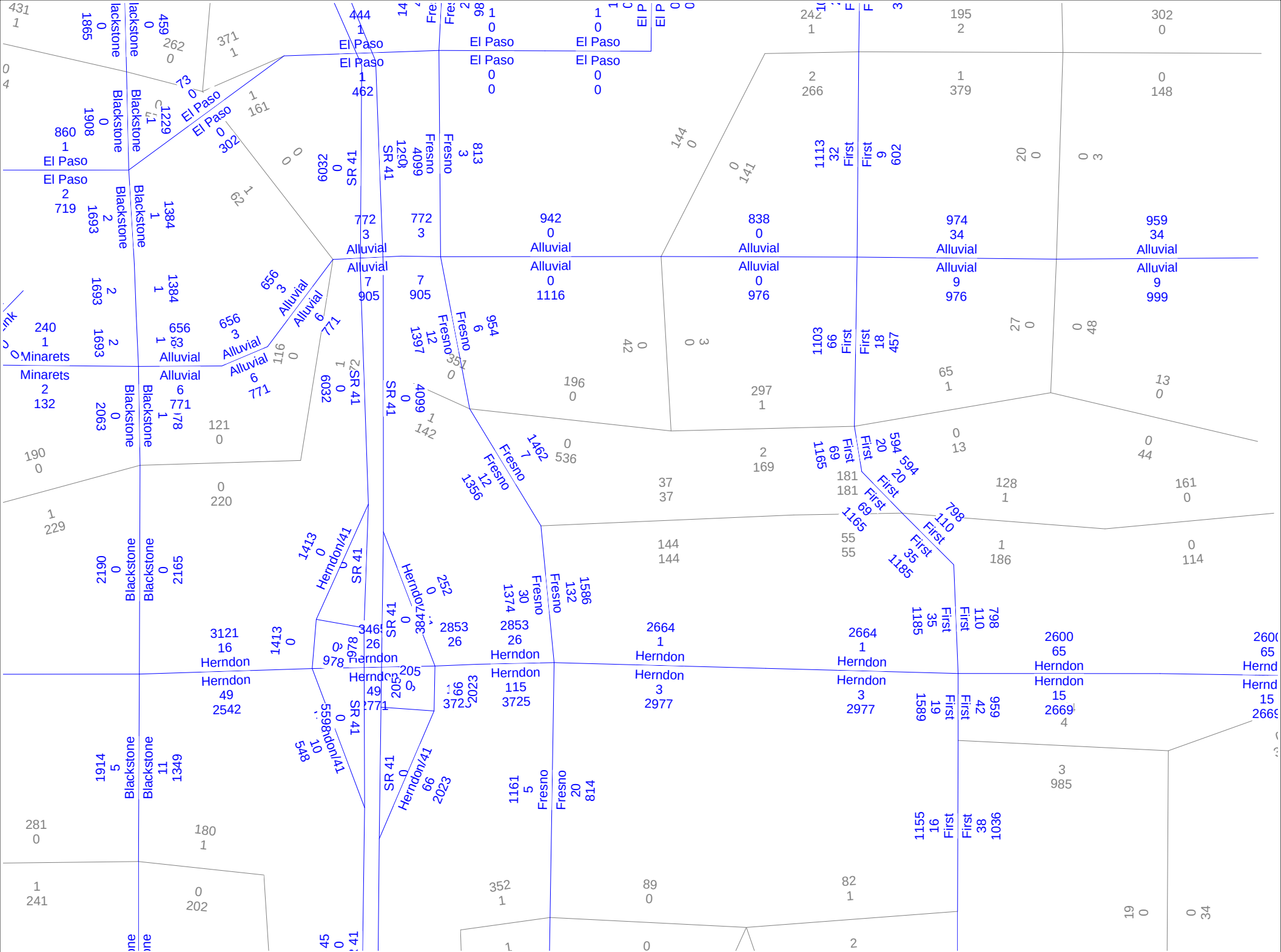
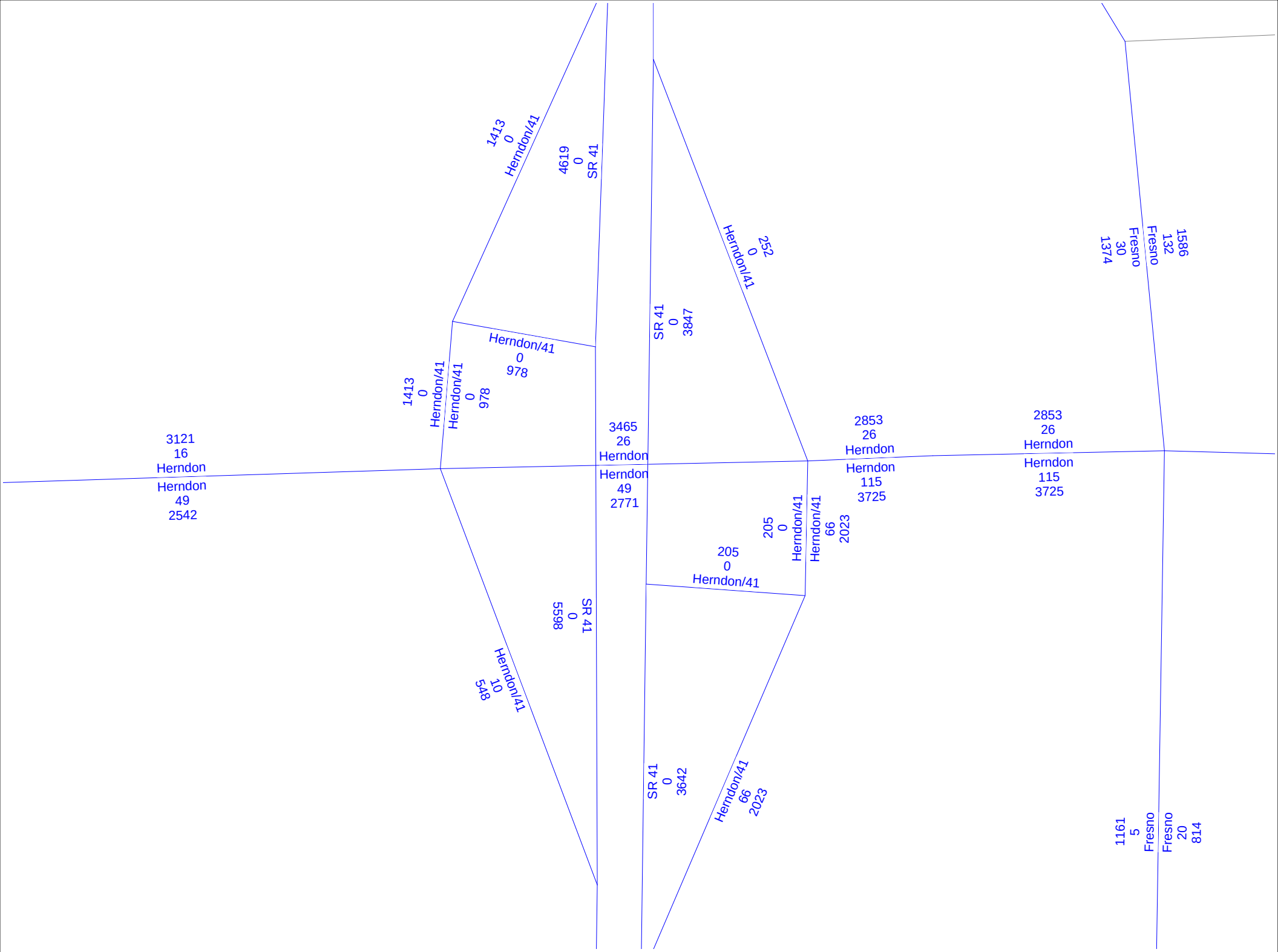

El Paso
Blackstone
Minarets
Alluvial
Fresno
First
SR 41
Herndon/41
Herndon
2035 Model AM
Licensed to VRPA Technologies



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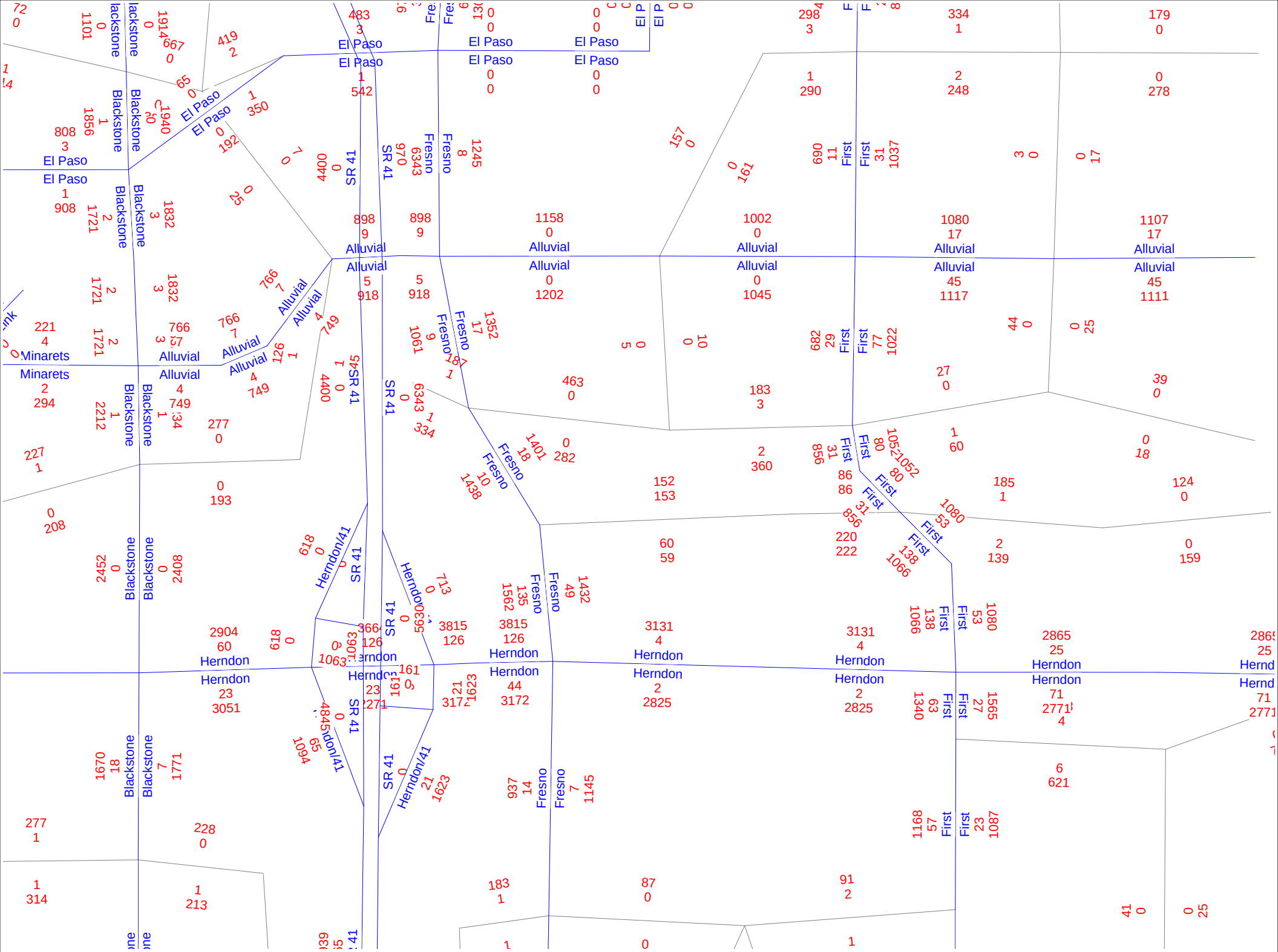

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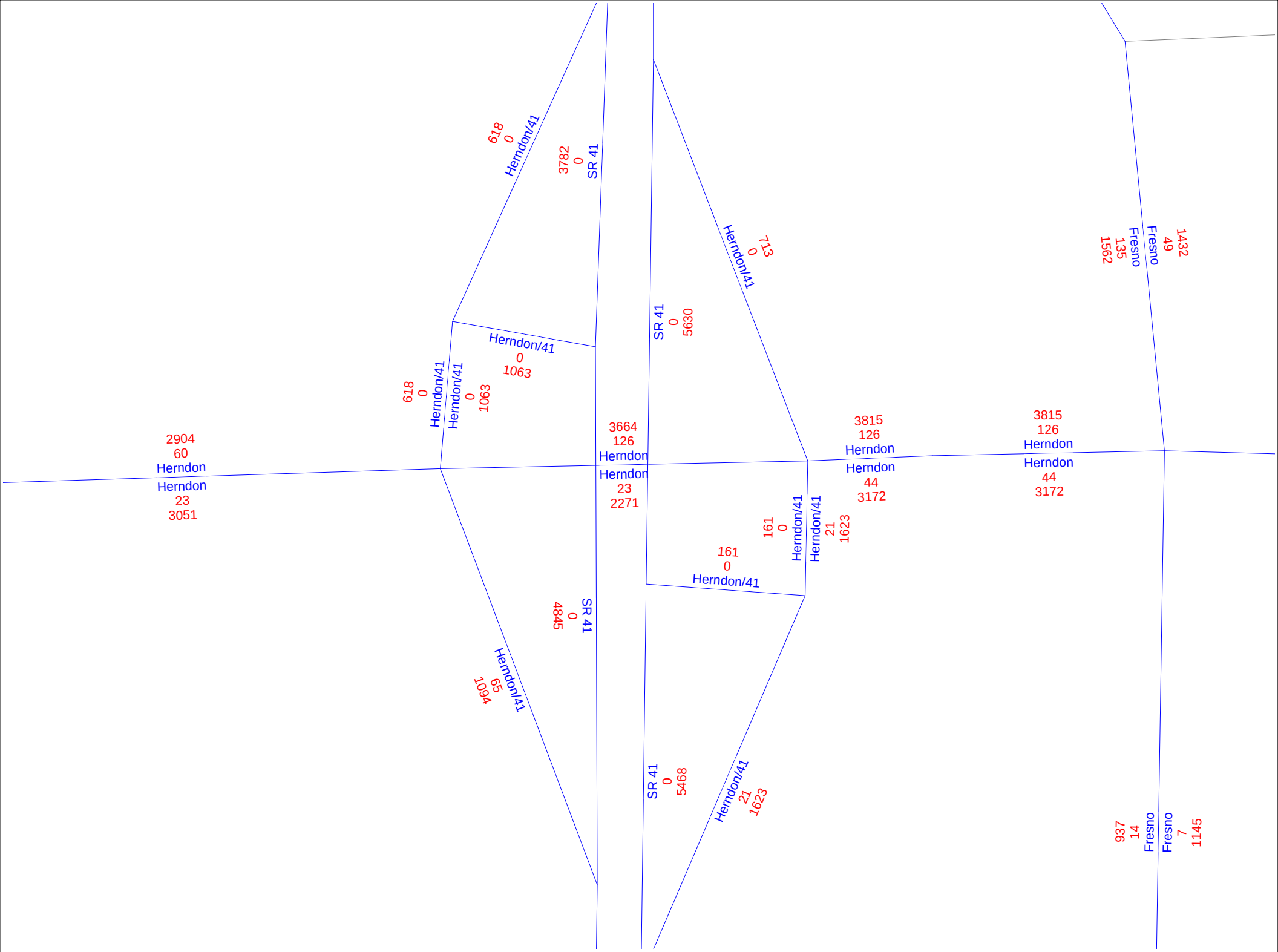
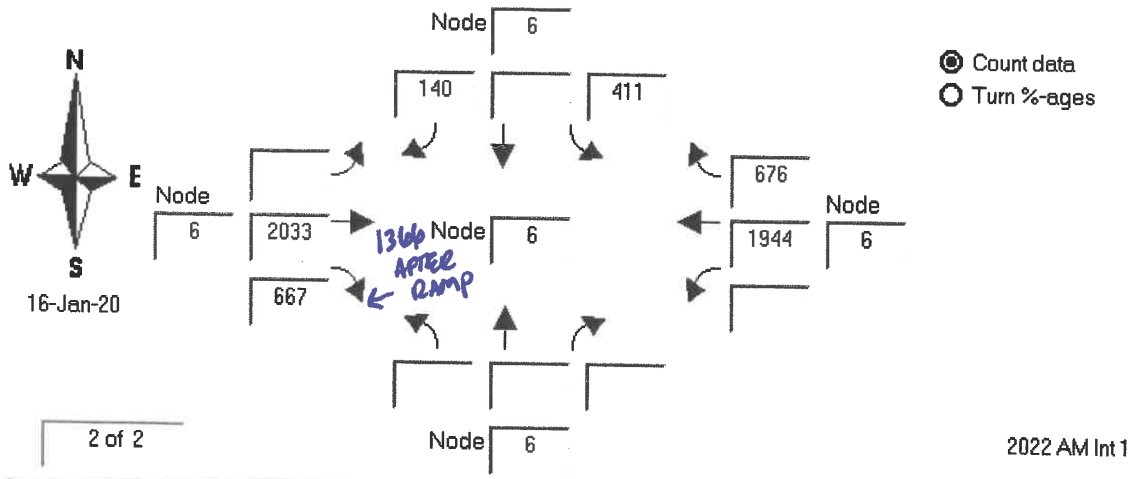
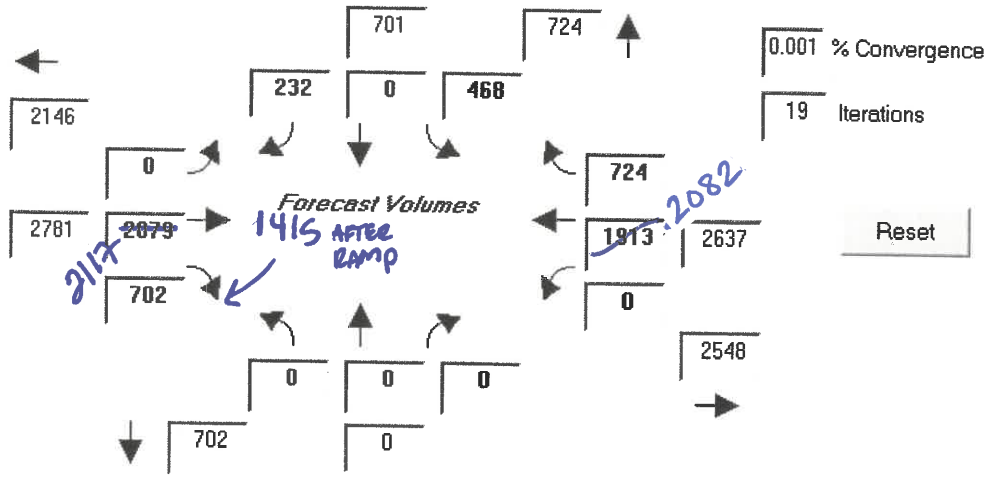


Licensed to VRPA Technologies

APPENDIX E

TurnsW32 Worksheets


N
W
E
S
16-Jan-20
Node 6
140
411
Node 6
2033
667
1366 AFTER RAMP
Node 6
676
1944
Node 6
Node 6
Count data
Turn %-ages
2 of 2
2022 AM Int 1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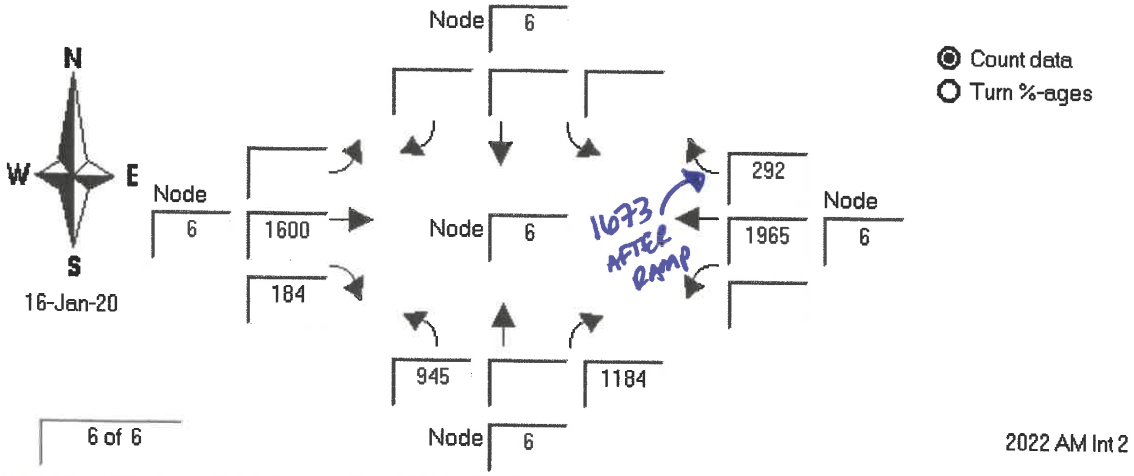
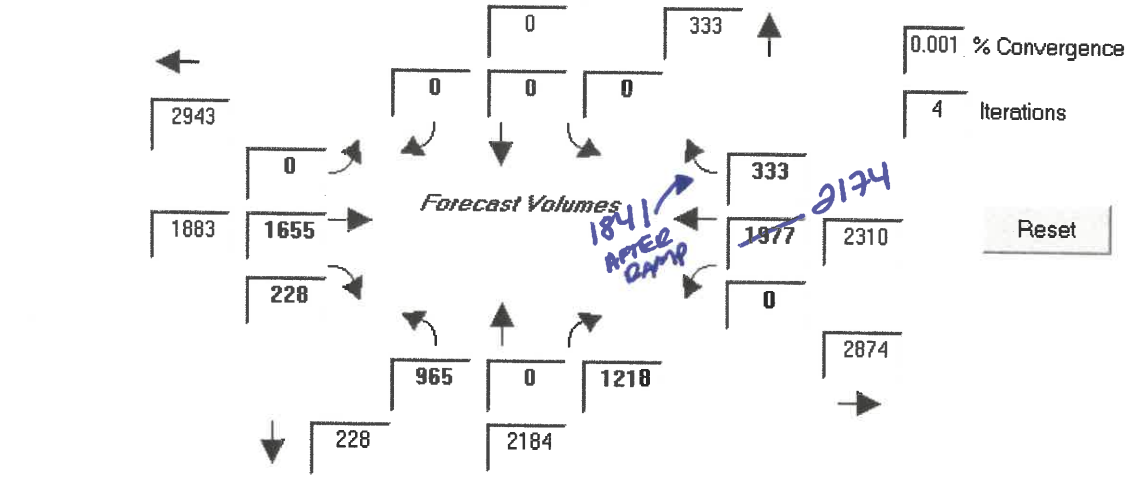
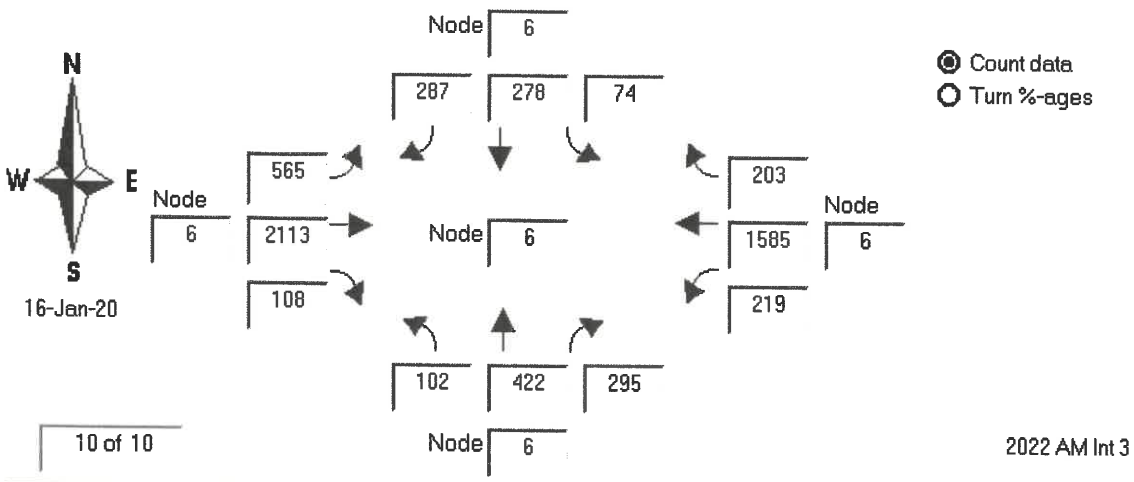
724
232
0
468
2146
0
724
2781
2679
Forecast Volumes
1415 AFTER RAMP
2117
1913
2082
2637
702
0
0
0
0
2548
702
0
0.001 % Convergence
19 Iterations
Reset

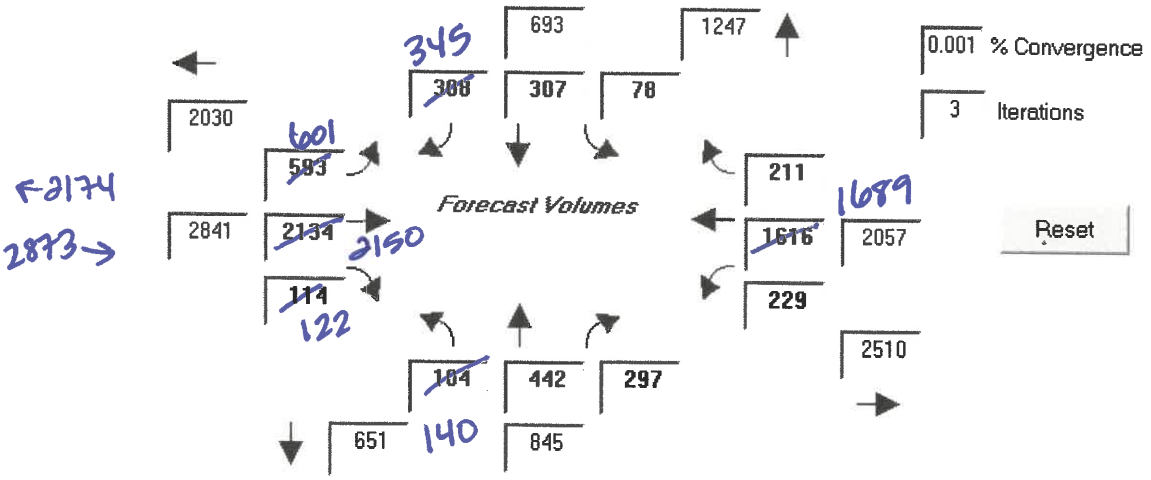

N
W
E
S
16-Jan-20
Node 6
Node 6
1600
184
Node 6
945
1184
Node 6
292
1965
Node 6
1673
AFTER RAMP
Count data
Turn %-ages
6 of 6
2022 AM Int 2


0
333
0
0
0
2943
0
1883
1655
228
Forecast Volumes
1841
AFTER RAMP
2174
333
1877
2310
0
2874
965
0
1218
228
2184
0.001 % Convergence
4 Iterations
Reset

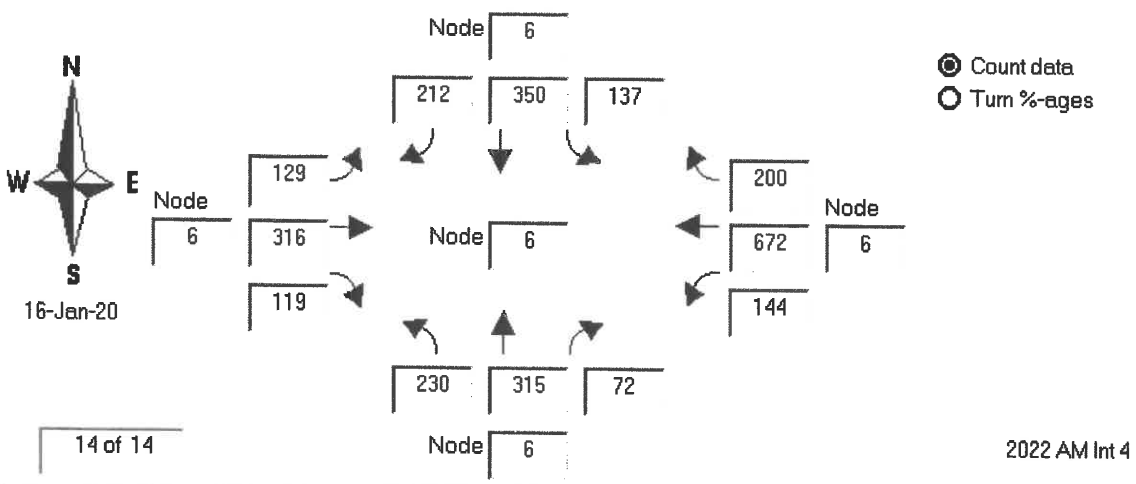
←2174

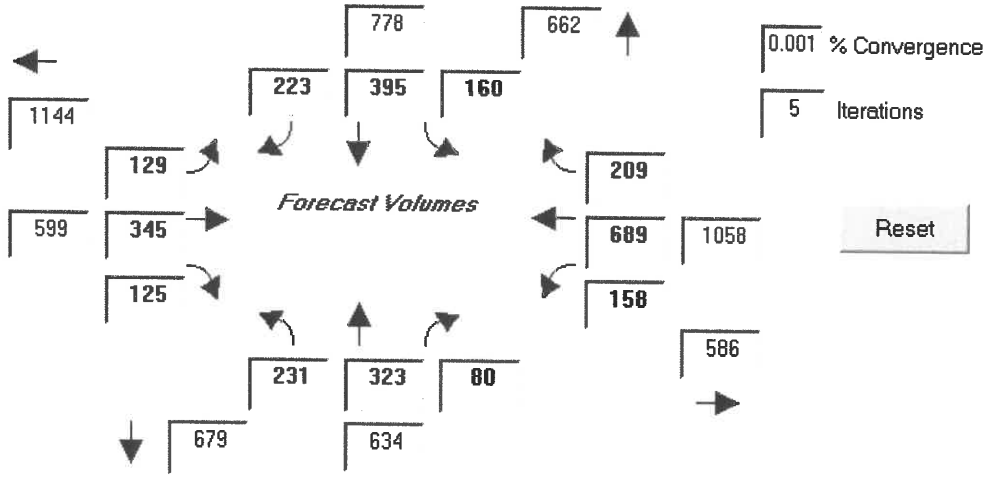
2873→

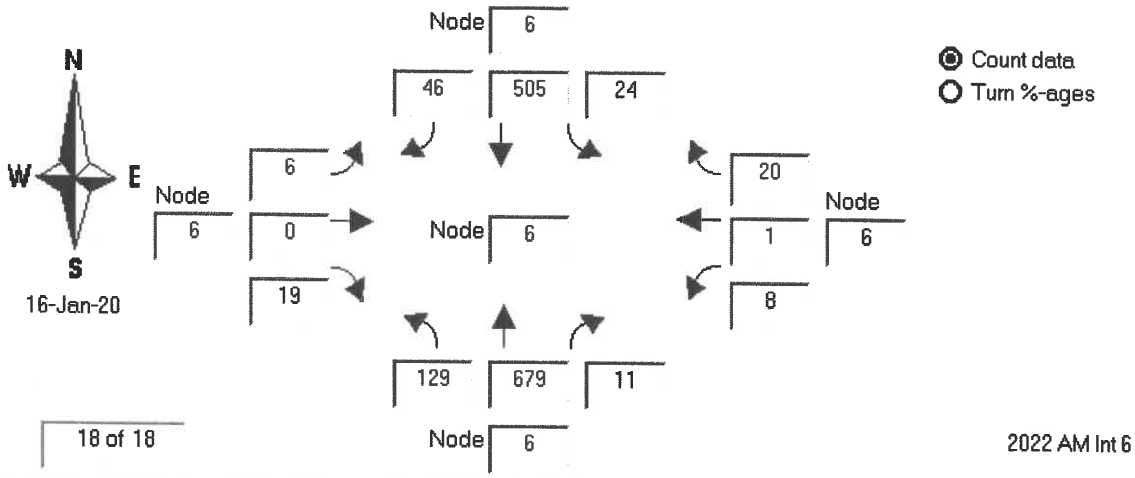


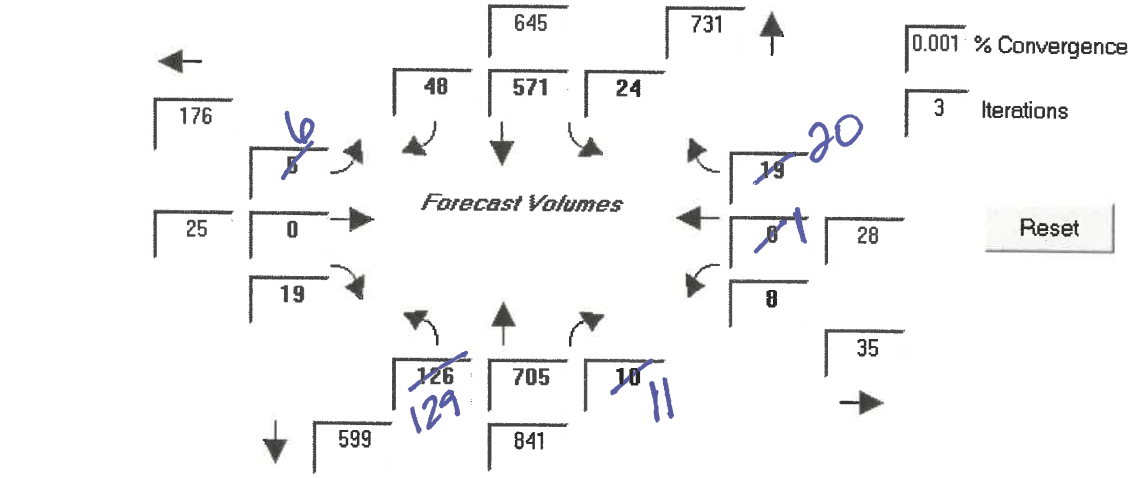


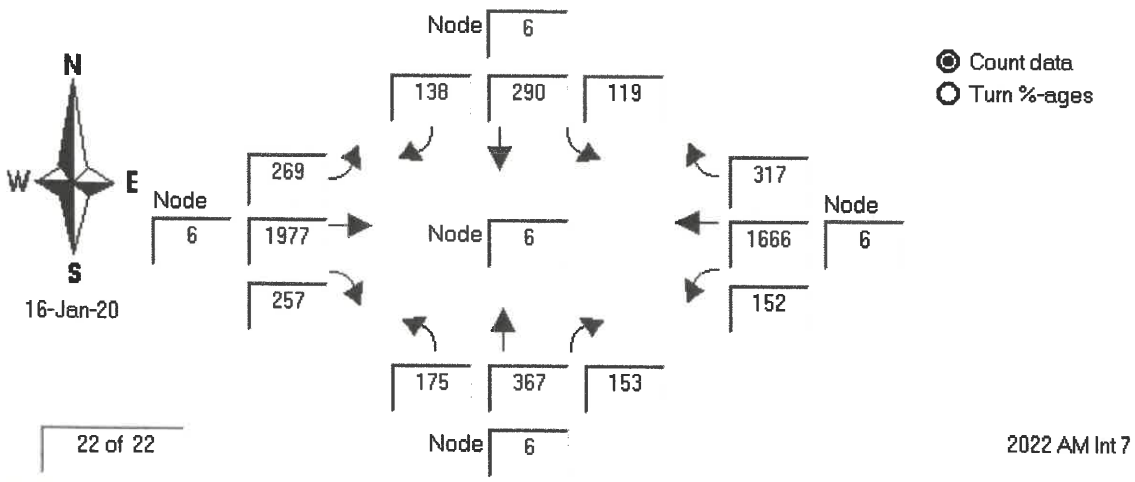
345
601
2150
122
140
1689
F 2174
2873 →
F 2129
2525 →


N
W
E
S
16-Jan-20
Node 6
212
350
137
129
316
119
Node 6
200
672
144
Node 6
230
315
72
Node 6
Count data
Turn %-ages
14 of 14
2022 AM Int 4


778
662
223
395
160
1144
129
345
125
599
Forecast Volumes
209
689
158
1058
586
231
323
80
679
634
0.001 % Convergence
5 Iterations
Reset

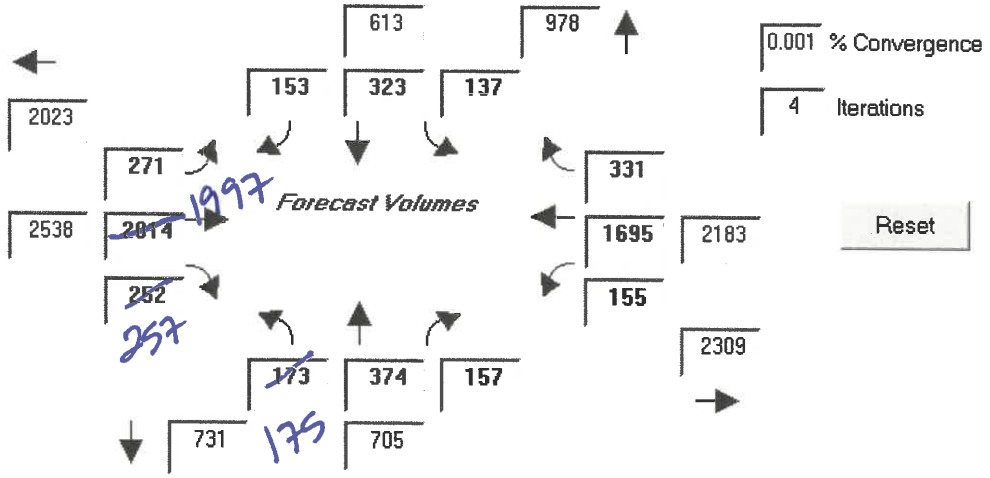

N
W
E
S
16-Jan-20
Node 6
46 505 24
Node 6
6 0 19
Node 6
20 1 8
Node 6
129 679 11
Node 6
Count data
Turn %-ages
18 of 18
2022 AM Int 6

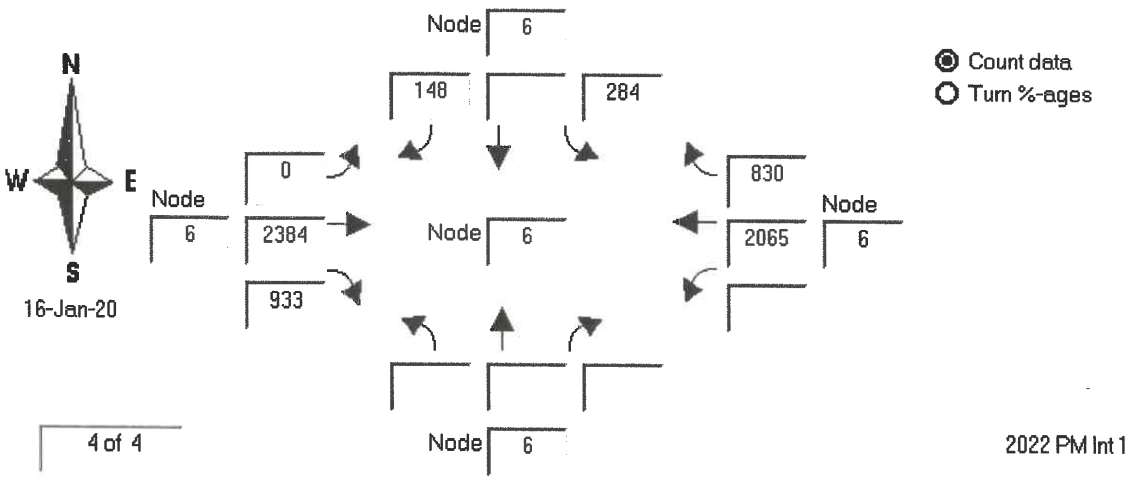

645
731
48 571 24
176
6
25 0 19
Forecast Volumes
19
1
28
8
35
126
705
10
599
841
0.001 % Convergence
3 Iterations
Reset

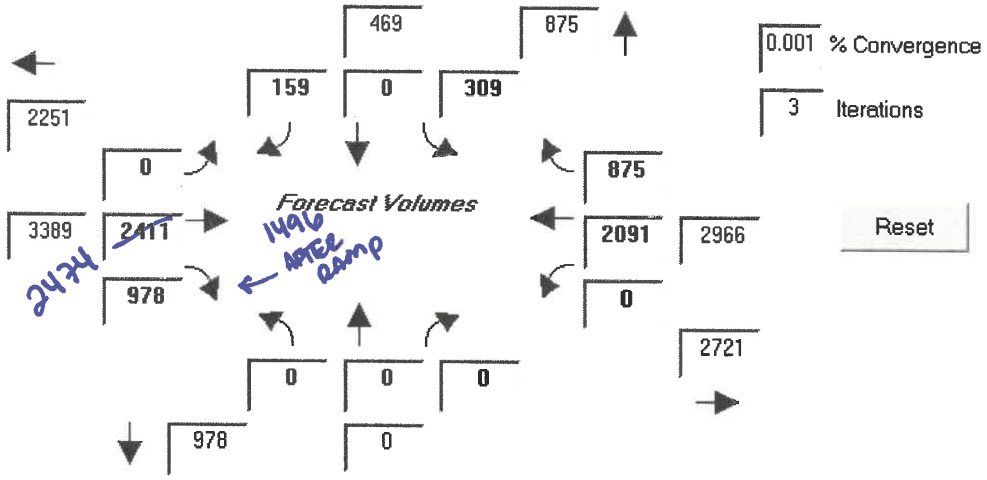


22 of 22

2022 AM Int 7



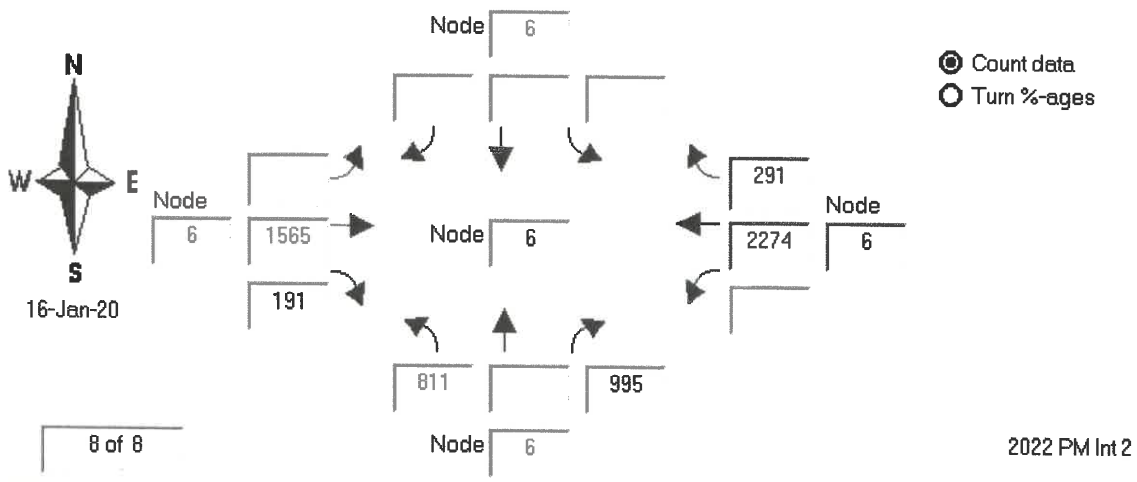


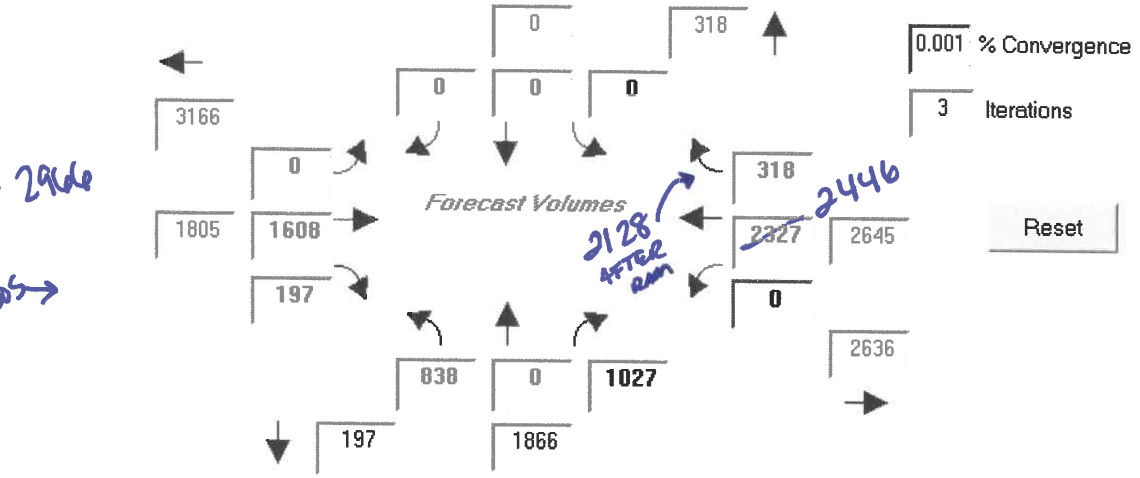


2474

← 2966

1805 →





← 2966

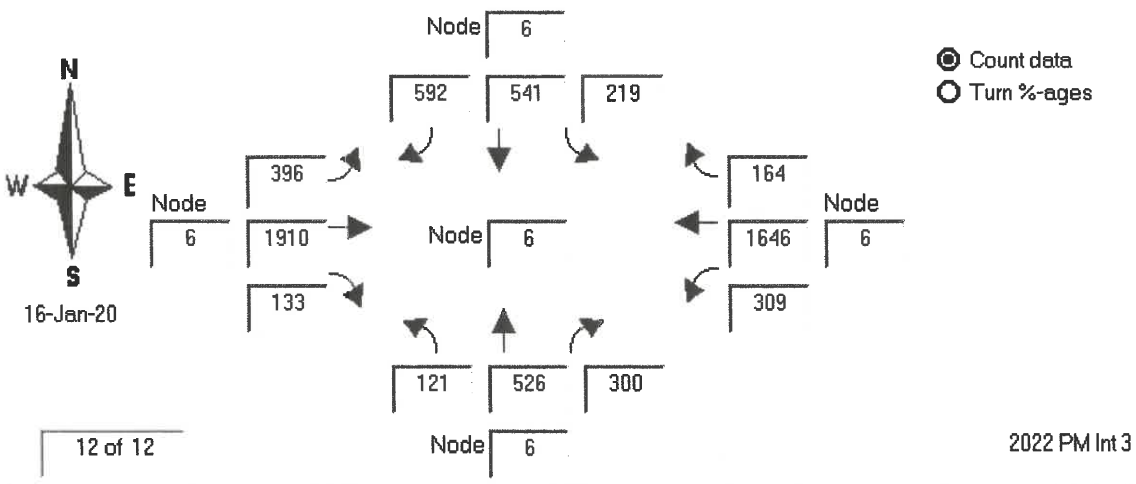
1805 →

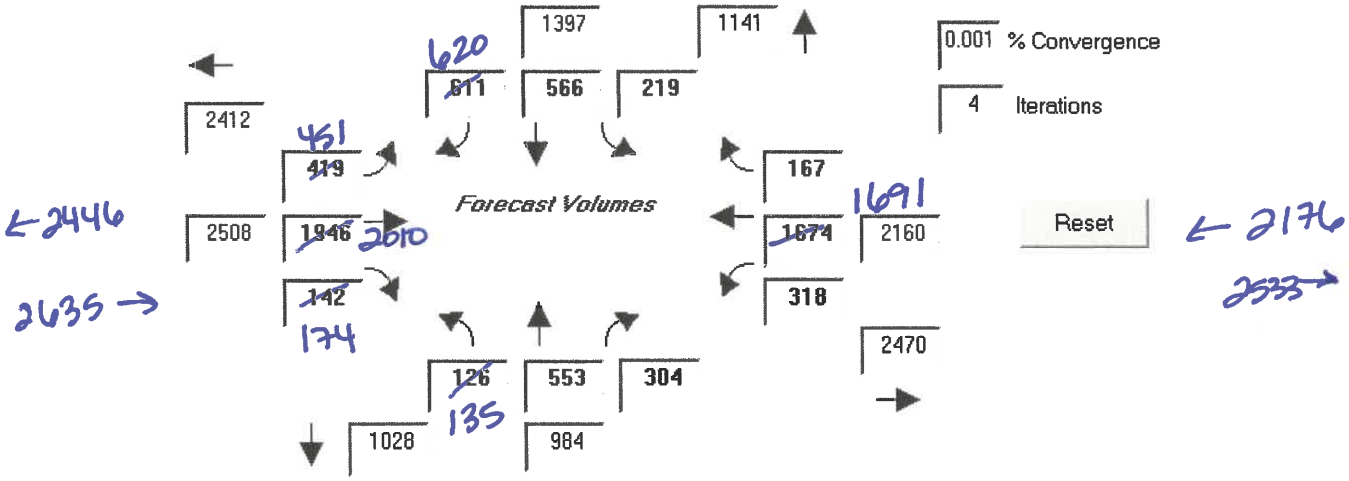
2128 AFTER adm

2446

← 2446

2635 →


N
W
E
S
16-Jan-20
Node 6
592
541
219
396
Node 6
1910
133
Node 6
164
1646
309
Node 6
121
526
300
Node 6
Count data
Turn %-ages
12 of 12
2022 PM Int 3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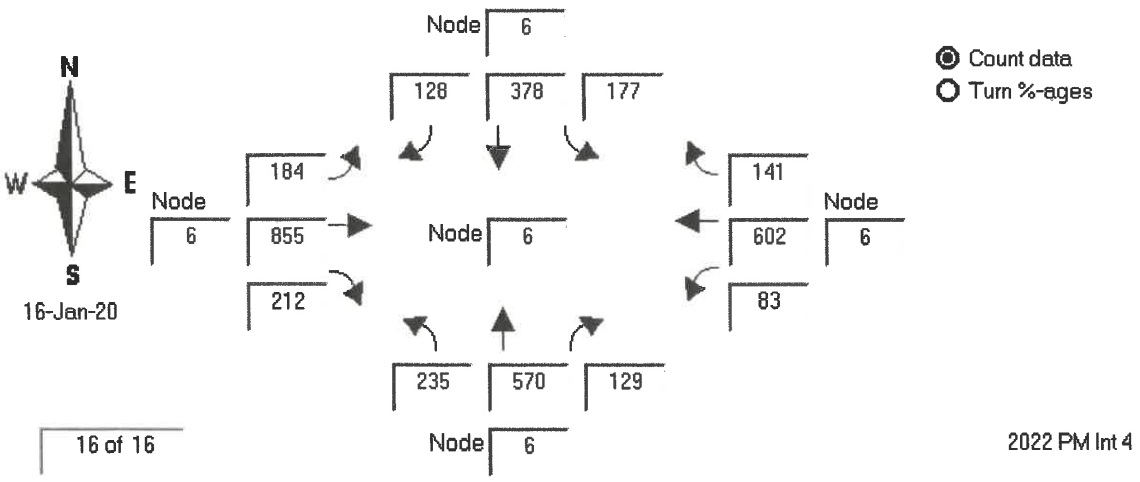
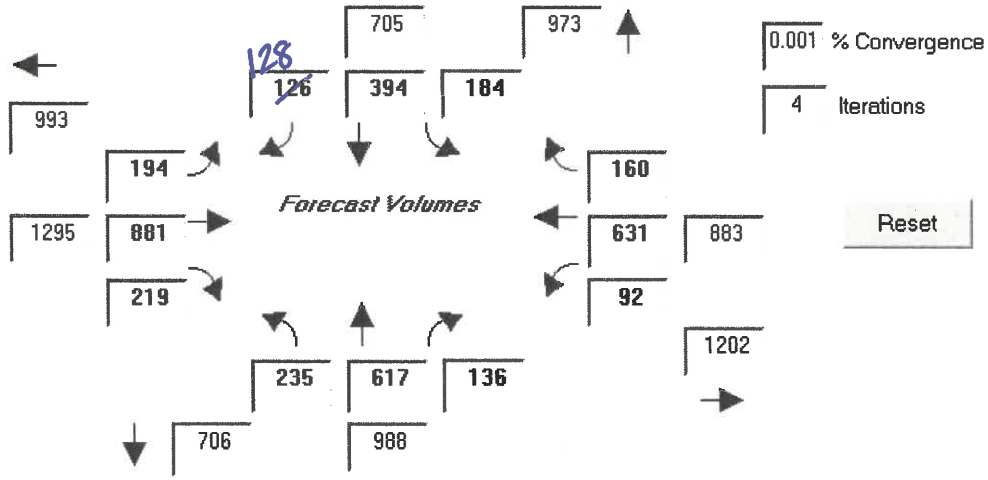
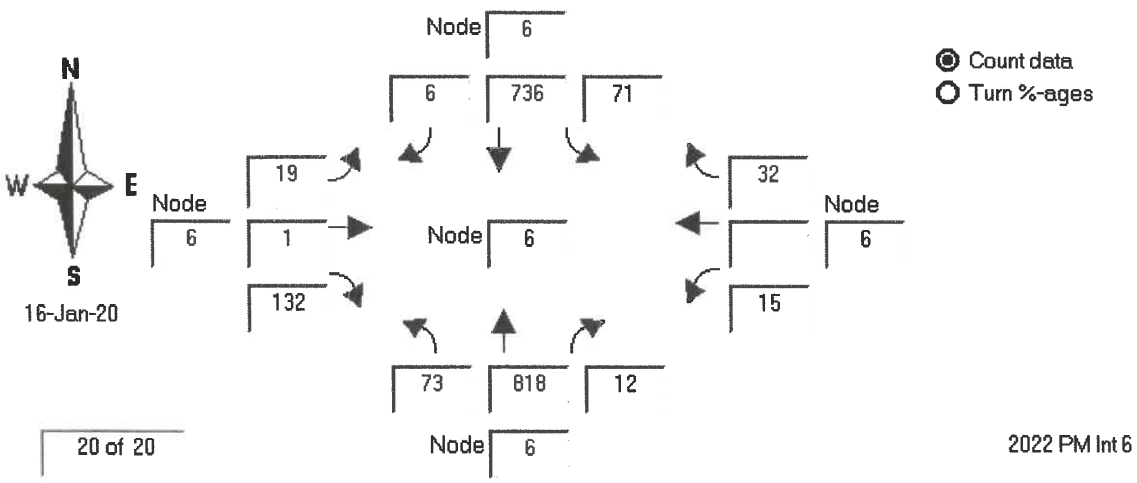
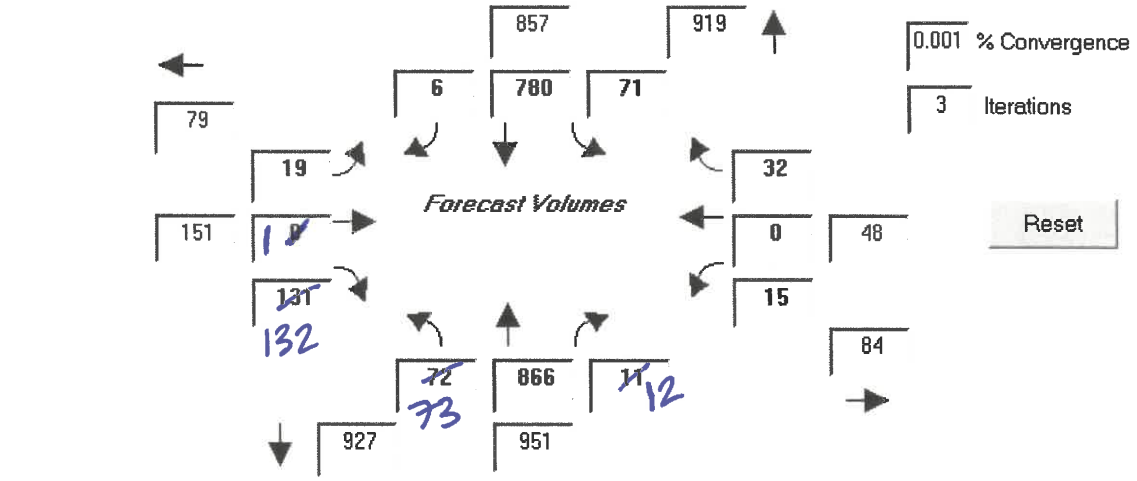
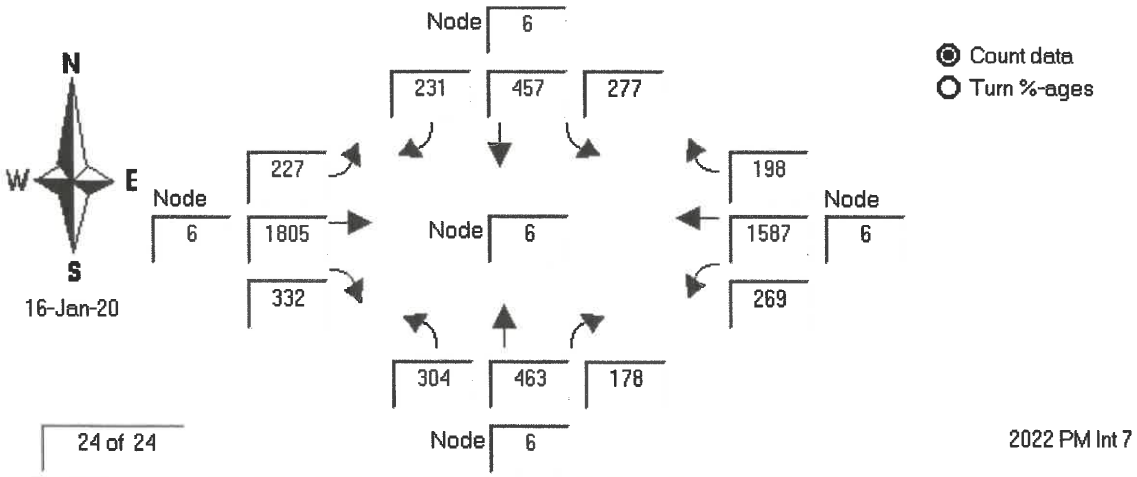
1141
620
611
566
219
2412
451
419
167
1691
2508
1946
2610
1674
2160
142
174
318
2470
126
135
553
304
1028
984
Forecast Volumes
0.001 % Convergence
4 Iterations
Reset
← 2446
2635 →
← 2176
2533 →

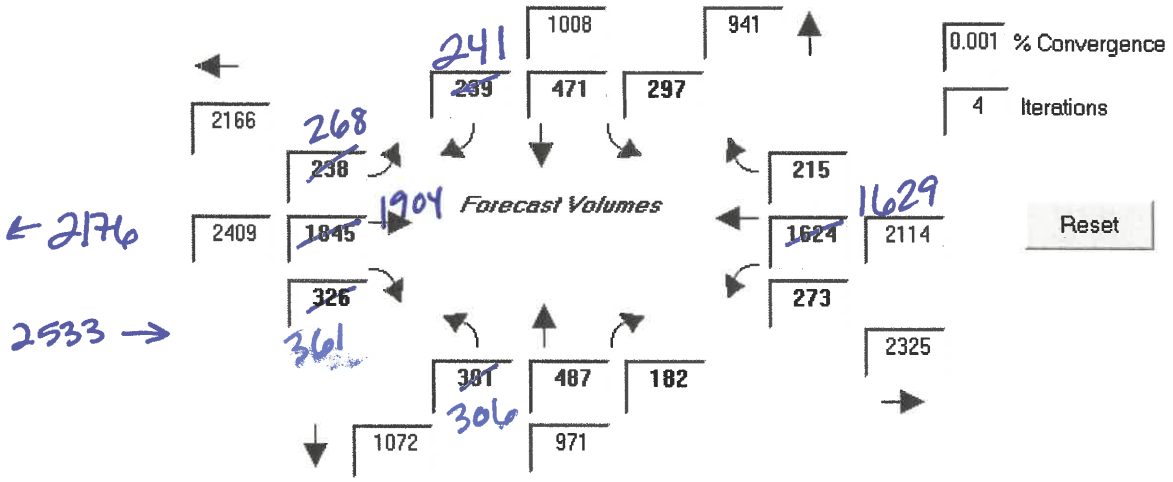

N
W
E
S
16-Jan-20
Node 6
128
378
177
184
855
212
Node 6
Node 6
141
602
83
Node 6
235
570
129
Node 6
Count data
Turn %-ages
16 of 16
2022 PM Int 4

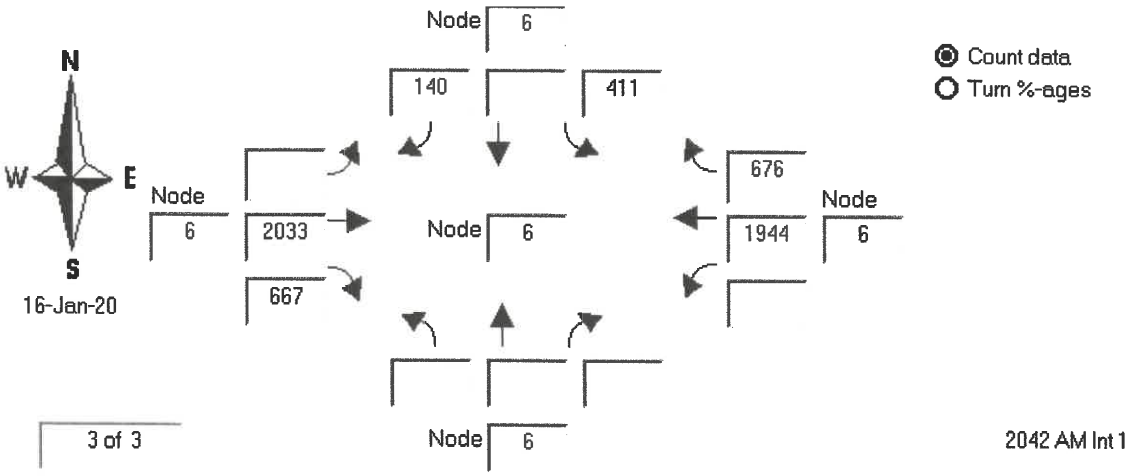

705
973
128
126
394
184
993
194
881
219
Forecast Volumes
160
631
92
1295
883
1202
235
617
136
706
988
0.001 % Convergence
4 Iterations
Reset

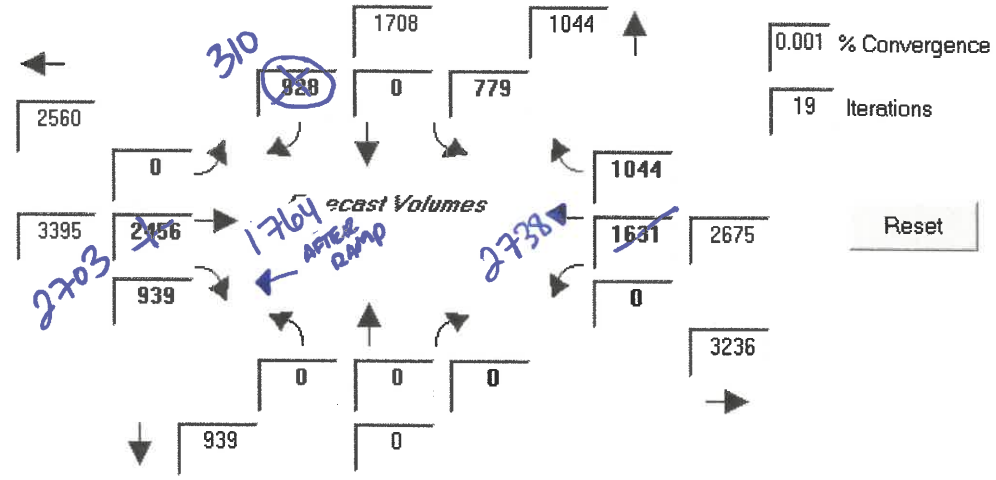

N
W
E
S
16-Jan-20
Node 6
6
736
71
19
1
132
Node 6
Node 6
32
6
15
73
818
12
Node 6
Count data
Turn %-ages
20 of 20
2022 PM Int 6

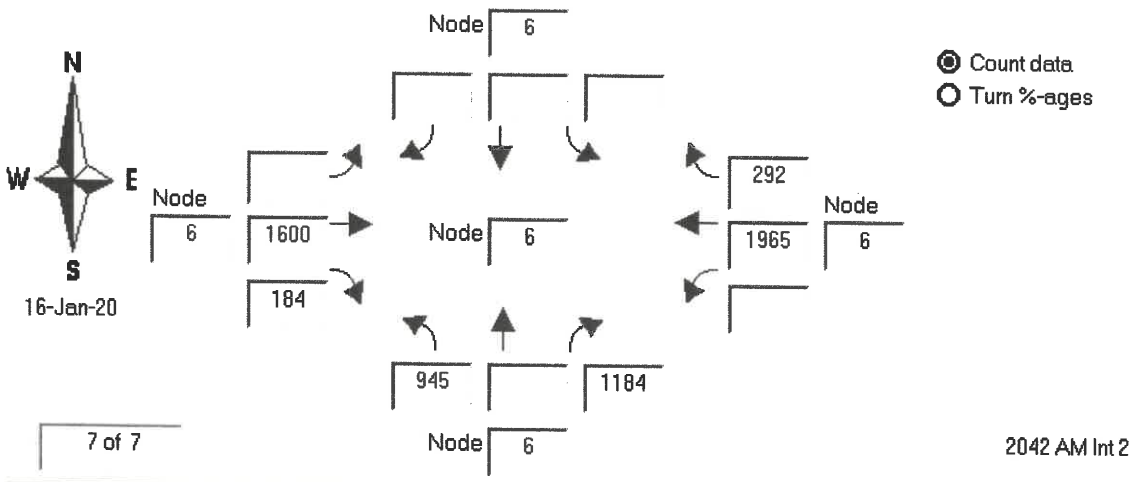

857
919
6
780
71
79
19
151
1
131
132
Forecast Volumes
32
0
48
15
84
72
73
866
11
12
927
951
0.001 % Convergence
3 Iterations
Reset

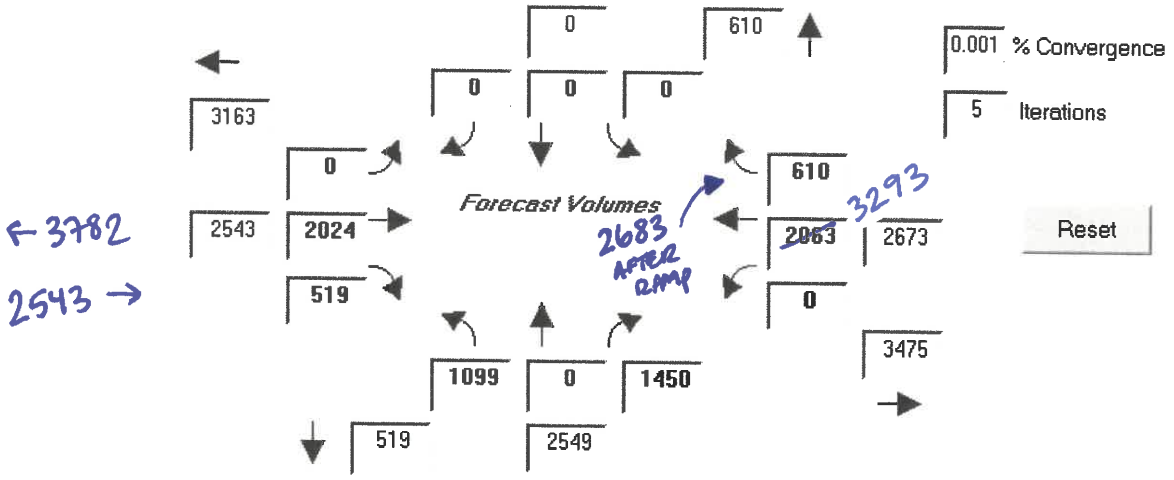

N
W
E
S
16-Jan-20
Node 6
231
457
277
227
1805
332
Node 6
198
1587
269
Node 6
304
463
178
Node 6
Count data
Turn %-ages
24 of 24
2022 PM Int 7


1008
941
241
289
471
297
2166
268
238
215
1904
Forecast Volumes
1629
2409
1845
1624
2114
326
273
361
381
487
182
306
1072
971
2325
0.001 % Convergence
4 Iterations
Reset
← 2176
2533 →


N
W
E
S
16-Jan-20
Node 6
140
411
Node 6
2033
667
Node 6
676
1944
Node 6
Node 6
Count data
Turn %-ages
3 of 3
2042 AM Int 1


1708
1044
310
328
0
779
2560
0
1044
3395
2456
1764
1631
2675
939
0
3236
939
0
0.001 % Convergence
19 Iterations
Reset
Forecast Volumes
AFTER RAMP
2703
2738
3782
2543



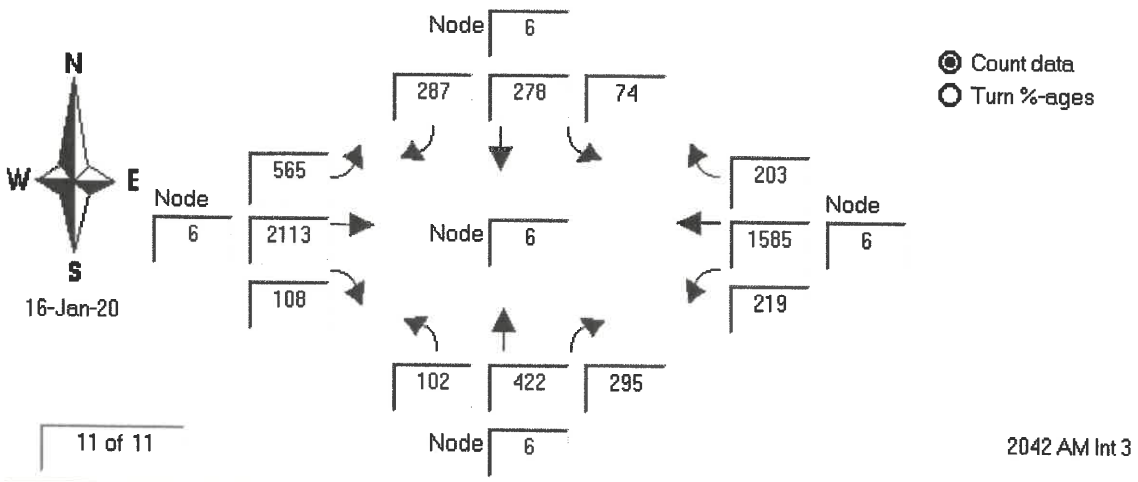


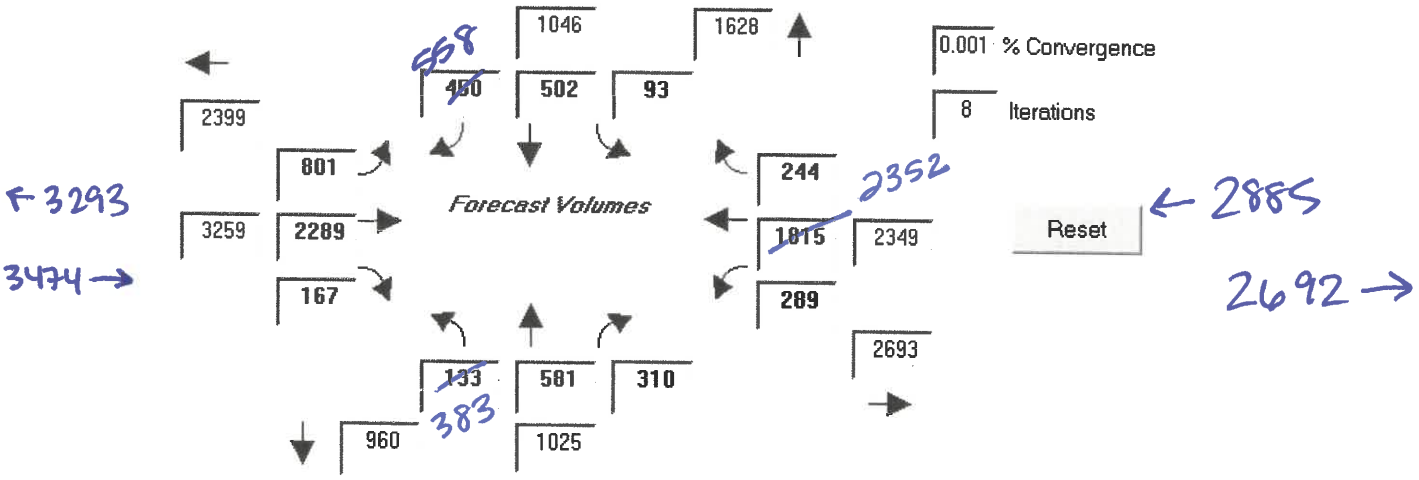
← 3782

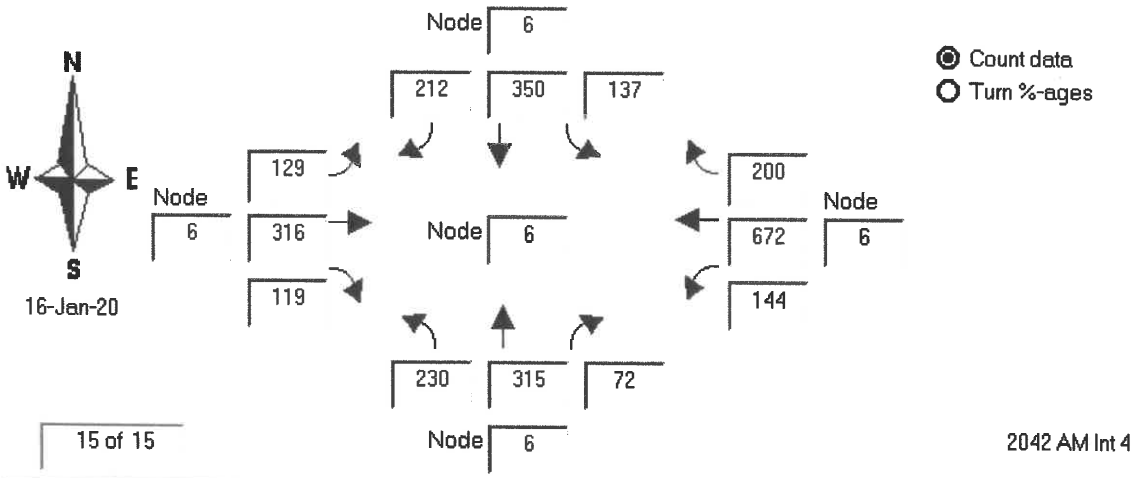
2543 →

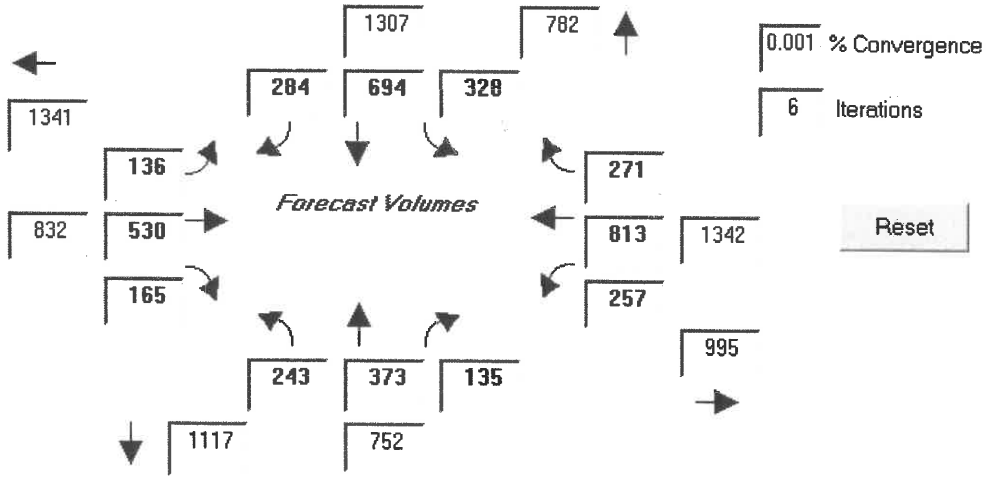
← 3293

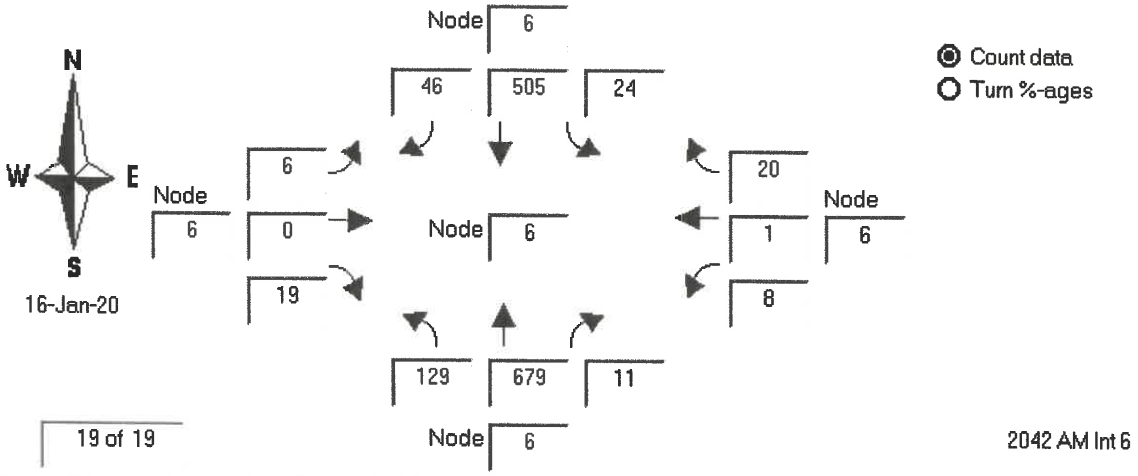
3474 →

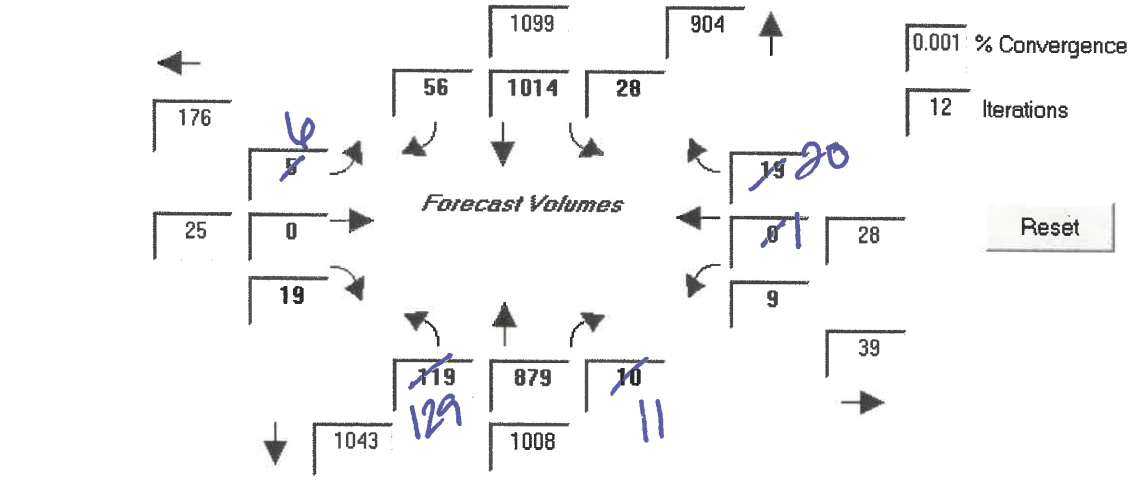

N
W
E
S
16-Jan-20
Node 6
287
278
74
Node 6
565
2113
108
Node 6
203
1585
219
Node 6
102
422
295
Node 6
Count data
Turn %-ages
11 of 11
2042 AM Int 3

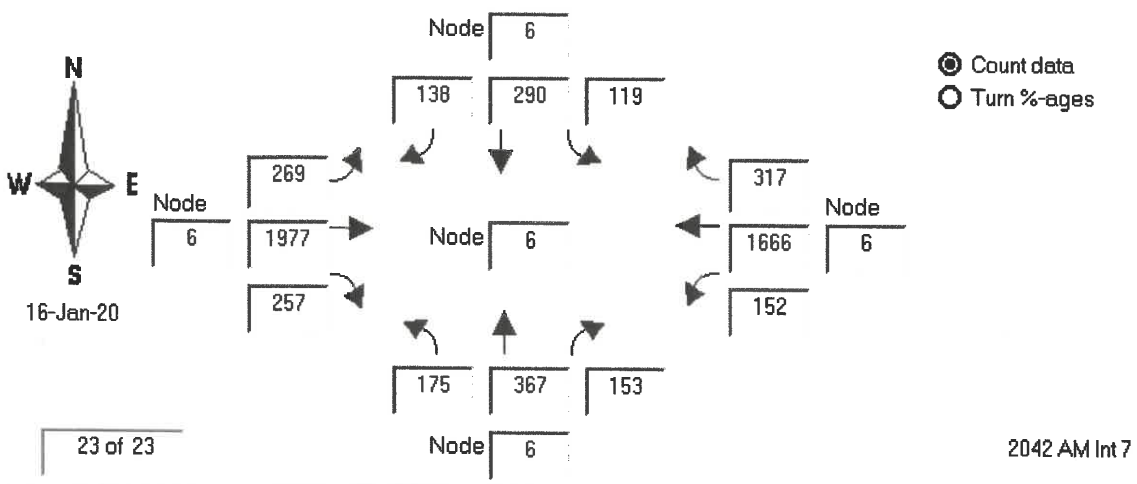

1046
1628
460
502
93
2399
801
3259
2289
167
Forecast Volumes
244
1815
2349
289
2693
133
581
310
960
1025
0.001 % Convergence
8 Iterations
Reset

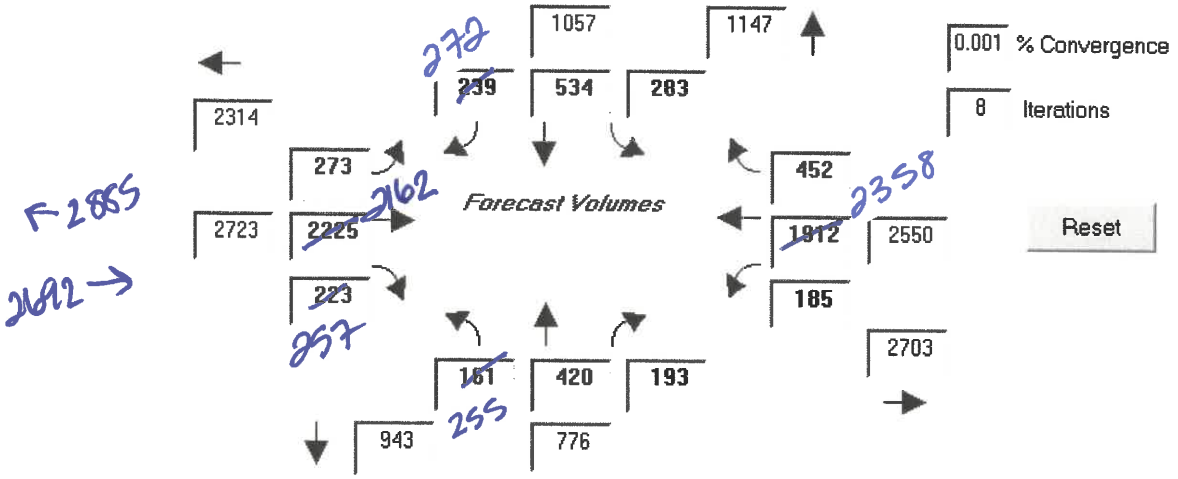

N
W
E
S
16-Jan-20
Node 6
212
350
137
129
316
119
Node 6
Node 6
200
672
144
Node 6
230
315
72
Node 6
Count data
Turn %-ages
15 of 15
2042 AM Int 4

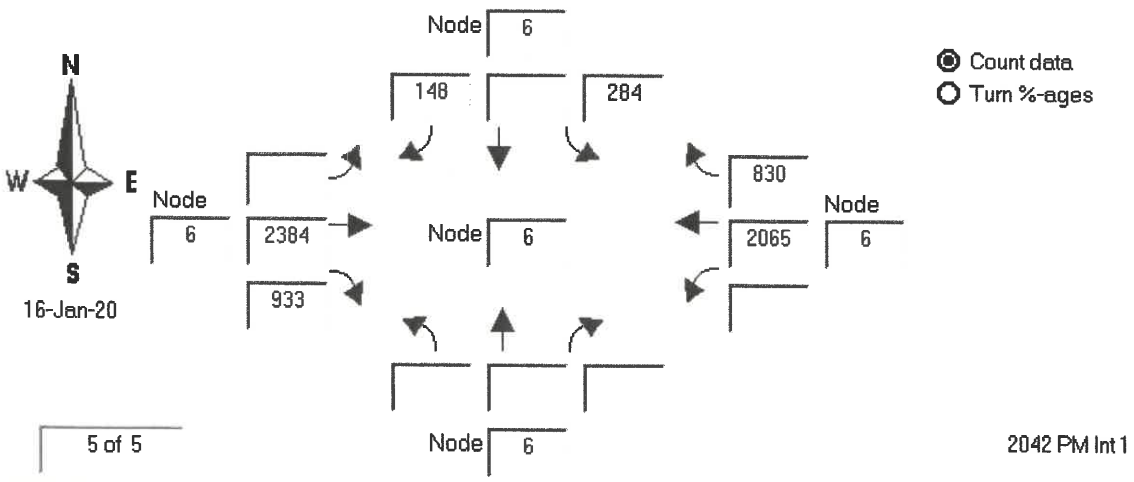

1307
782
284
694
328
1341
136
832
530
165
Forecast Volumes
271
813
257
1342
995
243
373
135
1117
752
0.001 % Convergence
6 Iterations
Reset

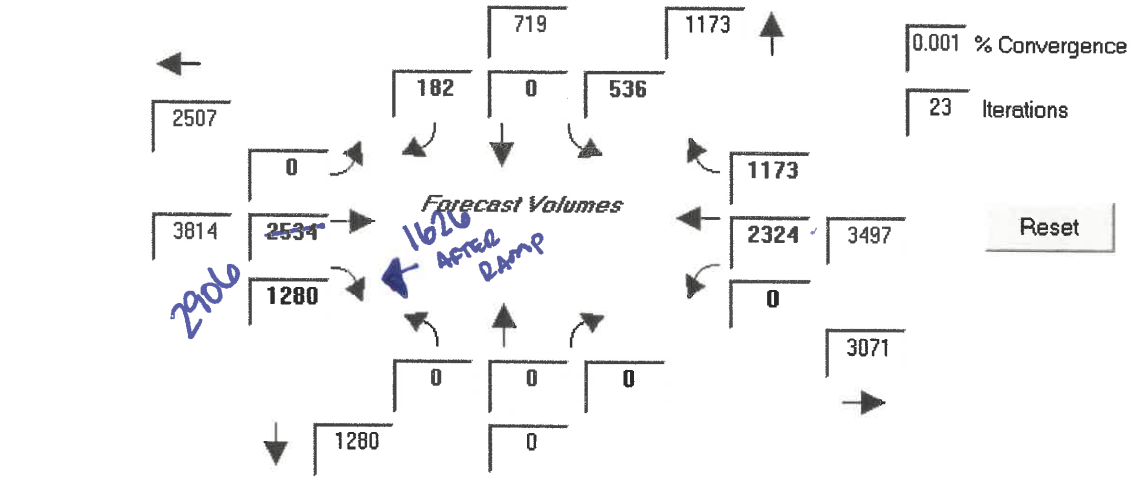

N
W
E
S
16-Jan-20
Node 6
46
505
24
Node 6
6
0
19
Node 6
20
1
8
Node 6
129
679
11
Node 6
Count data
Turn %-ages
19 of 19
2042 AM Int 6


1099
904
56
1014
28
176
6
5
25
0
19
Forecast Volumes
19
20
1
0
28
9
39
119
129
879
10
11
1043
1008
0.001 % Convergence
12 Iterations
Reset


N
W
E
S
16-Jan-20
Node 6
138
290
119
269
1977
257
317
1666
152
175
367
153
Node 6
Node 6
Node 6
Count data
Turn %-ages
23 of 23
2042 AM Int 7


1057
1147
239
534
283
2314
273
2723
2225
223
452
1912
2550
185
2703
161
420
193
943
776
Forecast Volumes
0.001 % Convergence
8 Iterations
Reset



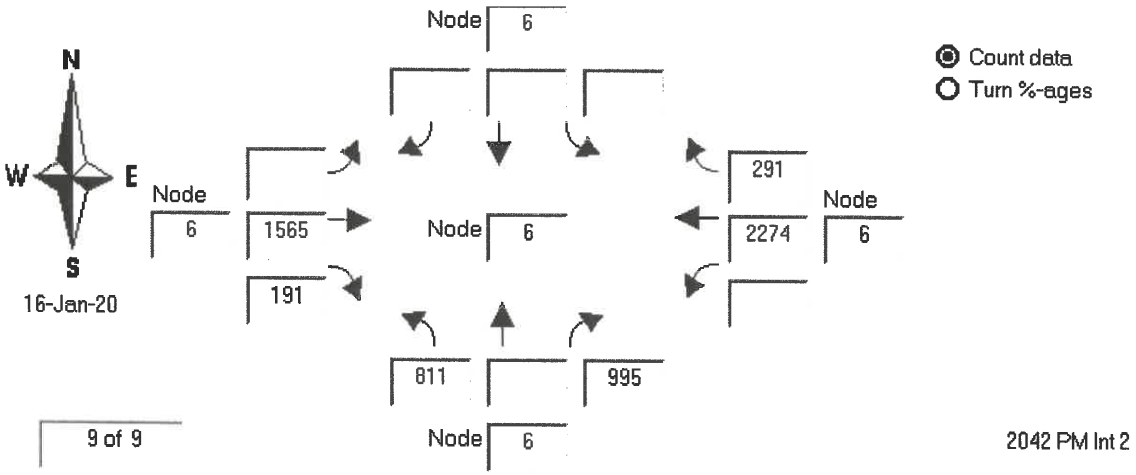


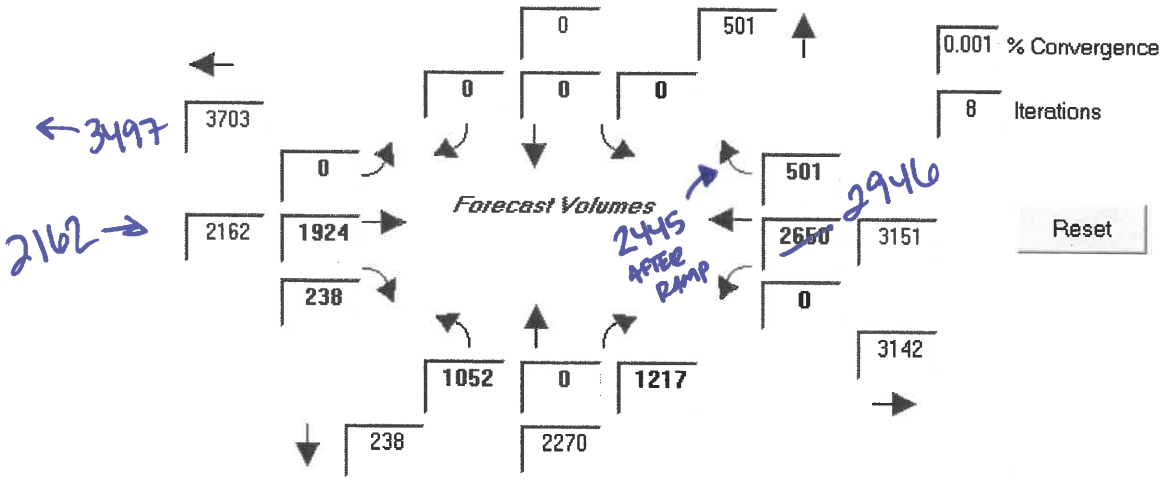
2906

1626 AFTER RAMP

← 3497

2162 →





← 3497

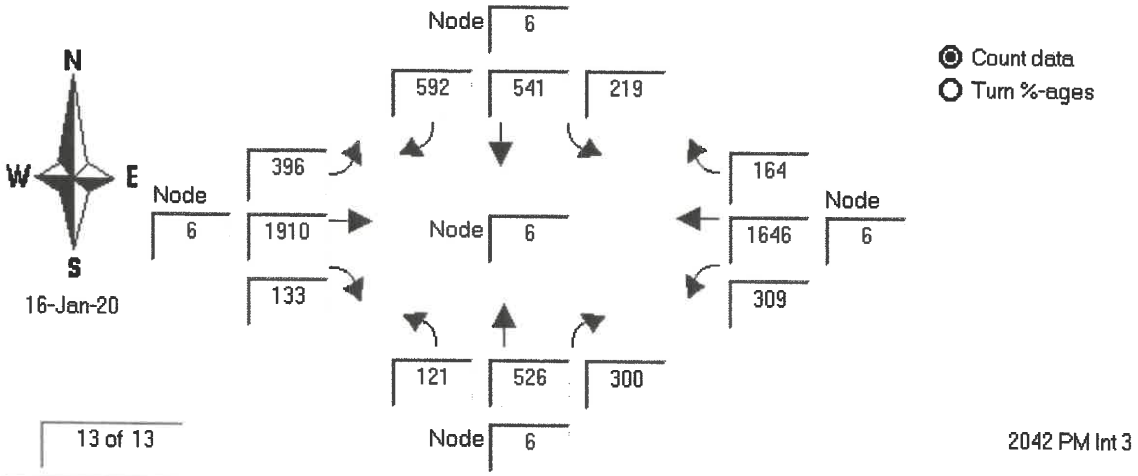
2162 →

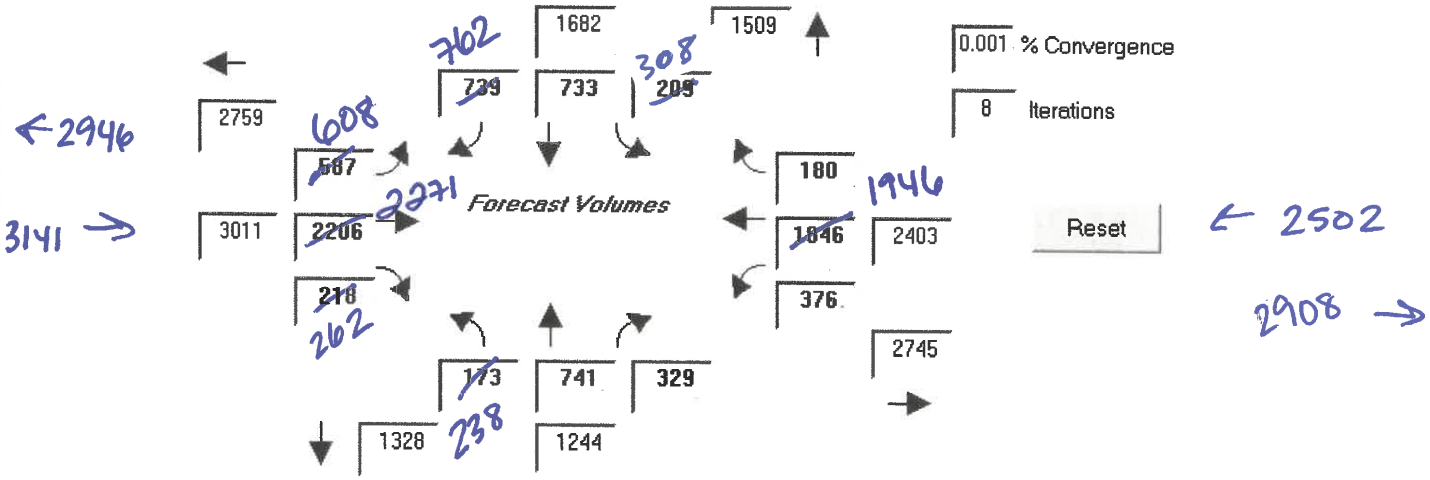
2445 AFTER RAMP

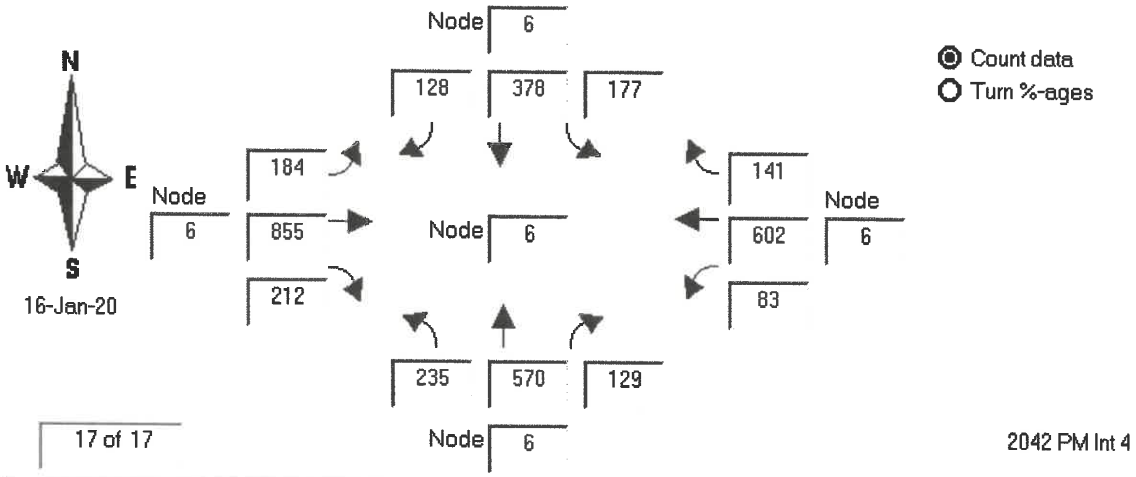
2946

← 2946

3141 →

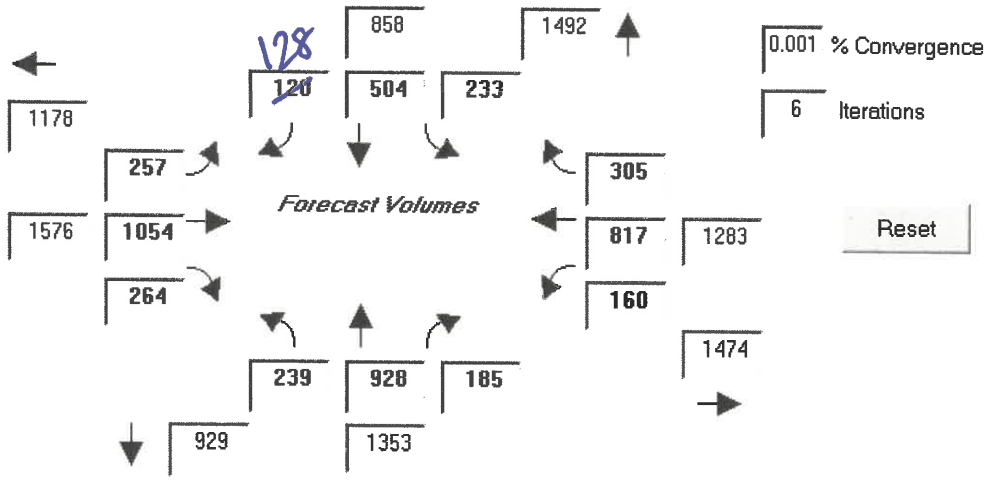

N
W
E
S
16-Jan-20
Node 6
592
541
219
Node 6
396
1910
133
Node 6
164
1646
309
Node 6
121
526
300
Node 6
Count data
Turn %-ages
13 of 13
2042 PM Int 3

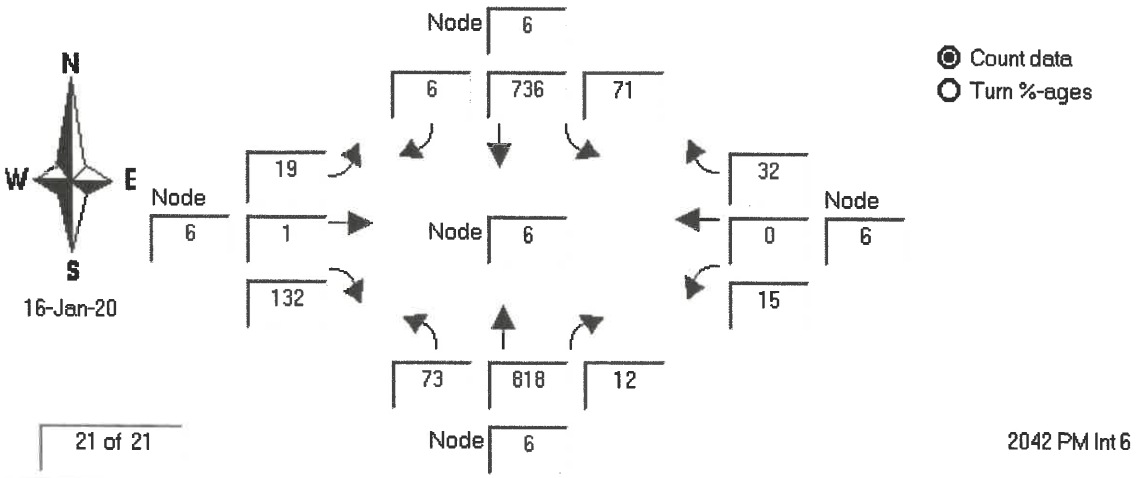

1682
1509
739
733
209
2759
587
3011
2206
218
Forecast Volumes
180
1846
2403
376
2745
173
741
329
1328
1244
0.001 % Convergence
8 Iterations
Reset
762
308
608
2271
1946
262
238
←2946
3141 →
← 2502
2908 →

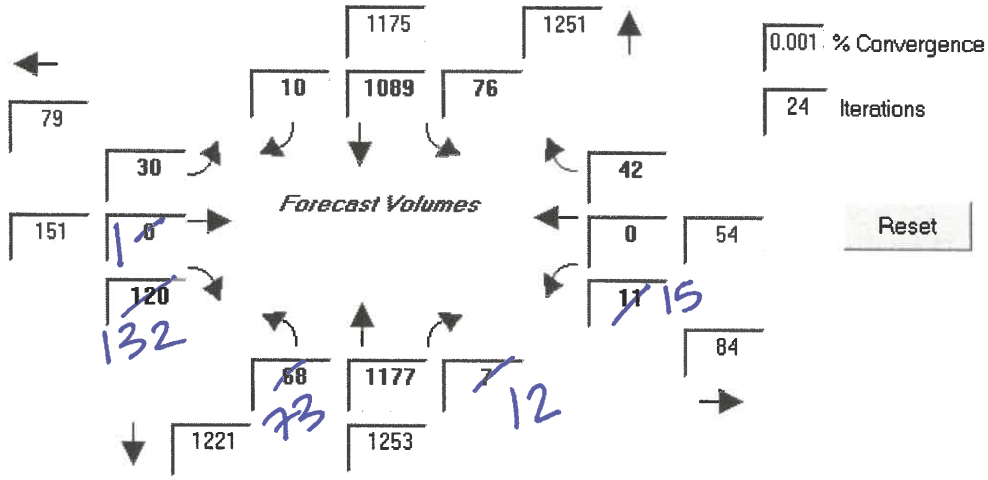


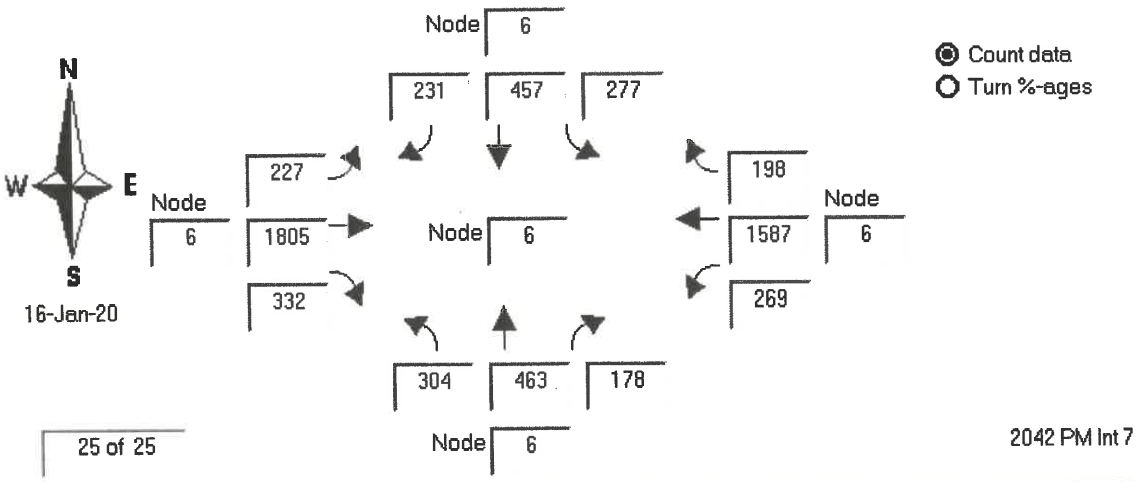
17 of 17

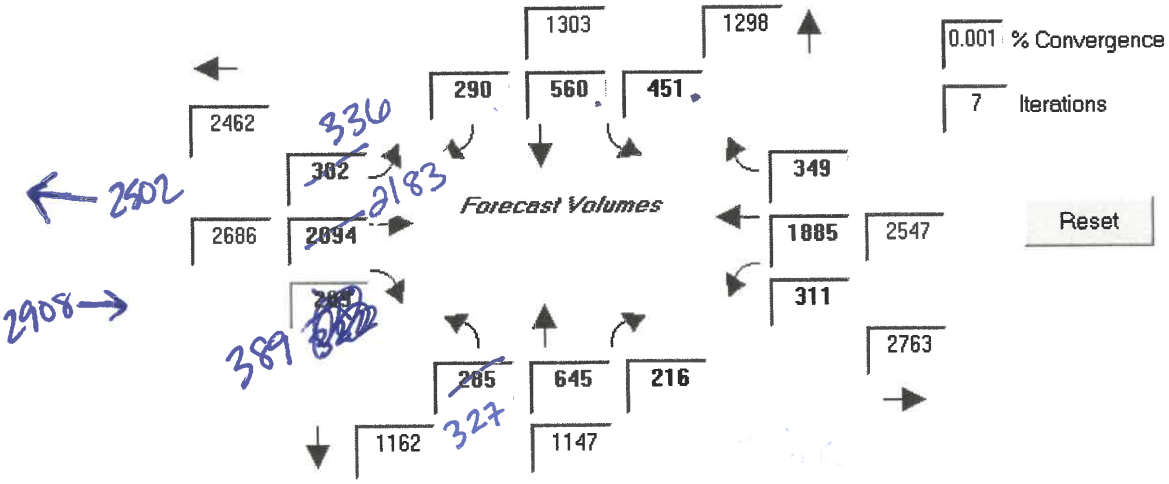
2042 PM Int 4




N
W
E
S
16-Jan-20
Node 6
6
736
71
Node 6
19
1
132
Node 6
32
0
15
Node 6
73
818
12
Node 6
Count data
Turn %-ages
21 of 21
2042 PM Int 6


1175
1251
10
1089
76
79
30
151
1
120
132
Forecast Volumes
42
0
54
11
15
84
68
73
1177
7
12
1221
1253
0.001 % Convergence
24 Iterations
Reset

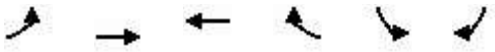

N
W
E
S
16-Jan-20
Node 6
231
457
277
227
Node 6
1805
332
Node 6
198
1587
269
Node 6
304
463
178
Node 6
Count data
Turn %-ages
25 of 25
2042 PM Int 7


1303
1298
290
560
451
2462
382
2686
2094
Forecast Volumes
349
1885
2547
311
2763
285
645
216
1162
1147
0.001 % Convergence
7 Iterations
Reset
2502
2908
336
2183
389
327

APPENDIX F

SYNCHRO 10 (HCM 6th Edition) Worksheets

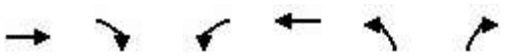
EXISTING WORKSHEETS



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰	↱
Traffic Volume (veh/h)	0	2033	1944	0	411	140
Future Volume (veh/h)	0	2033	1944	0	411	140
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	0	1074	1074	0	1465	1465
Adj Flow Rate, veh/h	0	2074	2160	0	514	175
Peak Hour Factor	0.98	0.98	0.90	0.90	0.80	0.80
Percent Heavy Veh, %	0	3	3	0	3	3
Cap, veh/h	0	2150	1706	0	426	379
Arrive On Green	0.00	0.58	1.00	0.00	0.31	0.31
Sat Flow, veh/h	0	3996	3126	0	1395	1241
Grp Volume(v), veh/h	0	2074	2160	0	514	175
Grp Sat Flow(s),veh/h/ln	0	924	978	0	1395	1241
Q Serve(g_s), s	0.0	64.2	69.8	0.0	36.6	13.7
Cycle Q Clear(g_c), s	0.0	64.2	69.8	0.0	36.6	13.7
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2150	1706	0	426	379
V/C Ratio(X)	0.00	0.96	1.27	0.00	1.21	0.46
Avail Cap(c_a), veh/h	0	2150	1706	0	426	379
HCM Platoon Ratio	1.00	1.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	23.9	0.0	0.0	41.7	33.7
Incr Delay (d2), s/veh	0.0	12.7	124.6	0.0	113.8	4.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	13.9	19.7	0.0	25.4	4.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	36.7	124.6	0.0	155.5	37.8
LnGrp LOS	A	D	F	A	F	D
Approach Vol, veh/h		2074	2160		689	
Approach Delay, s/veh		36.7	124.6		125.6	
Approach LOS		D	F		F	

Timer - Assigned Phs	4	6	8
Phs Duration (G+Y+Rc), s	77.0	43.0	77.0
Change Period (Y+Rc), s	7.2	6.4	7.2
Max Green Setting (Gmax), s	69.8	36.6	69.8
Max Q Clear Time (g_c+I1), s	66.2	38.6	71.8
Green Ext Time (p_c), s	3.2	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	87.7
HCM 6th LOS	F



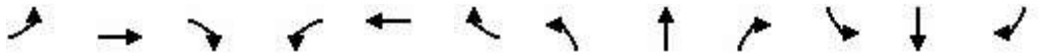
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1600	0	0	1965	945	1184
Future Volume (veh/h)	1600	0	0	1965	945	1184
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1172	0	0	1172	1563	1563
Adj Flow Rate, veh/h	1928	0	0	2159	995	1246
Peak Hour Factor	0.83	0.83	0.91	0.91	0.95	0.95
Percent Heavy Veh, %	3	0	0	3	3	3
Cap, veh/h	1509	0	0	1901	1174	948
Arrive On Green	0.94	0.00	0.00	0.47	0.41	0.41
Sat Flow, veh/h	3410	0	0	4360	2887	2331
Grp Volume(v), veh/h	1928	0	0	2159	995	1246
Grp Sat Flow(s),veh/h/ln	1066	0	0	1008	1444	1165
Q Serve(g_s), s	56.6	0.0	0.0	56.6	37.4	48.8
Cycle Q Clear(g_c), s	56.6	0.0	0.0	56.6	37.4	48.8
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1509	0	0	1901	1174	948
V/C Ratio(X)	1.28	0.00	0.00	1.14	0.85	1.31
Avail Cap(c_a), veh/h	1509	0	0	1901	1174	948
HCM Platoon Ratio	2.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.29	1.00	1.00
Uniform Delay (d), s/veh	3.4	0.0	0.0	31.7	32.2	35.6
Incr Delay (d2), s/veh	130.2	0.0	0.0	63.2	7.7	149.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	19.0	0.0	0.0	20.8	13.6	32.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	133.6	0.0	0.0	94.9	39.9	184.7
LnGrp LOS	F	A	A	F	D	F
Approach Vol, veh/h	1928			2159	2241	
Approach Delay, s/veh	133.6			94.9	120.4	
Approach LOS	F			F	F	

Timer - Assigned Phs	2	4	8
Phs Duration (G+Y+Rc), s	56.0	64.0	64.0
Change Period (Y+Rc), s	* 7.2	* 7.4	* 7.4
Max Green Setting (Gmax), s	* 49	* 57	* 57
Max Q Clear Time (g_c+I1), s	50.8	58.6	58.6
Green Ext Time (p_c), s	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	115.7
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



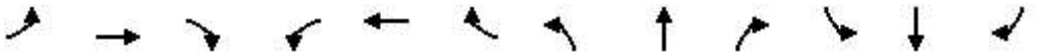
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	565	2113	108	219	1585	203	102	422	295	74	278	287
Future Volume (veh/h)	565	2113	108	219	1585	203	102	422	295	74	278	287
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	642	2401	123	241	1742	223	112	464	324	88	331	342
Peak Hour Factor	0.88	0.88	0.88	0.91	0.91	0.91	0.91	0.91	0.91	0.84	0.84	0.84
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	537	2525	784	229	2071	643	233	1537	477	184	1033	1244
Arrive On Green	0.16	0.50	0.50	0.07	0.41	0.41	0.07	0.30	0.30	0.05	0.29	0.29
Sat Flow, veh/h	3428	5066	1572	3428	5066	1572	3428	5066	1572	3428	3526	2768
Grp Volume(v), veh/h	642	2401	123	241	1742	223	112	464	324	88	331	342
Grp Sat Flow(s),veh/h/ln	1714	1689	1572	1714	1689	1572	1714	1689	1572	1714	1763	1384
Q Serve(g_s), s	22.7	65.5	5.4	9.7	44.9	14.2	4.6	10.2	26.2	3.6	10.6	9.2
Cycle Q Clear(g_c), s	22.7	65.5	5.4	9.7	44.9	14.2	4.6	10.2	26.2	3.6	10.6	9.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	537	2525	784	229	2071	643	233	1537	477	184	1033	1244
V/C Ratio(X)	1.20	0.95	0.16	1.05	0.84	0.35	0.48	0.30	0.68	0.48	0.32	0.27
Avail Cap(c_a), veh/h	537	2525	784	229	2071	643	233	1537	477	189	1033	1244
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.1	34.7	15.2	67.7	38.6	29.5	65.1	38.7	44.3	66.7	40.0	17.6
Incr Delay (d2), s/veh	90.1	1.2	0.0	33.0	0.4	0.1	1.5	0.5	7.6	1.9	0.8	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.3	25.3	2.2	5.2	17.8	5.2	2.0	4.2	10.9	1.6	4.7	2.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	151.2	35.9	15.3	100.6	39.0	29.7	66.6	39.2	51.9	68.6	40.8	18.1
LnGrp LOS	F	D	B	F	D	C	E	D	D	E	D	B
Approach Vol, veh/h		3166			2206			900			761	
Approach Delay, s/veh		58.4			44.8			47.2			33.8	
Approach LOS		E			D			D			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.7	49.9	16.0	78.3	15.8	47.8	29.0	65.3
Change Period (Y+Rc), s	5.9	* 5.9	6.3	5.7	5.9	5.3	6.3	5.7
Max Green Setting (Gmax), s	8.0	* 44	9.7	60.1	9.5	42.5	22.7	47.1
Max Q Clear Time (g_c+I1), s	5.6	28.2	11.7	67.5	6.6	12.6	24.7	46.9
Green Ext Time (p_c), s	0.0	3.6	0.0	0.0	0.1	3.5	0.0	0.2

Intersection Summary	
HCM 6th Ctrl Delay	50.1
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



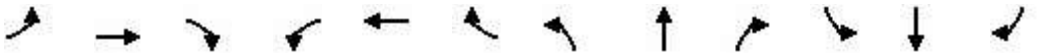
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	129	316	119	144	672	200	230	315	72	137	350	212
Future Volume (veh/h)	129	316	119	144	672	200	230	315	72	137	350	212
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	163	400	151	166	772	230	256	350	80	190	486	294
Peak Hour Factor	0.79	0.79	0.79	0.87	0.87	0.87	0.90	0.90	0.90	0.72	0.72	0.72
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	178	1107	494	181	824	245	271	1060	473	219	928	414
Arrive On Green	0.10	0.31	0.31	0.10	0.31	0.31	0.15	0.30	0.30	0.12	0.26	0.26
Sat Flow, veh/h	1767	3526	1572	1767	2677	798	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	163	400	151	166	508	494	256	350	80	190	486	294
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1712	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	10.2	9.8	5.3	10.4	31.4	31.4	16.1	8.6	4.2	11.8	13.2	19.0
Cycle Q Clear(g_c), s	10.2	9.8	5.3	10.4	31.4	31.4	16.1	8.6	4.2	11.8	13.2	19.0
Prop In Lane	1.00		1.00	1.00		0.47	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	178	1107	494	181	542	527	271	1060	473	219	928	414
V/C Ratio(X)	0.91	0.36	0.31	0.92	0.94	0.94	0.94	0.33	0.17	0.87	0.52	0.71
Avail Cap(c_a), veh/h	178	1107	494	181	554	538	271	1060	473	252	928	414
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	49.9	29.8	12.3	49.8	37.7	37.7	47.0	30.4	28.9	48.2	35.3	37.4
Incr Delay (d2), s/veh	43.9	0.2	0.3	43.5	23.5	24.0	39.7	0.8	0.8	23.6	2.1	9.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.6	4.1	2.9	6.7	16.6	16.2	9.9	3.7	1.7	6.5	5.8	8.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	93.8	30.0	12.6	93.4	61.3	61.8	86.6	31.3	29.7	71.8	37.4	47.3
LnGrp LOS	F	C	B	F	E	E	F	C	C	E	D	D
Approach Vol, veh/h		714			1168			686			970	
Approach Delay, s/veh		40.9			66.0			51.7			47.1	
Approach LOS		D			E			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.9	38.6	15.5	40.1	22.1	34.4	16.2	39.4
Change Period (Y+Rc), s	4.0	4.9	4.0	4.9	4.9	* 4.9	4.9	* 4.9
Max Green Setting (Gmax), s	16.0	30.7	11.5	35.0	17.2	* 30	11.3	* 35
Max Q Clear Time (g_c+I1), s	13.8	10.6	12.4	11.8	18.1	21.0	12.2	33.4
Green Ext Time (p_c), s	0.1	2.3	0.0	2.9	0.0	2.7	0.0	1.0

Intersection Summary	
HCM 6th Ctrl Delay	53.0
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	269	1977	257	152	1666	317	175	367	153	119	290	138
Future Volume (veh/h)	269	1977	257	152	1666	317	175	367	153	119	290	138
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	302	2221	289	179	1960	373	190	399	166	142	345	164
Peak Hour Factor	0.89	0.89	0.89	0.85	0.85	0.85	0.92	0.92	0.92	0.84	0.84	0.84
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	249	1752	544	1471	3533	1097	229	1175	524	249	1175	524
Arrive On Green	0.07	0.35	0.35	0.43	0.70	0.70	0.07	0.33	0.33	0.07	0.33	0.33
Sat Flow, veh/h	3428	5066	1572	3428	5066	1572	3428	3526	1572	3428	3526	1572
Grp Volume(v), veh/h	302	2221	289	179	1960	373	190	399	166	142	345	164
Grp Sat Flow(s),veh/h/ln	1714	1689	1572	1714	1689	1572	1714	1763	1572	1714	1763	1572
Q Serve(g_s), s	8.7	41.5	23.3	3.8	22.9	18.6	6.6	10.2	9.4	4.8	8.7	9.3
Cycle Q Clear(g_c), s	8.7	41.5	23.3	3.8	22.9	18.6	6.6	10.2	9.4	4.8	8.7	9.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	249	1752	544	1471	3533	1097	229	1175	524	249	1175	524
V/C Ratio(X)	1.22	1.27	0.53	0.12	0.55	0.34	0.83	0.34	0.32	0.57	0.29	0.31
Avail Cap(c_a), veh/h	249	1752	544	1471	3533	1097	229	1175	524	249	1175	524
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.6	39.3	54.6	20.6	9.0	19.6	55.3	30.1	29.8	53.8	29.6	29.8
Incr Delay (d2), s/veh	100.3	120.9	0.3	0.0	0.6	0.8	22.1	0.8	1.6	3.1	0.6	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.1	35.7	8.9	1.4	6.9	6.5	3.5	4.4	3.7	2.1	3.7	3.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	156.0	160.2	54.9	20.7	9.6	20.4	77.4	30.9	31.4	57.0	30.2	31.3
LnGrp LOS	F	F	D	C	A	C	E	C	C	E	C	C
Approach Vol, veh/h		2812			2512			755			651	
Approach Delay, s/veh		148.9			12.0			42.7			36.3	
Approach LOS		F			B			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.3	44.9	59.1	47.2	13.6	45.6	15.0	91.3
Change Period (Y+Rc), s	5.6	4.9	6.3	5.7	5.6	* 5.6	6.3	* 6.3
Max Green Setting (Gmax), s	8.0	40.0	8.0	41.5	8.0	* 40	8.7	* 41
Max Q Clear Time (g_c+I1), s	6.8	12.2	5.8	43.5	8.6	11.3	10.7	24.9
Green Ext Time (p_c), s	0.0	3.1	0.1	0.0	0.0	2.7	0.0	12.1

Intersection Summary	
HCM 6th Ctrl Delay	75.0
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	7	28	687	567	20
Future Vol, veh/h	0	7	28	687	567	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	175	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	44	44	88	88	85	85
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	16	32	781	667	24

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	346	691	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.96	4.16	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.33	2.23	-	-	-
Pot Cap-1 Maneuver	0	647	893	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	647	893	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.7	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	893	-	647	-	-
HCM Lane V/C Ratio	0.036	-	0.025	-	-
HCM Control Delay (s)	9.2	-	10.7	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Intersection	
Int Delay, s/veh	2.3

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	24	505	46	129	679	11	6	0	19	8	1	20
Future Vol, veh/h	24	505	46	129	679	11	6	0	19	8	1	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	175	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	90	90	90	52	52	52	66	66	66
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	28	587	53	143	754	12	12	0	37	12	2	30

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	766	0	0	640	0	0	1334	1722	320	1396	1742	383
Stage 1	-	-	-	-	-	-	670	670	-	1046	1046	-
Stage 2	-	-	-	-	-	-	664	1052	-	350	696	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	837	-	-	933	-	-	111	87	673	100	85	612
Stage 1	-	-	-	-	-	-	410	451	-	242	301	-
Stage 2	-	-	-	-	-	-	414	299	-	637	439	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	837	-	-	933	-	-	89	71	673	81	70	612
Mov Cap-2 Maneuver	-	-	-	-	-	-	89	71	-	81	70	-
Stage 1	-	-	-	-	-	-	396	436	-	234	255	-
Stage 2	-	-	-	-	-	-	331	253	-	582	425	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0.4	1.5	21.9	28.1
HCM LOS			C	D

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	261	933	-	-	837	-	-	199
HCM Lane V/C Ratio	0.184	0.154	-	-	0.033	-	-	0.221
HCM Control Delay (s)	21.9	9.6	-	-	9.4	-	-	28.1
HCM Lane LOS	C	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	0.7	0.5	-	-	0.1	-	-	0.8



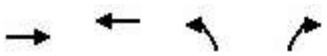
Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	2074	2160	514	175
v/c Ratio	0.97	1.27	1.22	0.46
Control Delay	38.3	142.9	156.0	37.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	38.3	142.9	156.0	37.2
Queue Length 50th (ft)	425	~780	~489	106
Queue Length 95th (ft)	#547	m#705	#585	152
Internal Link Dist (ft)	372	1	1238	
Turn Bay Length (ft)				275
Base Capacity (vph)	2137	1696	421	381
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.97	1.27	1.22	0.46

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1928	2159	995	1246
v/c Ratio	1.29	1.14	0.85	1.31
Control Delay	156.7	101.8	41.1	180.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	156.7	101.8	41.1	180.4
Queue Length 50th (ft)	~692	~568	356	~709
Queue Length 95th (ft)	m#658	#644	449	#860
Internal Link Dist (ft)	20	600	1418	
Turn Bay Length (ft)			825	825
Base Capacity (vph)	1500	1890	1164	948
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.29	1.14	0.85	1.31

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	642	2401	123	241	1742	223	112	464	324	88	331	342
v/c Ratio	1.21	1.15	0.17	1.06	1.07	0.35	0.50	0.30	0.55	0.47	0.32	0.27
Control Delay	160.1	112.6	2.2	139.3	88.4	7.8	73.8	39.4	24.1	75.1	41.1	13.0
Queue Delay	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	160.1	112.8	2.2	139.3	88.4	7.8	73.8	39.4	24.1	75.1	41.1	13.0
Queue Length 50th (ft)	~379	~973	0	~128	~663	14	53	123	125	42	128	64
Queue Length 95th (ft)	#486	#1021	20	#219	#759	77	87	157	228	68	160	84
Internal Link Dist (ft)		600			2533			848			301	
Turn Bay Length (ft)	250		50	250		150	175		175	225		150
Base Capacity (vph)	532	2087	739	227	1635	645	222	1528	589	187	1027	1258
Starvation Cap Reductn	0	150	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.21	1.24	0.17	1.06	1.07	0.35	0.50	0.30	0.55	0.47	0.32	0.27

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	163	400	151	166	1002	256	350	80	190	486	294
v/c Ratio	0.87	0.38	0.26	0.81	0.94	0.90	0.33	0.14	0.81	0.51	0.49
Control Delay	91.3	34.5	6.2	80.0	55.8	81.7	33.9	1.1	75.2	39.1	11.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	91.3	34.5	6.2	80.0	55.8	81.7	33.9	1.1	75.2	39.1	11.6
Queue Length 50th (ft)	126	129	0	127	385	196	112	0	143	168	35
Queue Length 95th (ft)	#202	151	32	#223	#486	#345	155	6	174	171	53
Internal Link Dist (ft)		513			412		1218			422	
Turn Bay Length (ft)	200		100	150		225		100	225		100
Base Capacity (vph)	192	1052	576	216	1086	296	1050	564	256	951	596
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.38	0.26	0.77	0.92	0.86	0.33	0.14	0.74	0.51	0.49

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

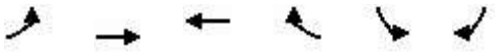


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	302	2221	289	179	1960	373	190	399	166	142	345	164
v/c Ratio	1.23	1.28	0.44	0.79	1.14	0.55	0.84	0.34	0.26	0.63	0.30	0.25
Control Delay	178.9	162.9	13.7	79.6	109.5	16.6	85.4	31.1	3.6	67.4	30.4	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	178.9	162.9	13.7	79.6	109.5	16.6	85.4	31.1	3.6	67.4	30.4	3.5
Queue Length 50th (ft)	~148	~797	61	71	~651	95	76	121	0	56	103	0
Queue Length 95th (ft)	#237	#876	136	#117	#678	170	#140	165	34	84	132	23
Internal Link Dist (ft)		2533			1136			1068			1112	
Turn Bay Length (ft)	250		175	250		200	200		150	200		175
Base Capacity (vph)	246	1741	657	226	1712	673	226	1168	649	226	1168	649
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.23	1.28	0.44	0.79	1.14	0.55	0.84	0.34	0.26	0.63	0.30	0.25

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰	↱
Traffic Volume (veh/h)	0	2384	2065	0	284	148
Future Volume (veh/h)	0	2384	2065	0	284	148
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	0	1074	1074	0	1465	1465
Adj Flow Rate, veh/h	0	2709	2320	0	369	192
Peak Hour Factor	0.88	0.88	0.89	0.89	0.77	0.77
Percent Heavy Veh, %	0	3	3	0	3	3
Cap, veh/h	0	2427	1926	0	321	286
Arrive On Green	0.00	0.66	1.00	0.00	0.23	0.23
Sat Flow, veh/h	0	3996	3126	0	1395	1241
Grp Volume(v), veh/h	0	2709	2320	0	369	192
Grp Sat Flow(s),veh/h/ln	0	924	978	0	1395	1241
Q Serve(g_s), s	0.0	78.8	78.8	0.0	27.6	16.9
Cycle Q Clear(g_c), s	0.0	78.8	78.8	0.0	27.6	16.9
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2427	1926	0	321	286
V/C Ratio(X)	0.00	1.12	1.20	0.00	1.15	0.67
Avail Cap(c_a), veh/h	0	2427	1926	0	321	286
HCM Platoon Ratio	1.00	1.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	20.6	0.0	0.0	46.2	42.1
Incr Delay (d2), s/veh	0.0	58.7	97.3	0.0	97.3	12.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	23.4	17.4	0.0	17.9	6.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	79.3	97.3	0.0	143.5	54.1
LnGrp LOS	A	F	F	A	F	D
Approach Vol, veh/h		2709	2320		561	
Approach Delay, s/veh		79.3	97.3		112.9	
Approach LOS		E	F		F	

Timer - Assigned Phs			4		6	8
Phs Duration (G+Y+Rc), s			86.0		34.0	86.0
Change Period (Y+Rc), s			7.2		6.4	7.2
Max Green Setting (Gmax), s			78.8		27.6	78.8
Max Q Clear Time (g_c+I1), s			80.8		29.6	80.8
Green Ext Time (p_c), s			0.0		0.0	0.0

Intersection Summary		
HCM 6th Ctrl Delay		90.1
HCM 6th LOS		F

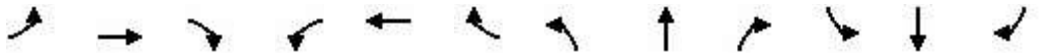
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1565	0	0	2274	811	995
Future Volume (veh/h)	1565	0	0	2274	811	995
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1172	0	0	1172	1563	1563
Adj Flow Rate, veh/h	1909	0	0	2740	891	1093
Peak Hour Factor	0.82	0.82	0.83	0.83	0.91	0.91
Percent Heavy Veh, %	3	0	0	3	3	3
Cap, veh/h	1696	0	0	2137	1006	812
Arrive On Green	1.00	0.00	0.00	0.53	0.35	0.35
Sat Flow, veh/h	3410	0	0	4360	2887	2331
Grp Volume(v), veh/h	1909	0	0	2740	891	1093
Grp Sat Flow(s),veh/h/ln	1066	0	0	1008	1444	1165
Q Serve(g_s), s	63.6	0.0	0.0	63.6	34.9	41.8
Cycle Q Clear(g_c), s	63.6	0.0	0.0	63.6	34.9	41.8
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1696	0	0	2137	1006	812
V/C Ratio(X)	1.13	0.00	0.00	1.28	0.89	1.35
Avail Cap(c_a), veh/h	1696	0	0	2137	1006	812
HCM Platoon Ratio	2.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.31	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	28.2	36.9	39.1
Incr Delay (d2), s/veh	64.9	0.0	0.0	128.2	11.4	164.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.2	0.0	0.0	32.5	13.3	29.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	64.9	0.0	0.0	156.4	48.2	203.1
LnGrp LOS	F	A	A	F	D	F
Approach Vol, veh/h	1909			2740	1984	
Approach Delay, s/veh	64.9			156.4	133.6	
Approach LOS	E			F	F	

Timer - Assigned Phs	2	4	8
Phs Duration (G+Y+Rc), s	49.0	71.0	71.0
Change Period (Y+Rc), s	* 7.2	* 7.4	* 7.4
Max Green Setting (Gmax), s	* 42	* 64	* 64
Max Q Clear Time (g_c+I1), s	43.8	65.6	65.6
Green Ext Time (p_c), s	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	123.3
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	396	1910	133	309	1646	164	121	526	300	219	541	592
Future Volume (veh/h)	396	1910	133	309	1646	164	121	526	300	219	541	592
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	435	2099	146	355	1892	189	123	537	306	238	588	643
Peak Hour Factor	0.91	0.91	0.91	0.87	0.87	0.87	0.98	0.98	0.98	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	395	1921	596	1274	3200	993	251	1537	477	215	1048	1141
Arrive On Green	0.12	0.38	0.38	0.37	0.63	0.63	0.07	0.30	0.30	0.06	0.30	0.30
Sat Flow, veh/h	3428	5066	1572	3428	5066	1572	3428	5066	1572	3428	3526	2768
Grp Volume(v), veh/h	435	2099	146	355	1892	189	123	537	306	238	588	643
Grp Sat Flow(s),veh/h/ln	1714	1689	1572	1714	1689	1572	1714	1689	1572	1714	1763	1384
Q Serve(g_s), s	16.7	55.0	9.2	10.5	31.8	7.3	5.0	12.0	18.3	9.1	20.4	29.6
Cycle Q Clear(g_c), s	16.7	55.0	9.2	10.5	31.8	7.3	5.0	12.0	18.3	9.1	20.4	29.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	395	1921	596	1274	3200	993	251	1537	477	215	1048	1141
V/C Ratio(X)	1.10	1.09	0.24	0.28	0.59	0.19	0.49	0.35	0.64	1.11	0.56	0.56
Avail Cap(c_a), veh/h	395	1921	596	1274	3200	993	251	1537	477	215	1048	1141
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	64.2	45.0	30.8	31.9	15.7	11.2	64.6	39.3	24.5	67.9	43.0	44.3
Incr Delay (d2), s/veh	49.8	42.6	0.1	0.0	0.1	0.0	1.5	0.6	6.5	92.7	2.2	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.8	29.5	3.4	4.3	11.1	2.4	2.2	5.0	7.4	6.7	9.0	10.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	114.0	87.6	30.9	31.9	15.8	11.2	66.1	40.0	31.0	160.6	45.1	46.3
LnGrp LOS	F	F	C	C	B	B	E	D	C	F	D	D
Approach Vol, veh/h		2680			2436			966			1469	
Approach Delay, s/veh		88.8			17.8			40.5			64.4	
Approach LOS		F			B			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.0	49.9	61.4	60.7	16.5	48.4	23.0	99.1
Change Period (Y+Rc), s	5.9	* 5.9	6.3	5.7	5.9	5.3	6.3	* 6.3
Max Green Setting (Gmax), s	9.1	* 44	13.7	55.0	10.0	43.1	16.7	* 52
Max Q Clear Time (g_c+I1), s	11.1	20.3	12.5	57.0	7.0	31.6	18.7	33.8
Green Ext Time (p_c), s	0.0	4.5	0.2	0.0	0.1	4.9	0.0	12.5

Intersection Summary	
HCM 6th Ctrl Delay	54.9
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

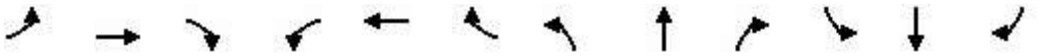
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	184	855	212	83	602	141	235	570	129	177	378	128
Future Volume (veh/h)	184	855	212	83	602	141	235	570	129	177	378	128
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	216	1006	249	86	621	145	280	679	154	184	394	133
Peak Hour Factor	0.85	0.85	0.85	0.97	0.97	0.97	0.84	0.84	0.84	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	244	1153	514	116	745	174	309	1108	494	213	945	421
Arrive On Green	0.14	0.33	0.33	0.07	0.26	0.26	0.17	0.31	0.31	0.12	0.27	0.27
Sat Flow, veh/h	1767	3526	1572	1767	2838	661	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	216	1006	249	86	385	381	280	679	154	184	394	133
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1736	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	13.6	30.5	9.0	5.4	23.4	23.5	17.7	18.6	8.5	11.6	10.5	7.7
Cycle Q Clear(g_c), s	13.6	30.5	9.0	5.4	23.4	23.5	17.7	18.6	8.5	11.6	10.5	7.7
Prop In Lane	1.00		1.00	1.00		0.38	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	244	1153	514	116	463	456	309	1108	494	213	945	421
V/C Ratio(X)	0.88	0.87	0.48	0.74	0.83	0.83	0.91	0.61	0.31	0.86	0.42	0.32
Avail Cap(c_a), veh/h	264	1272	567	140	512	504	342	1108	494	257	945	421
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.1	36.0	11.9	52.1	39.5	39.6	46.0	33.1	29.6	49.1	34.3	33.3
Incr Delay (d2), s/veh	26.6	6.4	0.7	15.4	10.4	10.7	25.3	2.5	1.6	21.9	1.4	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.7	13.6	3.0	2.9	11.2	11.1	9.7	8.1	3.3	6.3	4.6	3.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	74.7	42.5	12.6	67.6	49.9	50.3	71.3	35.6	31.3	71.0	35.6	35.2
LnGrp LOS	E	D	B	E	D	D	E	D	C	E	D	D
Approach Vol, veh/h		1471			852			1113			711	
Approach Delay, s/veh		42.1			51.9			44.0			44.7	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.6	40.6	12.4	42.1	23.9	35.3	19.7	34.7
Change Period (Y+Rc), s	4.9	* 4.9	4.9	* 4.9	4.0	4.9	4.0	4.9
Max Green Setting (Gmax), s	16.5	* 36	9.0	* 41	22.0	30.2	17.0	33.0
Max Q Clear Time (g_c+I1), s	13.6	20.6	7.4	32.5	19.7	12.5	15.6	25.5
Green Ext Time (p_c), s	0.1	4.3	0.0	4.6	0.2	2.6	0.1	2.7

Intersection Summary	
HCM 6th Ctrl Delay	45.1
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	227	1805	332	269	1587	198	304	463	178	277	457	231
Future Volume (veh/h)	227	1805	332	269	1587	198	304	463	178	277	457	231
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	270	2149	395	316	1867	233	358	545	209	351	578	292
Peak Hour Factor	0.84	0.84	0.84	0.85	0.85	0.85	0.85	0.85	0.85	0.79	0.79	0.79
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	1471	3474	1078	249	1693	525	289	1175	524	269	1175	524
Arrive On Green	0.43	0.69	0.69	0.07	0.33	0.33	0.08	0.33	0.33	0.08	0.33	0.33
Sat Flow, veh/h	3428	5066	1572	3428	5066	1572	3428	3526	1572	3428	3526	1572
Grp Volume(v), veh/h	270	2149	395	316	1867	233	358	545	209	351	578	292
Grp Sat Flow(s),veh/h/ln	1714	1689	1572	1714	1689	1572	1714	1763	1572	1714	1763	1572
Q Serve(g_s), s	5.9	27.8	20.1	8.7	40.1	18.0	10.1	14.6	12.3	9.4	15.7	18.2
Cycle Q Clear(g_c), s	5.9	27.8	20.1	8.7	40.1	18.0	10.1	14.6	12.3	9.4	15.7	18.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	1471	3474	1078	249	1693	525	289	1175	524	269	1175	524
V/C Ratio(X)	0.18	0.62	0.37	1.27	1.10	0.44	1.24	0.46	0.40	1.31	0.49	0.56
Avail Cap(c_a), veh/h	1471	3474	1078	249	1693	525	289	1175	524	269	1175	524
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.2	10.3	20.0	55.6	40.0	52.3	55.0	31.5	30.8	55.3	31.9	32.7
Incr Delay (d2), s/veh	0.0	0.1	0.1	149.8	55.8	2.7	134.2	1.3	2.3	162.4	1.5	4.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	8.4	6.8	8.8	24.3	7.2	9.7	6.3	4.8	10.0	6.8	7.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.2	10.4	20.1	205.4	95.7	55.0	189.2	32.9	33.0	217.7	33.4	37.0
LnGrp LOS	C	B	C	F	F	D	F	C	C	F	C	D
Approach Vol, veh/h		2814			2416			1112			1221	
Approach Delay, s/veh		12.8			106.1			83.2			87.2	
Approach LOS		B			F			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.0	45.6	15.0	89.9	15.7	44.9	59.1	45.8
Change Period (Y+Rc), s	5.6	* 5.6	6.3	* 6.3	5.6	4.9	6.3	5.7
Max Green Setting (Gmax), s	9.4	* 40	8.7	* 39	9.4	40.0	8.0	40.1
Max Q Clear Time (g_c+I1), s	11.4	16.6	10.7	29.8	12.1	20.2	7.9	42.1
Green Ext Time (p_c), s	0.0	4.2	0.0	8.3	0.0	4.6	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	65.0
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	45	12	896	767	4
Future Vol, veh/h	0	45	12	896	767	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	175	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	59	59	83	83	87	87
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	76	14	1080	882	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	444	887	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.96	4.16	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.33	2.23	-	-	-
Pot Cap-1 Maneuver	0	559	753	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	559	753	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.5	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	753	-	559	-	-
HCM Lane V/C Ratio	0.019	-	0.136	-	-
HCM Control Delay (s)	9.9	-	12.5	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.5	-	-

Intersection	
Int Delay, s/veh	18.9

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	71	736	6	73	818	12	19	1	132	15	0	32
Future Vol, veh/h	71	736	6	73	818	12	19	1	132	15	0	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	175	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	81	81	81	67	67	67	69	69	69
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	85	876	7	90	1010	15	28	1	197	22	0	46

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1025	0	0	883	0	0	1735	2255	442	1807	2251	513
Stage 1	-	-	-	-	-	-	1050	1050	-	1198	1198	-
Stage 2	-	-	-	-	-	-	685	1205	-	609	1053	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	667	-	-	756	-	-	56	40	560	49	40	504
Stage 1	-	-	-	-	-	-	241	300	-	195	255	-
Stage 2	-	-	-	-	-	-	402	253	-	446	299	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	667	-	-	756	-	-	42	31	560	25	31	504
Mov Cap-2 Maneuver	-	-	-	-	-	-	42	31	-	25	31	-
Stage 1	-	-	-	-	-	-	210	262	-	170	225	-
Stage 2	-	-	-	-	-	-	322	223	-	251	261	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	1	0.8	131.4	194.8
HCM LOS			F	F

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SERSWLn1
Capacity (veh/h)	211	756	-	-	667	-	- 71
HCM Lane V/C Ratio	1.075	0.119	-	-	0.127	-	- 0.959
HCM Control Delay (s)	131.4	10.4	-	-	11.2	-	- 194.8
HCM Lane LOS	F	B	-	-	B	-	- F
HCM 95th %tile Q(veh)	10.3	0.4	-	-	0.4	-	- 4.9



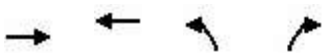
Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	2709	2320	369	192
v/c Ratio	1.12	1.21	1.16	0.66
Control Delay	83.7	112.5	142.9	52.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	83.7	112.5	142.9	52.5
Queue Length 50th (ft)	~704	~826	~338	130
Queue Length 95th (ft)	#745	m#626	#416	176
Internal Link Dist (ft)	372	1	1238	
Turn Bay Length (ft)				275
Base Capacity (vph)	2412	1914	318	290
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.12	1.21	1.16	0.66

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1909	2740	891	1093
v/c Ratio	1.13	1.29	0.89	1.34
Control Delay	87.2	161.6	49.6	193.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	87.2	161.6	49.6	193.1
Queue Length 50th (ft)	~626	~786	334	~626
Queue Length 95th (ft)	m#469	#751	#453	#775
Internal Link Dist (ft)	20	600	1418	
Turn Bay Length (ft)			825	825
Base Capacity (vph)	1685	2124	997	817
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.13	1.29	0.89	1.34

Intersection Summary

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95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	435	2099	146	355	1892	189	123	537	306	238	588	643
v/c Ratio	1.11	1.10	0.21	1.11	1.05	0.29	0.53	0.35	0.49	1.12	0.56	0.54
Control Delay	136.4	95.3	4.5	140.1	79.6	8.9	73.8	40.2	15.6	156.0	45.6	18.3
Queue Delay	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	136.4	95.9	4.5	140.1	79.6	8.9	73.8	40.2	15.6	156.0	45.6	18.3
Queue Length 50th (ft)	~241	~820	0	~196	~709	22	58	145	68	~132	247	155
Queue Length 95th (ft)	#352	#913	41	#285	#756	72	94	181	161	#223	311	203
Internal Link Dist (ft)		600			2533			848			301	
Turn Bay Length (ft)	250		50	250		150	175		175	225		150
Base Capacity (vph)	391	1910	689	321	1806	660	234	1528	622	213	1041	1185
Starvation Cap Reductn	0	68	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.11	1.14	0.21	1.11	1.05	0.29	0.53	0.35	0.49	1.12	0.56	0.54

Intersection Summary

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Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	216	1006	249	86	766	280	679	154	184	394	133
v/c Ratio	0.88	0.87	0.41	0.65	0.83	0.89	0.63	0.27	0.80	0.43	0.26
Control Delay	83.0	46.0	14.7	76.4	48.2	76.7	38.4	7.5	74.1	38.4	7.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.0	46.0	14.7	76.4	48.2	76.7	38.4	7.5	74.1	38.4	7.1
Queue Length 50th (ft)	166	376	58	66	283	213	241	6	139	135	0
Queue Length 95th (ft)	#277	426	114	#141	359	#325	281	46	#249	185	48
Internal Link Dist (ft)		513			412		1218			422	
Turn Bay Length (ft)	200		100	150		225		100	225		100
Base Capacity (vph)	257	1240	646	136	986	332	1079	581	249	913	508
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.84	0.81	0.39	0.63	0.78	0.84	0.63	0.27	0.74	0.43	0.26

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	270	2149	395	316	1867	233	358	545	209	351	578	292
v/c Ratio	1.19	1.30	0.62	1.28	1.11	0.36	1.35	0.47	0.32	1.32	0.49	0.45
Control Delay	170.0	174.1	22.8	199.4	96.4	10.0	220.6	33.2	6.8	210.5	33.7	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	170.0	174.1	22.8	199.4	96.4	10.0	220.6	33.2	6.8	210.5	33.7	13.2
Queue Length 50th (ft)	~130	~780	140	~160	~605	30	~186	174	10	~180	186	56
Queue Length 95th (ft)	#197	#784	216	#234	#635	80	#262	212	54	#230	206	97
Internal Link Dist (ft)		2533			1136			1068			1112	
Turn Bay Length (ft)	250		175	250		200	200		150	200		175
Base Capacity (vph)	226	1653	635	246	1682	641	266	1168	649	266	1168	649
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.19	1.30	0.62	1.28	1.11	0.36	1.35	0.47	0.32	1.32	0.49	0.45

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
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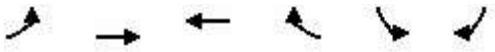
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

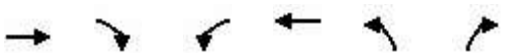
EXISTING PLUS PROJECT WORKSHEETS



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰	↱
Traffic Volume (veh/h)	0	2080	1957	0	411	140
Future Volume (veh/h)	0	2080	1957	0	411	140
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	0	1074	1074	0	1465	1465
Adj Flow Rate, veh/h	0	2122	2174	0	514	175
Peak Hour Factor	0.98	0.98	0.90	0.90	0.80	0.80
Percent Heavy Veh, %	0	3	3	0	3	3
Cap, veh/h	0	2150	1706	0	426	379
Arrive On Green	0.00	0.58	1.00	0.00	0.31	0.31
Sat Flow, veh/h	0	3996	3126	0	1395	1241
Grp Volume(v), veh/h	0	2122	2174	0	514	175
Grp Sat Flow(s),veh/h/ln	0	924	978	0	1395	1241
Q Serve(g_s), s	0.0	67.7	69.8	0.0	36.6	13.7
Cycle Q Clear(g_c), s	0.0	67.7	69.8	0.0	36.6	13.7
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2150	1706	0	426	379
V/C Ratio(X)	0.00	0.99	1.27	0.00	1.21	0.46
Avail Cap(c_a), veh/h	0	2150	1706	0	426	379
HCM Platoon Ratio	1.00	1.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	24.7	0.0	0.0	41.7	33.7
Incr Delay (d2), s/veh	0.0	16.6	128.2	0.0	113.8	4.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	15.1	20.3	0.0	25.4	4.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	41.3	128.2	0.0	155.5	37.8
LnGrp LOS	A	D	F	A	F	D
Approach Vol, veh/h		2122	2174		689	
Approach Delay, s/veh		41.3	128.2		125.6	
Approach LOS		D	F		F	

Timer - Assigned Phs	4	6	8
Phs Duration (G+Y+Rc), s	77.0	43.0	77.0
Change Period (Y+Rc), s	7.2	6.4	7.2
Max Green Setting (Gmax), s	69.8	36.6	69.8
Max Q Clear Time (g_c+I1), s	69.7	38.6	71.8
Green Ext Time (p_c), s	0.1	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	90.8
HCM 6th LOS	F



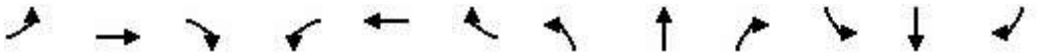
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1647	0	0	1996	945	1247
Future Volume (veh/h)	1647	0	0	1996	945	1247
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1172	0	0	1172	1563	1563
Adj Flow Rate, veh/h	1984	0	0	2193	995	1313
Peak Hour Factor	0.83	0.83	0.91	0.91	0.95	0.95
Percent Heavy Veh, %	3	0	0	3	3	3
Cap, veh/h	1482	0	0	1868	1198	967
Arrive On Green	0.93	0.00	0.00	0.46	0.41	0.41
Sat Flow, veh/h	3410	0	0	4360	2887	2331
Grp Volume(v), veh/h	1984	0	0	2193	995	1313
Grp Sat Flow(s),veh/h/ln	1066	0	0	1008	1444	1165
Q Serve(g_s), s	55.6	0.0	0.0	55.6	36.9	49.8
Cycle Q Clear(g_c), s	55.6	0.0	0.0	55.6	36.9	49.8
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1482	0	0	1868	1198	967
V/C Ratio(X)	1.34	0.00	0.00	1.17	0.83	1.36
Avail Cap(c_a), veh/h	1482	0	0	1868	1198	967
HCM Platoon Ratio	2.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.25	1.00	1.00
Uniform Delay (d), s/veh	4.4	0.0	0.0	32.2	31.3	35.1
Incr Delay (d2), s/veh	156.9	0.0	0.0	79.9	6.8	167.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	22.6	0.0	0.0	22.6	13.2	35.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	161.3	0.0	0.0	112.1	38.1	202.8
LnGrp LOS	F	A	A	F	D	F
Approach Vol, veh/h	1984			2193	2308	
Approach Delay, s/veh	161.3			112.1	131.8	
Approach LOS	F			F	F	

Timer - Assigned Phs	2	4	8
Phs Duration (G+Y+Rc), s	57.0	63.0	63.0
Change Period (Y+Rc), s	* 7.2	* 7.4	* 7.4
Max Green Setting (Gmax), s	* 50	* 56	* 56
Max Q Clear Time (g_c+I1), s	51.8	57.6	57.6
Green Ext Time (p_c), s	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	134.2
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	565	2223	108	223	1616	203	102	422	308	74	278	287
Future Volume (veh/h)	565	2223	108	223	1616	203	102	422	308	74	278	287
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	642	2526	123	245	1776	223	112	464	338	88	331	342
Peak Hour Factor	0.88	0.88	0.88	0.91	0.91	0.91	0.91	0.91	0.91	0.84	0.84	0.84
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	537	2525	784	229	2071	643	233	1537	477	184	1033	1244
Arrive On Green	0.16	0.50	0.50	0.07	0.41	0.41	0.07	0.30	0.30	0.05	0.29	0.29
Sat Flow, veh/h	3428	5066	1572	3428	5066	1572	3428	5066	1572	3428	3526	2768
Grp Volume(v), veh/h	642	2526	123	245	1776	223	112	464	338	88	331	342
Grp Sat Flow(s),veh/h/ln	1714	1689	1572	1714	1689	1572	1714	1689	1572	1714	1763	1384
Q Serve(g_s), s	22.7	72.3	5.4	9.7	46.3	14.2	4.6	10.2	27.7	3.6	10.6	9.2
Cycle Q Clear(g_c), s	22.7	72.3	5.4	9.7	46.3	14.2	4.6	10.2	27.7	3.6	10.6	9.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	537	2525	784	229	2071	643	233	1537	477	184	1033	1244
V/C Ratio(X)	1.20	1.00	0.16	1.07	0.86	0.35	0.48	0.30	0.71	0.48	0.32	0.27
Avail Cap(c_a), veh/h	537	2525	784	229	2071	643	233	1537	477	189	1033	1244
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.1	36.4	15.2	67.7	39.0	29.5	65.1	38.7	44.8	66.7	40.0	17.6
Incr Delay (d2), s/veh	90.1	5.5	0.0	39.3	0.5	0.1	1.5	0.5	8.6	1.9	0.8	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.3	28.8	2.2	5.4	18.4	5.2	2.0	4.2	11.6	1.6	4.7	2.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	151.2	41.8	15.3	107.0	39.5	29.7	66.6	39.2	53.4	68.6	40.8	18.1
LnGrp LOS	F	F	B	F	D	C	E	D	D	E	D	B
Approach Vol, veh/h		3291			2244			914			761	
Approach Delay, s/veh		62.2			45.9			47.8			33.8	
Approach LOS		E			D			D			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.7	49.9	16.0	78.3	15.8	47.8	29.0	65.3
Change Period (Y+Rc), s	5.9	* 5.9	6.3	5.7	5.9	5.3	6.3	5.7
Max Green Setting (Gmax), s	8.0	* 44	9.7	60.1	9.5	42.5	22.7	47.1
Max Q Clear Time (g_c+I1), s	5.6	29.7	11.7	74.3	6.6	12.6	24.7	48.3
Green Ext Time (p_c), s	0.0	3.5	0.0	0.0	0.1	3.5	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	52.3
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
4: First St & Alluvial Ave

04/24/2020

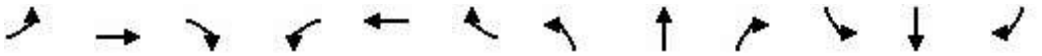
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	129	316	135	179	672	200	234	324	82	137	381	212
Future Volume (veh/h)	129	316	135	179	672	200	234	324	82	137	381	212
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	163	400	171	206	772	230	260	360	91	190	529	294
Peak Hour Factor	0.79	0.79	0.79	0.87	0.87	0.87	0.90	0.90	0.90	0.72	0.72	0.72
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	189	1029	459	232	827	246	286	1077	480	217	914	408
Arrive On Green	0.11	0.29	0.29	0.13	0.31	0.31	0.16	0.31	0.31	0.12	0.26	0.26
Sat Flow, veh/h	1767	3526	1572	1767	2677	798	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	163	400	171	206	508	494	260	360	91	190	529	294
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1712	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	10.9	10.9	6.8	13.8	33.6	33.6	17.4	9.5	5.1	12.7	15.7	20.4
Cycle Q Clear(g_c), s	10.9	10.9	6.8	13.8	33.6	33.6	17.4	9.5	5.1	12.7	15.7	20.4
Prop In Lane	1.00		1.00	1.00		0.47	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	189	1029	459	232	544	529	286	1077	480	217	914	408
V/C Ratio(X)	0.86	0.39	0.37	0.89	0.93	0.93	0.91	0.33	0.19	0.87	0.58	0.72
Avail Cap(c_a), veh/h	191	1031	460	236	560	544	295	1077	480	250	914	408
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.7	33.9	14.5	51.3	40.3	40.3	49.4	32.2	30.7	51.7	38.7	40.5
Incr Delay (d2), s/veh	30.6	0.2	0.5	30.7	22.7	23.2	29.9	0.8	0.9	24.8	2.7	10.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.4	4.6	3.8	8.0	17.5	17.1	9.9	4.1	2.0	7.0	7.0	8.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	83.3	34.2	15.0	81.9	63.0	63.4	79.3	33.1	31.6	76.5	41.4	51.0
LnGrp LOS	F	C	B	F	E	E	E	C	C	E	D	D
Approach Vol, veh/h		734			1208			711			1013	
Approach Delay, s/veh		40.6			66.4			49.8			50.8	
Approach LOS		D			E			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.8	41.5	19.8	39.9	24.3	36.0	17.7	41.9
Change Period (Y+Rc), s	4.0	4.9	4.0	4.9	4.9	* 4.9	4.9	* 4.9
Max Green Setting (Gmax), s	17.0	34.1	16.0	35.1	20.0	* 31	13.0	* 38
Max Q Clear Time (g_c+I1), s	14.7	11.5	15.8	12.9	19.4	22.4	12.9	35.6
Green Ext Time (p_c), s	0.1	2.4	0.0	3.0	0.1	2.9	0.0	1.4

Intersection Summary	
HCM 6th Ctrl Delay	53.7
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	391	1977	257	152	1666	374	175	420	153	135	305	173
Future Volume (veh/h)	391	1977	257	152	1666	374	175	420	153	135	305	173
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	439	2221	289	179	1960	440	190	457	166	161	363	206
Peak Hour Factor	0.89	0.89	0.89	0.85	0.85	0.85	0.92	0.92	0.92	0.84	0.84	0.84
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	306	1752	544	1471	3449	1071	229	1175	524	249	1175	524
Arrive On Green	0.09	0.35	0.35	0.43	0.68	0.68	0.07	0.33	0.33	0.07	0.33	0.33
Sat Flow, veh/h	3428	5066	1572	3428	5066	1572	3428	3526	1572	3428	3526	1572
Grp Volume(v), veh/h	439	2221	289	179	1960	440	190	457	166	161	363	206
Grp Sat Flow(s),veh/h/ln	1714	1689	1572	1714	1689	1572	1714	1763	1572	1714	1763	1572
Q Serve(g_s), s	10.7	41.5	23.3	3.8	24.2	24.0	6.6	11.9	9.4	5.5	9.2	12.1
Cycle Q Clear(g_c), s	10.7	41.5	23.3	3.8	24.2	24.0	6.6	11.9	9.4	5.5	9.2	12.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	306	1752	544	1471	3449	1071	229	1175	524	249	1175	524
V/C Ratio(X)	1.44	1.27	0.53	0.12	0.57	0.41	0.83	0.39	0.32	0.65	0.31	0.39
Avail Cap(c_a), veh/h	306	1752	544	1471	3449	1071	229	1175	524	249	1175	524
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.7	39.3	54.6	20.6	10.0	22.2	55.3	30.6	29.8	54.2	29.7	30.7
Incr Delay (d2), s/veh	198.0	120.9	0.3	0.0	0.7	1.2	22.1	1.0	1.6	5.8	0.7	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.9	35.7	8.9	1.4	7.6	8.5	3.5	5.1	3.7	2.5	3.9	4.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	252.6	160.2	54.9	20.7	10.7	23.3	77.4	31.6	31.4	59.9	30.4	32.9
LnGrp LOS	F	F	D	C	B	C	E	C	C	E	C	C
Approach Vol, veh/h		2949			2579			813			730	
Approach Delay, s/veh		163.6			13.5			42.3			37.6	
Approach LOS		F			B			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.3	44.9	59.1	47.2	13.6	45.6	17.0	89.3
Change Period (Y+Rc), s	5.6	4.9	6.3	5.7	5.6	* 5.6	6.3	* 6.3
Max Green Setting (Gmax), s	8.0	40.0	8.0	41.5	8.0	* 40	10.7	* 39
Max Q Clear Time (g_c+I1), s	7.5	13.9	5.8	43.5	8.6	14.1	12.7	26.2
Green Ext Time (p_c), s	0.0	3.5	0.1	0.0	0.0	3.0	0.0	10.1

Intersection Summary	
HCM 6th Ctrl Delay	81.9
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	43	91	696	586	83
Future Vol, veh/h	0	43	91	696	586	83
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	175	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	44	44	88	88	85	85
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	98	103	791	689	98

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	394	787	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.96	4.16	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.33	2.23	-	-	-
Pot Cap-1 Maneuver	0	602	822	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	602	822	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.1	1.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	822	-	602	-	-
HCM Lane V/C Ratio	0.126	-	0.162	-	-
HCM Control Delay (s)	10	-	12.1	-	-
HCM Lane LOS	B	-	B	-	-
HCM 95th %tile Q(veh)	0.4	-	0.6	-	-

Intersection	
Int Delay, s/veh	24.3

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	33	532	65	299	679	11	20	0	58	8	1	20
Future Vol, veh/h	33	532	65	299	679	11	20	0	58	8	1	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	175	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	90	90	90	52	52	52	66	66	66
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	38	619	76	332	754	12	38	0	112	12	2	30

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	766	0	0	695	0	0	1775	2163	348	1810	2195	383
Stage 1	-	-	-	-	-	-	733	733	-	1424	1424	-
Stage 2	-	-	-	-	-	-	1042	1430	-	386	771	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	837	-	-	890	-	-	52	46	645	49	44	612
Stage 1	-	-	-	-	-	-	376	422	-	141	198	-
Stage 2	-	-	-	-	-	-	244	197	-	606	405	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	837	-	-	890	-	-	~ 33	28	645	28	26	612
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 33	28	-	28	26	-
Stage 1	-	-	-	-	-	-	359	403	-	135	124	-
Stage 2	-	-	-	-	-	-	144	124	-	478	387	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0.5	3.5	272.2	92.9
HCM LOS			F	F

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SERSWLn1
Capacity (veh/h)	112	890	-	-	837	-	- 81
HCM Lane V/C Ratio	1.339	0.373	-	-	0.046	-	- 0.542
HCM Control Delay (s)	272.2	11.4	-	-	9.5	-	- 92.9
HCM Lane LOS	F	B	-	-	A	-	- F
HCM 95th %tile Q(veh)	10.2	1.7	-	-	0.1	-	- 2.4

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



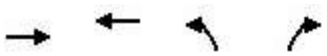
Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	2122	2174	514	175
v/c Ratio	0.99	1.28	1.22	0.46
Control Delay	43.1	146.9	156.0	37.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	43.1	146.9	156.0	37.2
Queue Length 50th (ft)	448	~796	~489	106
Queue Length 95th (ft)	#569	m#693	#585	152
Internal Link Dist (ft)	372	1	1238	
Turn Bay Length (ft)				275
Base Capacity (vph)	2137	1696	421	381
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.99	1.28	1.22	0.46

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1984	2193	995	1313
v/c Ratio	1.35	1.18	0.84	1.36
Control Delay	184.6	118.2	39.2	198.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	184.6	118.2	39.2	198.4
Queue Length 50th (ft)	~735	~592	350	~763
Queue Length 95th (ft)	m#697	#668	442	#914
Internal Link Dist (ft)	20	600	1418	
Turn Bay Length (ft)			825	825
Base Capacity (vph)	1473	1857	1188	967
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.35	1.18	0.84	1.36

Intersection Summary
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	642	2526	123	245	1776	223	112	464	338	88	331	342
v/c Ratio	1.21	1.21	0.17	1.08	1.09	0.35	0.50	0.30	0.57	0.47	0.32	0.27
Control Delay	160.1	137.0	2.2	143.7	95.4	7.8	73.8	39.4	25.5	75.1	41.1	13.0
Queue Delay	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	160.1	137.1	2.2	143.7	95.4	7.8	73.8	39.4	25.5	75.1	41.1	13.0
Queue Length 50th (ft)	~379	~1063	0	~132	~687	14	53	123	139	42	128	64
Queue Length 95th (ft)	#486	#1106	20	#224	#783	77	87	157	245	68	160	84
Internal Link Dist (ft)		600			2533			848			301	
Turn Bay Length (ft)	250		50	250		150	175		175	225		150
Base Capacity (vph)	532	2087	739	227	1635	645	222	1528	589	187	1027	1258
Starvation Cap Reductn	0	142	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.21	1.30	0.17	1.08	1.09	0.35	0.50	0.30	0.57	0.47	0.32	0.27

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	163	400	171	206	1002	260	360	91	190	529	294
v/c Ratio	0.87	0.39	0.30	0.95	0.94	0.91	0.34	0.16	0.81	0.56	0.50
Control Delay	91.1	34.9	6.1	102.8	55.9	83.4	34.0	2.2	75.3	40.0	13.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	91.1	34.9	6.1	102.8	55.9	83.4	34.0	2.2	75.3	40.0	13.6
Queue Length 50th (ft)	126	129	0	161	385	199	116	0	143	186	46
Queue Length 95th (ft)	#202	151	32	#297	#486	#353	160	13	174	186	65
Internal Link Dist (ft)		513			412		1218			422	
Turn Bay Length (ft)	200		100	150		225		100	225		100
Base Capacity (vph)	192	1051	590	216	1085	296	1052	565	256	950	583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.38	0.29	0.95	0.92	0.88	0.34	0.16	0.74	0.56	0.50

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	439	2221	289	179	1960	440	190	457	166	161	363	206
v/c Ratio	1.45	1.28	0.44	0.79	1.20	0.65	0.84	0.39	0.26	0.71	0.31	0.31
Control Delay	258.5	162.9	13.7	79.6	134.3	20.0	85.4	31.9	3.6	72.6	30.7	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	258.5	162.9	13.7	79.6	134.3	20.0	85.4	31.9	3.6	72.6	30.7	5.2
Queue Length 50th (ft)	~238	~797	61	71	~676	128	76	142	0	63	109	0
Queue Length 95th (ft)	#338	#876	136	#117	#702	214	#140	190	34	#97	139	40
Internal Link Dist (ft)		2533			1136			1068			1112	
Turn Bay Length (ft)	250		175	250		200	200		150	200		175
Base Capacity (vph)	303	1741	657	226	1628	672	226	1168	649	226	1168	660
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.45	1.28	0.44	0.79	1.20	0.65	0.84	0.39	0.26	0.71	0.31	0.31

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

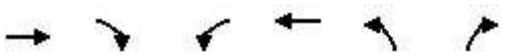
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰	↱
Traffic Volume (veh/h)	0	2405	2119	0	284	148
Future Volume (veh/h)	0	2405	2119	0	284	148
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	0	1074	1074	0	1465	1465
Adj Flow Rate, veh/h	0	2733	2381	0	369	192
Peak Hour Factor	0.88	0.88	0.89	0.89	0.77	0.77
Percent Heavy Veh, %	0	3	3	0	3	3
Cap, veh/h	0	2427	1926	0	321	286
Arrive On Green	0.00	0.66	1.00	0.00	0.23	0.23
Sat Flow, veh/h	0	3996	3126	0	1395	1241
Grp Volume(v), veh/h	0	2733	2381	0	369	192
Grp Sat Flow(s),veh/h/ln	0	924	978	0	1395	1241
Q Serve(g_s), s	0.0	78.8	78.8	0.0	27.6	16.9
Cycle Q Clear(g_c), s	0.0	78.8	78.8	0.0	27.6	16.9
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2427	1926	0	321	286
V/C Ratio(X)	0.00	1.13	1.24	0.00	1.15	0.67
Avail Cap(c_a), veh/h	0	2427	1926	0	321	286
HCM Platoon Ratio	1.00	1.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	20.6	0.0	0.0	46.2	42.1
Incr Delay (d2), s/veh	0.0	62.8	111.0	0.0	97.3	12.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	24.1	19.8	0.0	17.9	6.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	83.4	111.0	0.0	143.5	54.1
LnGrp LOS	A	F	F	A	F	D
Approach Vol, veh/h		2733	2381		561	
Approach Delay, s/veh		83.4	111.0		112.9	
Approach LOS		F	F		F	

Timer - Assigned Phs			4		6	8
Phs Duration (G+Y+Rc), s			86.0		34.0	86.0
Change Period (Y+Rc), s			7.2		6.4	7.2
Max Green Setting (Gmax), s			78.8		27.6	78.8
Max Q Clear Time (g_c+I1), s			80.8		29.6	80.8
Green Ext Time (p_c), s			0.0		0.0	0.0

Intersection Summary		
HCM 6th Ctrl Delay		97.9
HCM 6th LOS		F



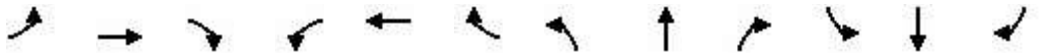
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1586	0	0	2401	811	1023
Future Volume (veh/h)	1586	0	0	2401	811	1023
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1172	0	0	1172	1563	1563
Adj Flow Rate, veh/h	1934	0	0	2893	891	1124
Peak Hour Factor	0.82	0.82	0.83	0.83	0.91	0.91
Percent Heavy Veh, %	3	0	0	3	3	3
Cap, veh/h	1696	0	0	2137	1006	812
Arrive On Green	1.00	0.00	0.00	0.53	0.35	0.35
Sat Flow, veh/h	3410	0	0	4360	2887	2331
Grp Volume(v), veh/h	1934	0	0	2893	891	1124
Grp Sat Flow(s),veh/h/ln	1066	0	0	1008	1444	1165
Q Serve(g_s), s	63.6	0.0	0.0	63.6	34.9	41.8
Cycle Q Clear(g_c), s	63.6	0.0	0.0	63.6	34.9	41.8
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1696	0	0	2137	1006	812
V/C Ratio(X)	1.14	0.00	0.00	1.35	0.89	1.38
Avail Cap(c_a), veh/h	1696	0	0	2137	1006	812
HCM Platoon Ratio	2.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.20	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	28.2	36.9	39.1
Incr Delay (d2), s/veh	70.9	0.0	0.0	159.9	11.4	180.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.1	0.0	0.0	37.2	13.3	31.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	70.9	0.0	0.0	188.1	48.2	219.8
LnGrp LOS	F	A	A	F	D	F
Approach Vol, veh/h	1934			2893	2015	
Approach Delay, s/veh	70.9			188.1	143.9	
Approach LOS	E			F	F	

Timer - Assigned Phs		2		4		8
Phs Duration (G+Y+Rc), s		49.0		71.0		71.0
Change Period (Y+Rc), s		* 7.2		* 7.4		* 7.4
Max Green Setting (Gmax), s		* 42		* 64		* 64
Max Q Clear Time (g_c+I1), s		43.8		65.6		65.6
Green Ext Time (p_c), s		0.0		0.0		0.0

Intersection Summary		
HCM 6th Ctrl Delay	142.0	
HCM 6th LOS	F	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	396	1959	133	323	1773	164	121	526	306	219	541	592
Future Volume (veh/h)	396	1959	133	323	1773	164	121	526	306	219	541	592
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	435	2153	146	371	2038	189	123	537	312	238	588	643
Peak Hour Factor	0.91	0.91	0.91	0.87	0.87	0.87	0.98	0.98	0.98	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	371	1921	596	806	2543	790	236	1537	477	215	1048	1122
Arrive On Green	0.11	0.38	0.38	0.24	0.50	0.50	0.07	0.30	0.30	0.06	0.30	0.30
Sat Flow, veh/h	3428	5066	1572	3428	5066	1572	3428	5066	1572	3428	3526	2768
Grp Volume(v), veh/h	435	2153	146	371	2038	189	123	537	312	238	588	643
Grp Sat Flow(s),veh/h/ln	1714	1689	1572	1714	1689	1572	1714	1689	1572	1714	1763	1384
Q Serve(g_s), s	15.7	55.0	9.2	13.5	48.6	9.7	5.0	12.0	25.0	9.1	20.4	23.9
Cycle Q Clear(g_c), s	15.7	55.0	9.2	13.5	48.6	9.7	5.0	12.0	25.0	9.1	20.4	23.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	371	1921	596	806	2543	790	236	1537	477	215	1048	1122
V/C Ratio(X)	1.17	1.12	0.24	0.46	0.80	0.24	0.52	0.35	0.65	1.11	0.56	0.57
Avail Cap(c_a), veh/h	371	1921	596	806	2543	790	236	1537	477	215	1048	1122
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	64.7	45.0	30.8	47.6	30.1	19.9	65.2	39.3	43.9	68.0	43.0	29.2
Incr Delay (d2), s/veh	80.2	55.0	0.1	0.0	0.3	0.1	2.0	0.6	6.8	92.7	2.2	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.8	31.7	3.4	5.6	18.6	3.5	2.2	5.0	10.4	6.7	9.0	7.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	144.9	100.0	30.9	47.6	30.3	20.0	67.2	40.0	50.7	160.6	45.1	31.4
LnGrp LOS	F	F	C	D	C	B	E	D	D	F	D	C
Approach Vol, veh/h		2734			2598			972			1469	
Approach Delay, s/veh		103.4			32.0			46.9			57.8	
Approach LOS		F			C			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.0	49.3	41.0	60.7	15.9	48.4	22.0	79.7
Change Period (Y+Rc), s	5.9	5.3	6.3	5.7	5.9	5.3	6.3	* 6.3
Max Green Setting (Gmax), s	9.1	44.0	13.7	55.0	10.0	43.1	15.7	* 53
Max Q Clear Time (g_c+I1), s	11.1	27.0	15.5	57.0	7.0	25.9	17.7	50.6
Green Ext Time (p_c), s	0.0	4.1	0.0	0.0	0.1	6.0	0.0	2.2

Intersection Summary	
HCM 6th Ctrl Delay	63.9
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

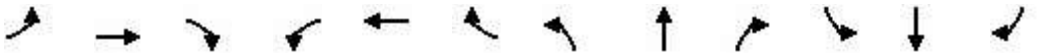
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	184	855	219	98	602	141	253	606	169	177	392	128
Future Volume (veh/h)	184	855	219	98	602	141	253	606	169	177	392	128
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	216	1006	258	101	621	145	301	721	201	184	408	133
Peak Hour Factor	0.85	0.85	0.85	0.97	0.97	0.97	0.84	0.84	0.84	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	243	1142	510	125	752	175	327	1082	482	230	915	408
Arrive On Green	0.14	0.32	0.32	0.07	0.26	0.26	0.18	0.31	0.31	0.13	0.26	0.26
Sat Flow, veh/h	1767	3526	1572	1767	2838	661	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	216	1006	258	101	385	381	301	721	201	184	408	133
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1736	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	14.0	31.4	9.5	6.6	23.9	24.0	19.5	20.7	11.8	11.8	11.3	8.0
Cycle Q Clear(g_c), s	14.0	31.4	9.5	6.6	23.9	24.0	19.5	20.7	11.8	11.8	11.3	8.0
Prop In Lane	1.00		1.00	1.00		0.38	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	243	1142	510	125	467	460	327	1082	482	230	915	408
V/C Ratio(X)	0.89	0.88	0.51	0.81	0.83	0.83	0.92	0.67	0.42	0.80	0.45	0.33
Avail Cap(c_a), veh/h	258	1242	554	137	500	492	334	1082	482	251	915	408
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	49.3	37.2	12.0	53.3	40.2	40.3	46.6	35.1	32.1	49.2	36.1	34.8
Incr Delay (d2), s/veh	28.0	7.2	0.8	27.2	10.3	10.7	29.6	3.3	2.6	15.7	1.6	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.9	14.2	3.2	3.8	11.4	11.3	11.0	9.1	4.7	6.1	5.0	3.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	77.3	44.4	12.7	80.4	50.6	50.9	76.1	38.4	34.7	64.8	37.6	37.0
LnGrp LOS	E	D	B	F	D	D	E	D	C	E	D	D
Approach Vol, veh/h		1480			867			1223			725	
Approach Delay, s/veh		43.7			54.2			47.1			44.4	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.0	40.6	13.1	42.6	25.5	35.1	20.0	35.7
Change Period (Y+Rc), s	4.9	* 4.9	4.9	* 4.9	4.0	4.9	4.0	4.9
Max Green Setting (Gmax), s	16.5	* 36	9.0	* 41	22.0	30.2	17.0	33.0
Max Q Clear Time (g_c+I1), s	13.8	22.7	8.6	33.4	21.5	13.3	16.0	26.0
Green Ext Time (p_c), s	0.1	4.4	0.0	4.3	0.1	2.7	0.1	2.6

Intersection Summary	
HCM 6th Ctrl Delay	46.9
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	282	1805	332	269	1587	223	304	487	178	342	519	372
Future Volume (veh/h)	282	1805	332	269	1587	223	304	487	178	342	519	372
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	336	2149	395	316	1867	262	358	573	209	433	657	471
Peak Hour Factor	0.84	0.84	0.84	0.85	0.85	0.85	0.85	0.85	0.85	0.79	0.79	0.79
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	1491	3474	1078	249	1663	516	289	1175	524	269	1175	524
Arrive On Green	0.43	0.69	0.69	0.07	0.33	0.33	0.08	0.33	0.33	0.08	0.33	0.33
Sat Flow, veh/h	3428	5066	1572	3428	5066	1572	3428	3526	1572	3428	3526	1572
Grp Volume(v), veh/h	336	2149	395	316	1867	262	358	573	209	433	657	471
Grp Sat Flow(s),veh/h/ln	1714	1689	1572	1714	1689	1572	1714	1763	1572	1714	1763	1572
Q Serve(g_s), s	7.4	27.8	20.1	8.7	39.4	20.8	10.1	15.5	12.3	9.4	18.3	34.2
Cycle Q Clear(g_c), s	7.4	27.8	20.1	8.7	39.4	20.8	10.1	15.5	12.3	9.4	18.3	34.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	1491	3474	1078	249	1663	516	289	1175	524	269	1175	524
V/C Ratio(X)	0.23	0.62	0.37	1.27	1.12	0.51	1.24	0.49	0.40	1.61	0.56	0.90
Avail Cap(c_a), veh/h	1491	3474	1078	249	1663	516	289	1175	524	269	1175	524
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.2	10.3	20.0	55.6	40.3	54.2	55.0	31.8	30.8	55.3	32.8	38.1
Incr Delay (d2), s/veh	0.0	0.1	0.1	149.8	63.7	3.5	134.2	1.4	2.3	292.2	1.9	20.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	8.4	6.8	8.8	25.2	8.4	9.7	6.7	4.8	14.9	7.9	15.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.2	10.4	20.1	205.4	104.0	57.7	189.2	33.3	33.0	347.5	34.7	58.9
LnGrp LOS	C	B	C	F	F	E	F	C	C	F	C	E
Approach Vol, veh/h		2880			2445			1140			1561	
Approach Delay, s/veh		13.0			112.2			82.2			128.8	
Approach LOS		B			F			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.0	45.6	15.0	89.9	15.7	44.9	59.8	45.1
Change Period (Y+Rc), s	5.6	* 5.6	6.3	* 6.3	5.6	4.9	6.3	5.7
Max Green Setting (Gmax), s	9.4	* 40	8.7	* 39	9.4	40.0	8.7	39.4
Max Q Clear Time (g_c+I1), s	11.4	17.5	10.7	29.8	12.1	36.2	9.4	41.4
Green Ext Time (p_c), s	0.0	4.4	0.0	8.3	0.0	2.1	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	75.5
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	190	40	932	775	32
Future Vol, veh/h	0	190	40	932	775	32
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	175	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	59	59	83	83	87	87
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	322	48	1123	891	37

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	464	928	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.96	4.16	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.33	2.23	-	-	-
Pot Cap-1 Maneuver	0	542	726	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	542	726	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.9	0.4	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	726	-	542	-	-
HCM Lane V/C Ratio	0.066	-	0.594	-	-
HCM Control Delay (s)	10.3	-	20.9	-	-
HCM Lane LOS	B	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	3.9	-	-

Intersection	
Int Delay, s/veh	718.4

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	107	845	14	149	818	12	77	1	291	15	0	32
Future Vol, veh/h	107	845	14	149	818	12	77	1	291	15	0	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	175	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	81	81	81	67	67	67	69	69	69
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	127	1006	17	184	1010	15	115	1	434	22	0	46

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1025	0	0	1023	0	0	2142	2662	512	2144	2663	513
Stage 1	-	-	-	-	-	-	1269	1269	-	1386	1386	-
Stage 2	-	-	-	-	-	-	873	1393	-	758	1277	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	667	-	-	668	-	-	~ 27	22	504	27	22	504
Stage 1	-	-	-	-	-	-	177	236	-	149	207	-
Stage 2	-	-	-	-	-	-	309	205	-	363	234	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	667	-	-	668	-	-	~ 17	13	504	~ 2	13	504
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 17	13	-	~ 2	13	-
Stage 1	-	-	-	-	-	-	143	191	-	121	150	-
Stage 2	-	-	-	-	-	-	203	149	-	40	190	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	1.3	1.9	$ 3153.5	$ 5848.3
HCM LOS			F	F

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SERSWLn1
Capacity (veh/h)	71	668	-	-	667	-	- 6
HCM Lane V/C Ratio	7.757	0.275	-	-	0.191	-	- 11.353
HCM Control Delay (s)	$ 3153.5	12.4	-	-	11.7	-	$ 5848.3
HCM Lane LOS	F	B	-	-	B	-	- F
HCM 95th %tile Q(veh)	63.2	1.1	-	-	0.7	-	- 10.3

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



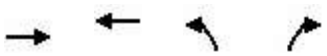
Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	2733	2381	369	192
v/c Ratio	1.13	1.24	1.16	0.66
Control Delay	87.9	126.8	142.9	52.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	87.9	126.8	142.9	52.7
Queue Length 50th (ft)	~715	~863	~338	131
Queue Length 95th (ft)	#756	m#610	#416	177
Internal Link Dist (ft)	372	1	1238	
Turn Bay Length (ft)				275
Base Capacity (vph)	2412	1914	318	290
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.13	1.24	1.16	0.66

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	1934	2893	891	1124
v/c Ratio	1.15	1.36	0.89	1.38
Control Delay	92.5	192.9	49.6	209.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	92.5	192.9	49.6	209.1
Queue Length 50th (ft)	~641	~857	334	~656
Queue Length 95th (ft)	m#517	#816	#453	#804
Internal Link Dist (ft)	20	600	1418	
Turn Bay Length (ft)			825	825
Base Capacity (vph)	1685	2124	997	817
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.15	1.36	0.89	1.38

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	435	2153	146	371	2038	189	123	537	312	238	588	643
v/c Ratio	1.18	1.13	0.22	1.16	1.11	0.29	0.53	0.35	0.50	1.12	0.56	0.55
Control Delay	160.2	106.0	9.9	155.2	99.6	14.9	73.8	40.2	16.2	156.0	45.6	18.9
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	160.2	106.1	9.9	155.2	99.6	14.9	73.8	40.2	16.2	156.0	45.6	18.9
Queue Length 50th (ft)	~253	~859	22	~212	~802	50	58	145	73	~132	247	157
Queue Length 95th (ft)	#364	#950	71	#302	#842	105	94	181	168	#223	311	207
Internal Link Dist (ft)		600			2533			848			301	
Turn Bay Length (ft)	250		50	250		150	175		175	225		150
Base Capacity (vph)	368	1910	662	321	1840	642	234	1528	622	213	1041	1167
Starvation Cap Reductn	0	67	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.18	1.17	0.22	1.16	1.11	0.29	0.53	0.35	0.50	1.12	0.56	0.55

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	216	1006	258	101	766	301	721	201	184	408	133
v/c Ratio	0.88	0.87	0.42	0.77	0.83	0.93	0.67	0.35	0.77	0.45	0.26
Control Delay	83.8	46.4	15.3	88.6	48.5	83.5	39.9	12.3	70.5	39.0	7.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.8	46.4	15.3	88.6	48.5	83.5	39.9	12.3	70.5	39.0	7.1
Queue Length 50th (ft)	166	376	63	78	283	232	260	33	139	141	0
Queue Length 95th (ft)	#277	426	122	#173	359	#360	301	80	#249	191	48
Internal Link Dist (ft)		513			412		1218			422	
Turn Bay Length (ft)	200		100	150		225		100	225		100
Base Capacity (vph)	254	1228	642	134	977	329	1069	577	246	905	504
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.82	0.40	0.75	0.78	0.91	0.67	0.35	0.75	0.45	0.26

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



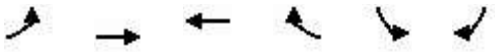
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	336	2149	395	316	1867	262	358	573	209	433	657	471
v/c Ratio	1.37	1.30	0.62	1.28	1.13	0.41	1.35	0.49	0.32	1.63	0.56	0.73
Control Delay	230.1	174.1	22.8	199.4	104.2	12.6	220.6	33.6	6.8	334.2	35.1	27.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	230.1	174.1	22.8	199.4	104.2	12.6	220.6	33.6	6.8	334.2	35.1	27.8
Queue Length 50th (ft)	~176	~780	140	~160	~614	47	~186	185	10	~248	218	195
Queue Length 95th (ft)	#247	#784	216	#234	#644	104	#262	224	54	#296	237	249
Internal Link Dist (ft)		2533			1136			1068			1112	
Turn Bay Length (ft)	250		175	250		200	200		150	200		175
Base Capacity (vph)	246	1653	635	246	1653	633	266	1168	649	266	1168	649
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.37	1.30	0.62	1.28	1.13	0.41	1.35	0.49	0.32	1.63	0.56	0.73

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

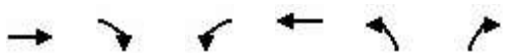
NEAR-TERM
WORKSHEETS



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	2176	2101	0	476	232
Future Volume (veh/h)	0	2176	2101	0	476	232
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	0	1074	1074	0	1465	1465
Adj Flow Rate, veh/h	0	2220	2334	0	595	290
Peak Hour Factor	0.98	0.98	0.90	0.90	0.80	0.80
Percent Heavy Veh, %	0	3	3	0	3	3
Cap, veh/h	0	2088	1657	0	449	399
Arrive On Green	0.00	0.56	1.00	0.00	0.32	0.32
Sat Flow, veh/h	0	3996	3126	0	1395	1241
Grp Volume(v), veh/h	0	2220	2334	0	595	290
Grp Sat Flow(s),veh/h/ln	0	924	978	0	1395	1241
Q Serve(g_s), s	0.0	67.8	67.8	0.0	38.6	24.8
Cycle Q Clear(g_c), s	0.0	67.8	67.8	0.0	38.6	24.8
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2088	1657	0	449	399
V/C Ratio(X)	0.00	1.06	1.41	0.00	1.33	0.73
Avail Cap(c_a), veh/h	0	2088	1657	0	449	399
HCM Platoon Ratio	1.00	1.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	26.1	0.0	0.0	40.7	36.0
Incr Delay (d2), s/veh	0.0	39.0	187.5	0.0	161.5	11.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	18.5	28.8	0.0	32.7	8.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	65.1	187.5	0.0	202.2	47.0
LnGrp LOS	A	F	F	A	F	D
Approach Vol, veh/h		2220	2334		885	
Approach Delay, s/veh		65.1	187.5		151.3	
Approach LOS		E	F		F	

Timer - Assigned Phs			4		6	8
Phs Duration (G+Y+Rc), s			75.0		45.0	75.0
Change Period (Y+Rc), s			7.2		6.4	7.2
Max Green Setting (Gmax), s			67.8		38.6	67.8
Max Q Clear Time (g_c+I1), s			69.8		40.6	69.8
Green Ext Time (p_c), s			0.0		0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	131.7
HCM 6th LOS	F



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1722	0	0	2232	965	1314
Future Volume (veh/h)	1722	0	0	2232	965	1314
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1172	0	0	1172	1563	1563
Adj Flow Rate, veh/h	2075	0	0	2453	1016	1383
Peak Hour Factor	0.83	0.83	0.91	0.91	0.95	0.95
Percent Heavy Veh, %	3	0	0	3	3	3
Cap, veh/h	1482	0	0	1868	1198	967
Arrive On Green	0.93	0.00	0.00	0.46	0.41	0.41
Sat Flow, veh/h	3410	0	0	4360	2887	2331
Grp Volume(v), veh/h	2075	0	0	2453	1016	1383
Grp Sat Flow(s),veh/h/ln	1066	0	0	1008	1444	1165
Q Serve(g_s), s	55.6	0.0	0.0	55.6	38.1	49.8
Cycle Q Clear(g_c), s	55.6	0.0	0.0	55.6	38.1	49.8
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1482	0	0	1868	1198	967
V/C Ratio(X)	1.40	0.00	0.00	1.31	0.85	1.43
Avail Cap(c_a), veh/h	1482	0	0	1868	1198	967
HCM Platoon Ratio	2.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.12	1.00	1.00
Uniform Delay (d), s/veh	4.4	0.0	0.0	32.2	31.7	35.1
Incr Delay (d2), s/veh	184.1	0.0	0.0	141.4	7.5	199.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	26.3	0.0	0.0	30.6	13.7	40.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	188.5	0.0	0.0	173.6	39.2	234.6
LnGrp LOS	F	A	A	F	D	F
Approach Vol, veh/h	2075			2453	2399	
Approach Delay, s/veh	188.5			173.6	151.8	
Approach LOS	F			F	F	

Timer - Assigned Phs	2	4	8
Phs Duration (G+Y+Rc), s	57.0	63.0	63.0
Change Period (Y+Rc), s	* 7.2	* 7.4	* 7.4
Max Green Setting (Gmax), s	* 50	* 56	* 56
Max Q Clear Time (g_c+I1), s	51.8	57.6	57.6
Green Ext Time (p_c), s	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	170.5
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	640	2260	135	237	1720	229	149	448	313	85	311	368
Future Volume (veh/h)	640	2260	135	237	1720	229	149	448	313	85	311	368
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	727	2568	153	260	1890	252	164	492	344	101	370	438
Peak Hour Factor	0.88	0.88	0.88	0.91	0.91	0.91	0.91	0.91	0.91	0.84	0.84	0.84
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	537	2634	818	229	2179	677	236	1537	477	186	1033	1244
Arrive On Green	0.16	0.52	0.52	0.07	0.43	0.43	0.07	0.30	0.30	0.05	0.29	0.29
Sat Flow, veh/h	3428	5066	1572	3428	5066	1572	3428	5066	1572	3428	3526	2768
Grp Volume(v), veh/h	727	2568	153	260	1890	252	164	492	344	101	370	438
Grp Sat Flow(s),veh/h/ln	1714	1689	1572	1714	1689	1572	1714	1689	1572	1714	1763	1384
Q Serve(g_s), s	22.7	71.6	6.9	9.7	49.2	15.8	6.8	10.9	28.3	4.2	12.0	12.8
Cycle Q Clear(g_c), s	22.7	71.6	6.9	9.7	49.2	15.8	6.8	10.9	28.3	4.2	12.0	12.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	537	2634	818	229	2179	677	236	1537	477	186	1033	1244
V/C Ratio(X)	1.35	0.98	0.19	1.13	0.87	0.37	0.70	0.32	0.72	0.54	0.36	0.35
Avail Cap(c_a), veh/h	537	2634	818	229	2179	677	236	1537	477	189	1033	1244
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.1	33.9	15.5	67.7	37.5	28.0	66.0	39.0	45.0	66.8	40.5	20.0
Incr Delay (d2), s/veh	160.7	2.0	0.0	65.6	0.5	0.1	8.6	0.6	9.1	3.1	1.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	21.6	27.5	2.6	6.2	19.4	5.8	3.2	4.5	11.9	1.9	5.3	4.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	221.8	35.9	15.6	133.3	38.0	28.2	74.7	39.5	54.1	69.9	41.4	20.8
LnGrp LOS	F	D	B	F	D	C	E	D	D	E	D	C
Approach Vol, veh/h		3448			2402			1000			909	
Approach Delay, s/veh		74.2			47.3			50.3			34.7	
Approach LOS		E			D			D			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.8	49.9	16.0	81.5	15.9	47.8	29.0	68.5
Change Period (Y+Rc), s	5.9	* 5.9	6.3	5.7	5.9	5.3	6.3	5.7
Max Green Setting (Gmax), s	8.0	* 44	9.7	60.1	9.5	42.5	22.7	47.1
Max Q Clear Time (g_c+I1), s	6.2	30.3	11.7	73.6	8.8	14.8	24.7	51.2
Green Ext Time (p_c), s	0.0	3.6	0.0	0.0	0.0	4.2	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	58.2
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
4: First St & Alluvial Ave

04/24/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	131	348	141	193	696	209	235	332	90	160	426	227
Future Volume (veh/h)	131	348	141	193	696	209	235	332	90	160	426	227
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	166	441	178	222	800	240	261	369	100	222	592	315
Peak Hour Factor	0.79	0.79	0.79	0.87	0.87	0.87	0.90	0.90	0.90	0.72	0.72	0.72
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	185	1054	470	243	866	260	269	950	424	249	882	394
Arrive On Green	0.10	0.30	0.30	0.14	0.32	0.32	0.15	0.27	0.27	0.14	0.25	0.25
Sat Flow, veh/h	1767	3526	1572	1767	2672	802	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	166	441	178	222	528	512	261	369	100	222	592	315
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1711	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	10.8	11.7	6.9	14.4	33.6	33.6	17.1	9.9	5.8	14.3	17.6	21.8
Cycle Q Clear(g_c), s	10.8	11.7	6.9	14.4	33.6	33.6	17.1	9.9	5.8	14.3	17.6	21.8
Prop In Lane	1.00		1.00	1.00		0.47	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	185	1054	470	243	571	554	269	950	424	249	882	394
V/C Ratio(X)	0.90	0.42	0.38	0.91	0.92	0.92	0.97	0.39	0.24	0.89	0.67	0.80
Avail Cap(c_a), veh/h	185	1074	479	243	594	577	269	950	424	258	882	394
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.4	32.7	14.1	49.4	37.9	37.9	49.0	34.7	33.1	49.1	39.3	40.9
Incr Delay (d2), s/veh	38.2	0.3	0.5	35.2	20.0	20.4	46.5	1.2	1.3	29.0	4.0	15.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.7	4.9	3.8	8.6	17.1	16.7	10.8	4.3	2.3	8.2	7.9	9.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	89.6	32.9	14.6	84.7	57.9	58.4	95.5	35.9	34.4	78.1	43.3	56.5
LnGrp LOS	F	C	B	F	E	E	F	D	C	E	D	E
Approach Vol, veh/h		785			1262			730			1129	
Approach Delay, s/veh		40.8			62.8			57.0			53.8	
Approach LOS		D			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.4	36.2	20.0	39.7	22.6	34.0	17.1	42.6
Change Period (Y+Rc), s	4.0	4.9	4.0	4.9	4.9	* 4.9	4.9	* 4.9
Max Green Setting (Gmax), s	17.0	29.8	16.0	35.4	17.7	* 29	12.2	* 39
Max Q Clear Time (g_c+I1), s	16.3	11.9	16.4	13.7	19.1	23.8	12.8	35.6
Green Ext Time (p_c), s	0.0	2.4	0.0	3.3	0.0	2.3	0.0	2.1

Intersection Summary	
HCM 6th Ctrl Delay	54.7
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	393	2004	260	155	1709	388	184	427	157	153	338	188
Future Volume (veh/h)	393	2004	260	155	1709	388	184	427	157	153	338	188
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	442	2252	292	182	2011	456	200	464	171	182	402	224
Peak Hour Factor	0.89	0.89	0.89	0.85	0.85	0.85	0.92	0.92	0.92	0.84	0.84	0.84
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	306	1752	544	1471	3449	1071	229	1175	524	249	1175	524
Arrive On Green	0.09	0.35	0.35	0.43	0.68	0.68	0.07	0.33	0.33	0.07	0.33	0.33
Sat Flow, veh/h	3428	5066	1572	3428	5066	1572	3428	3526	1572	3428	3526	1572
Grp Volume(v), veh/h	442	2252	292	182	2011	456	200	464	171	182	402	224
Grp Sat Flow(s),veh/h/ln	1714	1689	1572	1714	1689	1572	1714	1763	1572	1714	1763	1572
Q Serve(g_s), s	10.7	41.5	23.6	3.8	25.2	25.3	6.9	12.1	9.8	6.2	10.3	13.3
Cycle Q Clear(g_c), s	10.7	41.5	23.6	3.8	25.2	25.3	6.9	12.1	9.8	6.2	10.3	13.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	306	1752	544	1471	3449	1071	229	1175	524	249	1175	524
V/C Ratio(X)	1.45	1.29	0.54	0.12	0.58	0.43	0.88	0.39	0.33	0.73	0.34	0.43
Avail Cap(c_a), veh/h	306	1752	544	1471	3449	1071	229	1175	524	249	1175	524
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.7	39.3	54.7	20.6	10.1	22.5	55.5	30.7	29.9	54.5	30.1	31.1
Incr Delay (d2), s/veh	202.4	128.9	0.3	0.0	0.7	1.2	29.2	1.0	1.7	10.6	0.8	2.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.0	37.0	9.0	1.5	7.9	9.0	3.9	5.2	3.8	3.0	4.4	5.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	257.0	168.1	55.1	20.7	10.9	23.7	84.7	31.7	31.6	65.1	30.9	33.6
LnGrp LOS	F	F	E	C	B	C	F	C	C	E	C	C
Approach Vol, veh/h		2986			2649			835			808	
Approach Delay, s/veh		170.2			13.8			44.4			39.4	
Approach LOS		F			B			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.3	44.9	59.1	47.2	13.6	45.6	17.0	89.3
Change Period (Y+Rc), s	5.6	4.9	6.3	5.7	5.6	* 5.6	6.3	* 6.3
Max Green Setting (Gmax), s	8.0	40.0	8.0	41.5	8.0	* 40	10.7	* 39
Max Q Clear Time (g_c+I1), s	8.2	14.1	5.8	43.5	8.9	15.3	12.7	27.3
Green Ext Time (p_c), s	0.0	3.6	0.1	0.0	0.0	3.3	0.0	9.5

Intersection Summary	
HCM 6th Ctrl Delay	84.3
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	43	91	740	662	83
Future Vol, veh/h	0	43	91	740	662	83
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	175	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	44	44	88	88	85	85
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	98	103	841	779	98

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	439	877	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.96	4.16	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.33	2.23	-	-	-
Pot Cap-1 Maneuver	0	563	759	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	563	759	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.7	1.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	759	-	563	-	-
HCM Lane V/C Ratio	0.136	-	0.174	-	-
HCM Control Delay (s)	10.5	-	12.7	-	-
HCM Lane LOS	B	-	B	-	-
HCM 95th %tile Q(veh)	0.5	-	0.6	-	-

Intersection	
Int Delay, s/veh	34.5

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	33	598	67	299	705	11	20	0	58	8	1	20
Future Vol, veh/h	33	598	67	299	705	11	20	0	58	8	1	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	175	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	90	90	90	52	52	52	66	66	66
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	38	695	78	332	783	12	38	0	112	12	2	30

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	795	0	0	773	0	0	1867	2269	387	1877	2302	398
Stage 1	-	-	-	-	-	-	810	810	-	1453	1453	-
Stage 2	-	-	-	-	-	-	1057	1459	-	424	849	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	816	-	-	832	-	-	44	39	609	43	38	599
Stage 1	-	-	-	-	-	-	338	389	-	135	192	-
Stage 2	-	-	-	-	-	-	239	190	-	576	373	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	816	-	-	832	-	-	~ 26	22	609	23	22	599
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 26	22	-	23	22	-
Stage 1	-	-	-	-	-	-	322	371	-	129	115	-
Stage 2	-	-	-	-	-	-	135	114	-	449	355	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0.5	3.6	$ 424.1	125.7
HCM LOS			F	F

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SERSWLn1
Capacity (veh/h)	90	832	-	-	816	-	- 68
HCM Lane V/C Ratio	1.667	0.399	-	-	0.047	-	- 0.646
HCM Control Delay (s)	$ 424.1	12.2	-	-	9.6	-	- 125.7
HCM Lane LOS	F	B	-	-	A	-	- F
HCM 95th %tile Q(veh)	12.1	1.9	-	-	0.1	-	- 2.8

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



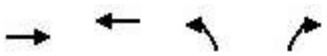
Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	2220	2334	595	290
v/c Ratio	1.07	1.42	1.34	0.72
Control Delay	68.1	207.0	201.6	47.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	68.1	207.0	201.6	47.6
Queue Length 50th (ft)	~553	~889	~601	196
Queue Length 95th (ft)	#629	m#685	#692	257
Internal Link Dist (ft)	372	1	1238	
Turn Bay Length (ft)				275
Base Capacity (vph)	2075	1647	444	400
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.07	1.42	1.34	0.72

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



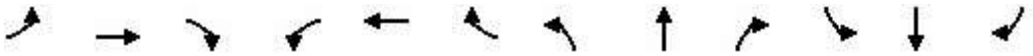
Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	2075	2453	1016	1383
v/c Ratio	1.41	1.32	0.86	1.43
Control Delay	211.4	177.8	40.4	229.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	211.4	177.8	40.4	229.9
Queue Length 50th (ft)	~789	~714	362	~828
Queue Length 95th (ft)	m#674	#787	457	#981
Internal Link Dist (ft)	20	600	1418	
Turn Bay Length (ft)			825	825
Base Capacity (vph)	1473	1857	1188	966
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.41	1.32	0.86	1.43

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	727	2568	153	260	1890	252	164	492	344	101	370	438
v/c Ratio	1.37	1.23	0.21	1.15	1.16	0.39	0.74	0.32	0.59	0.54	0.36	0.35
Control Delay	221.2	145.3	4.4	162.1	121.2	10.5	86.2	39.7	26.8	77.8	41.7	14.4
Queue Delay	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	221.2	145.5	4.4	162.1	121.2	10.5	86.2	39.7	26.8	77.8	41.7	14.4
Queue Length 50th (ft)	~465	~1093	0	~147	~769	34	79	131	148	48	145	90
Queue Length 95th (ft)	#573	#1134	41	#241	#863	106	#131	167	255	75	179	113
Internal Link Dist (ft)		600			2533			848			301	
Turn Bay Length (ft)	250		50	250		150	175		175	225		150
Base Capacity (vph)	532	2087	739	227	1635	645	222	1528	586	187	1027	1258
Starvation Cap Reductn	0	139	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.37	1.32	0.21	1.15	1.16	0.39	0.74	0.32	0.59	0.54	0.36	0.35

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	166	441	178	222	1040	261	369	100	222	592	315
v/c Ratio	0.88	0.43	0.31	1.04	0.97	0.91	0.36	0.18	0.90	0.63	0.55
Control Delay	93.8	35.5	7.7	122.9	60.5	84.0	34.9	2.9	87.4	42.1	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	93.8	35.5	7.7	122.9	60.5	84.0	34.9	2.9	87.4	42.1	16.8
Queue Length 50th (ft)	129	144	8	~186	407	200	119	0	171	213	66
Queue Length 95th (ft)	#206	166	41	#328	#520	#355	164	20	#205	209	87
Internal Link Dist (ft)		513			412		1218			422	
Turn Bay Length (ft)	200		100	150		225		100	225		100
Base Capacity (vph)	190	1041	580	214	1074	293	1021	552	253	941	573
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.87	0.42	0.31	1.04	0.97	0.89	0.36	0.18	0.88	0.63	0.55

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	442	2252	292	182	2011	456	200	464	171	182	402	224
v/c Ratio	1.46	1.29	0.44	0.81	1.24	0.68	0.88	0.40	0.26	0.81	0.34	0.33
Control Delay	262.5	170.5	13.9	81.1	147.2	21.2	91.9	32.0	4.0	81.1	31.2	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	262.5	170.5	13.9	81.1	147.2	21.2	91.9	32.0	4.0	81.1	31.2	5.1
Queue Length 50th (ft)	~241	~815	63	73	~706	140	80	144	0	73	122	0
Queue Length 95th (ft)	#341	#894	139	#120	#731	229	#150	192	38	#117	154	42
Internal Link Dist (ft)		2533			1136			1068			1112	
Turn Bay Length (ft)	250		175	250		200	200		150	200		175
Base Capacity (vph)	303	1741	657	226	1628	674	226	1168	649	226	1168	672
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.46	1.29	0.44	0.81	1.24	0.68	0.88	0.40	0.26	0.81	0.34	0.33

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

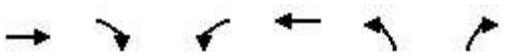
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰	↱
Traffic Volume (veh/h)	0	2503	2158	0	318	159
Future Volume (veh/h)	0	2503	2158	0	318	159
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	0	1074	1074	0	1465	1465
Adj Flow Rate, veh/h	0	2844	2425	0	413	206
Peak Hour Factor	0.88	0.88	0.89	0.89	0.77	0.77
Percent Heavy Veh, %	0	3	3	0	3	3
Cap, veh/h	0	2365	1877	0	344	306
Arrive On Green	0.00	0.64	1.00	0.00	0.25	0.25
Sat Flow, veh/h	0	3996	3126	0	1395	1241
Grp Volume(v), veh/h	0	2844	2425	0	413	206
Grp Sat Flow(s),veh/h/ln	0	924	978	0	1395	1241
Q Serve(g_s), s	0.0	76.8	76.8	0.0	29.6	18.0
Cycle Q Clear(g_c), s	0.0	76.8	76.8	0.0	29.6	18.0
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2365	1877	0	344	306
V/C Ratio(X)	0.00	1.20	1.29	0.00	1.20	0.67
Avail Cap(c_a), veh/h	0	2365	1877	0	344	306
HCM Platoon Ratio	1.00	1.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	21.6	0.0	0.0	45.2	40.8
Incr Delay (d2), s/veh	0.0	95.4	135.5	0.0	114.7	11.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	29.2	23.6	0.0	20.8	6.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	117.0	135.5	0.0	159.9	52.1
LnGrp LOS	A	F	F	A	F	D
Approach Vol, veh/h		2844	2425		619	
Approach Delay, s/veh		117.0	135.5		124.0	
Approach LOS		F	F		F	

Timer - Assigned Phs		4		6	8
Phs Duration (G+Y+Rc), s		84.0		36.0	84.0
Change Period (Y+Rc), s		7.2		6.4	7.2
Max Green Setting (Gmax), s		76.8		29.6	76.8
Max Q Clear Time (g_c+I1), s		78.8		31.6	78.8
Green Ext Time (p_c), s		0.0		0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	125.4
HCM 6th LOS	F



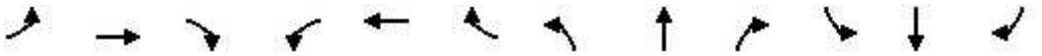
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1646	0	0	2621	838	1083
Future Volume (veh/h)	1646	0	0	2621	838	1083
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1172	0	0	1172	1563	1563
Adj Flow Rate, veh/h	2007	0	0	3158	921	1190
Peak Hour Factor	0.82	0.82	0.83	0.83	0.91	0.91
Percent Heavy Veh, %	3	0	0	3	3	3
Cap, veh/h	1722	0	0	2170	982	792
Arrive On Green	1.00	0.00	0.00	0.54	0.34	0.34
Sat Flow, veh/h	3410	0	0	4360	2887	2331
Grp Volume(v), veh/h	2007	0	0	3158	921	1190
Grp Sat Flow(s),veh/h/ln	1066	0	0	1008	1444	1165
Q Serve(g_s), s	64.6	0.0	0.0	64.6	37.1	40.8
Cycle Q Clear(g_c), s	64.6	0.0	0.0	64.6	37.1	40.8
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1722	0	0	2170	982	792
V/C Ratio(X)	1.17	0.00	0.00	1.46	0.94	1.50
Avail Cap(c_a), veh/h	1722	0	0	2170	982	792
HCM Platoon Ratio	2.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.13	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	27.7	38.4	39.6
Incr Delay (d2), s/veh	81.1	0.0	0.0	205.2	17.2	232.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.9	0.0	0.0	44.5	14.8	36.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	81.1	0.0	0.0	232.9	55.6	272.0
LnGrp LOS	F	A	A	F	E	F
Approach Vol, veh/h	2007			3158	2111	
Approach Delay, s/veh	81.1			232.9	177.6	
Approach LOS	F			F	F	

Timer - Assigned Phs	2	4	8
Phs Duration (G+Y+Rc), s	48.0	72.0	72.0
Change Period (Y+Rc), s	* 7.2	* 7.4	* 7.4
Max Green Setting (Gmax), s	* 41	* 65	* 65
Max Q Clear Time (g_c+I1), s	42.8	66.6	66.6
Green Ext Time (p_c), s	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	175.0
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	486	2059	183	335	1818	175	149	556	315	237	571	662
Future Volume (veh/h)	486	2059	183	335	1818	175	149	556	315	237	571	662
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	534	2263	201	385	2090	201	152	567	321	258	621	720
Peak Hour Factor	0.91	0.91	0.91	0.87	0.87	0.87	0.98	0.98	0.98	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	371	1921	596	806	2543	790	236	1537	477	215	1048	1122
Arrive On Green	0.11	0.38	0.38	0.24	0.50	0.50	0.07	0.30	0.30	0.06	0.30	0.30
Sat Flow, veh/h	3428	5066	1572	3428	5066	1572	3428	5066	1572	3428	3526	2768
Grp Volume(v), veh/h	534	2263	201	385	2090	201	152	567	321	258	621	720
Grp Sat Flow(s),veh/h/ln	1714	1689	1572	1714	1689	1572	1714	1689	1572	1714	1763	1384
Q Serve(g_s), s	15.7	55.0	13.2	14.0	50.7	10.4	6.3	12.7	25.9	9.1	21.8	27.8
Cycle Q Clear(g_c), s	15.7	55.0	13.2	14.0	50.7	10.4	6.3	12.7	25.9	9.1	21.8	27.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	371	1921	596	806	2543	790	236	1537	477	215	1048	1122
V/C Ratio(X)	1.44	1.18	0.34	0.48	0.82	0.25	0.64	0.37	0.67	1.20	0.59	0.64
Avail Cap(c_a), veh/h	371	1921	596	806	2543	790	236	1537	477	215	1048	1122
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	64.7	45.0	32.0	47.8	30.6	20.1	65.8	39.6	44.2	68.0	43.5	30.3
Incr Delay (d2), s/veh	198.8	80.5	0.1	0.0	0.3	0.1	5.8	0.7	7.4	125.6	2.5	2.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.9	36.2	4.9	5.9	19.4	3.7	2.9	5.3	10.8	7.7	9.7	9.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	263.4	125.5	32.2	47.8	30.9	20.2	71.6	40.3	51.6	193.5	45.9	33.2
LnGrp LOS	F	F	C	D	C	C	E	D	D	F	D	C
Approach Vol, veh/h		2998			2676			1040			1599	
Approach Delay, s/veh		143.8			32.5			48.3			64.0	
Approach LOS		F			C			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.0	49.3	41.0	60.7	15.9	48.4	22.0	79.7
Change Period (Y+Rc), s	5.9	5.3	6.3	5.7	5.9	5.3	6.3	* 6.3
Max Green Setting (Gmax), s	9.1	44.0	13.7	55.0	10.0	43.1	15.7	* 53
Max Q Clear Time (g_c+I1), s	11.1	27.9	16.0	57.0	8.3	29.8	17.7	52.7
Green Ext Time (p_c), s	0.0	4.2	0.0	0.0	0.1	5.8	0.0	0.3

Intersection Summary	
HCM 6th Ctrl Delay	80.7
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	198	886	226	107	633	160	253	653	176	184	408	130
Future Volume (veh/h)	198	886	226	107	633	160	253	653	176	184	408	130
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	233	1042	266	110	653	165	301	777	210	192	425	135
Peak Hour Factor	0.85	0.85	0.85	0.97	0.97	0.97	0.84	0.84	0.84	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	253	1156	516	134	747	189	326	1060	473	231	897	400
Arrive On Green	0.14	0.33	0.33	0.08	0.27	0.27	0.18	0.30	0.30	0.13	0.25	0.25
Sat Flow, veh/h	1767	3526	1572	1767	2788	704	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	233	1042	266	110	413	405	301	777	210	192	425	135
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1729	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	15.4	33.5	10.0	7.3	26.6	26.6	19.9	23.5	12.8	12.6	12.1	8.3
Cycle Q Clear(g_c), s	15.4	33.5	10.0	7.3	26.6	26.6	19.9	23.5	12.8	12.6	12.1	8.3
Prop In Lane	1.00		1.00	1.00		0.41	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	253	1156	516	134	472	463	326	1060	473	231	897	400
V/C Ratio(X)	0.92	0.90	0.52	0.82	0.87	0.87	0.92	0.73	0.44	0.83	0.47	0.34
Avail Cap(c_a), veh/h	253	1218	543	134	490	481	328	1060	473	246	897	400
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.2	38.1	12.2	54.1	41.5	41.5	47.6	37.2	33.5	50.3	37.5	36.1
Incr Delay (d2), s/veh	36.0	9.1	0.8	31.8	15.5	16.0	30.8	4.5	3.0	20.2	1.8	2.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.2	15.4	3.4	4.4	13.2	13.1	11.3	10.5	5.2	6.7	5.4	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	86.2	47.2	13.0	85.8	57.0	57.5	78.4	41.7	36.5	70.5	39.3	38.4
LnGrp LOS	F	D	B	F	E	E	E	D	D	E	D	D
Approach Vol, veh/h		1541			928			1288			752	
Approach Delay, s/veh		47.2			60.7			49.4			47.1	
Approach LOS		D			E			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.4	40.6	13.9	43.8	25.9	35.1	21.0	36.7
Change Period (Y+Rc), s	4.9	* 4.9	4.9	* 4.9	4.0	4.9	4.0	4.9
Max Green Setting (Gmax), s	16.5	* 36	9.0	* 41	22.0	30.2	17.0	33.0
Max Q Clear Time (g_c+I1), s	14.6	25.5	9.3	35.5	21.9	14.1	17.4	28.6
Green Ext Time (p_c), s	0.1	4.1	0.0	3.4	0.0	2.7	0.0	1.9

Intersection Summary	
HCM 6th Ctrl Delay	50.6
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	323	1919	368	273	1638	240	309	511	182	362	533	382
Future Volume (veh/h)	323	1919	368	273	1638	240	309	511	182	362	533	382
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	385	2285	438	321	1927	282	364	601	214	458	675	484
Peak Hour Factor	0.84	0.84	0.84	0.85	0.85	0.85	0.85	0.85	0.85	0.79	0.79	0.79
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	1491	3474	1078	249	1663	516	260	1175	524	269	1205	537
Arrive On Green	0.43	0.69	0.69	0.07	0.33	0.33	0.08	0.33	0.33	0.08	0.34	0.34
Sat Flow, veh/h	3428	5066	1572	3428	5066	1572	3428	3526	1572	3428	3526	1572
Grp Volume(v), veh/h	385	2285	438	321	1927	282	364	601	214	458	675	484
Grp Sat Flow(s),veh/h/ln	1714	1689	1572	1714	1689	1572	1714	1763	1572	1714	1763	1572
Q Serve(g_s), s	8.6	31.0	23.5	8.7	39.4	22.7	9.1	16.4	12.6	9.4	18.7	35.1
Cycle Q Clear(g_c), s	8.6	31.0	23.5	8.7	39.4	22.7	9.1	16.4	12.6	9.4	18.7	35.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	1491	3474	1078	249	1663	516	260	1175	524	269	1205	537
V/C Ratio(X)	0.26	0.66	0.41	1.29	1.16	0.55	1.40	0.51	0.41	1.71	0.56	0.90
Avail Cap(c_a), veh/h	1491	3474	1078	249	1663	516	260	1175	524	269	1205	537
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.6	10.8	21.4	55.6	40.3	55.0	55.5	32.1	30.9	55.3	32.2	37.6
Incr Delay (d2), s/veh	0.0	0.1	0.1	157.8	78.6	4.1	201.7	1.6	2.3	332.9	1.9	20.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	9.3	8.0	9.1	27.4	9.2	11.1	7.1	4.9	16.4	8.1	15.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.6	10.9	21.5	213.5	118.9	59.1	257.1	33.7	33.2	388.2	34.0	58.3
LnGrp LOS	C	B	C	F	F	E	F	C	C	F	C	E
Approach Vol, veh/h		3108			2530			1179			1617	
Approach Delay, s/veh		13.7			124.2			102.6			141.6	
Approach LOS		B			F			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.0	45.6	15.0	89.9	14.7	45.9	59.8	45.1
Change Period (Y+Rc), s	5.6	* 5.6	6.3	* 6.3	5.6	4.9	6.3	5.7
Max Green Setting (Gmax), s	9.4	* 40	8.7	* 39	8.4	41.0	8.7	39.4
Max Q Clear Time (g_c+I1), s	11.4	18.4	10.7	33.0	11.1	37.1	10.6	41.4
Green Ext Time (p_c), s	0.0	4.6	0.0	5.9	0.0	2.2	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	83.8
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	190	40	953	865	32
Future Vol, veh/h	0	190	40	953	865	32
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	175	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	59	59	83	83	87	87
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	322	48	1148	994	37

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	516	1031	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.96	4.16	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.33	2.23	-	-	-
Pot Cap-1 Maneuver	0	501	664	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	501	664	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	24.2	0.4	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	664	-	501	-	-
HCM Lane V/C Ratio	0.073	-	0.643	-	-
HCM Control Delay (s)	10.8	-	24.2	-	-
HCM Lane LOS	B	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	4.5	-	-

Intersection	
Int Delay, s/veh	947.6

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	107	889	14	149	866	12	77	1	291	15	0	32
Future Vol, veh/h	107	889	14	149	866	12	77	1	291	15	0	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	175	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	81	81	81	67	67	67	69	69	69
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	127	1058	17	184	1069	15	115	1	434	22	0	46

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1084	0	0	1075	0	0	2224	2773	538	2229	2774	542
Stage 1	-	-	-	-	-	-	1321	1321	-	1445	1445	-
Stage 2	-	-	-	-	-	-	903	1452	-	784	1329	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	633	-	-	638	-	-	~ 23	19	485	23	19	482
Stage 1	-	-	-	-	-	-	164	222	-	137	193	-
Stage 2	-	-	-	-	-	-	297	192	-	350	220	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	633	-	-	638	-	-	~ 14	11	485	~ 1	11	482
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 14	11	-	~ 1	11	-
Stage 1	-	-	-	-	-	-	131	177	-	109	137	-
Stage 2	-	-	-	-	-	-	191	137	-	29	176	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	1.3	1.9	$ 3811.7	$ 12098
HCM LOS			F	F

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SERSWLn1
Capacity (veh/h)	60	638	-	-	633	-	- 3
HCM Lane V/C Ratio	9.179	0.288	-	-	0.201	-	- 22.705
HCM Control Delay (s)	$ 3811.7	12.9	-	-	12.1	-	$ 12098
HCM Lane LOS	F	B	-	-	B	-	- F
HCM 95th %tile Q(veh)	64.5	1.2	-	-	0.7	-	- 10.6

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



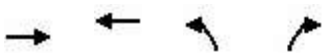
Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	2844	2425	413	206
v/c Ratio	1.21	1.30	1.21	0.67
Control Delay	121.9	150.9	158.7	51.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	121.9	150.9	158.7	51.4
Queue Length 50th (ft)	~781	~879	~391	140
Queue Length 95th (ft)	#819	m#228	#465	186
Internal Link Dist (ft)	372	1	1238	
Turn Bay Length (ft)				275
Base Capacity (vph)	2351	1866	341	309
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.21	1.30	1.21	0.67

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	2007	3158	921	1190
v/c Ratio	1.17	1.46	0.95	1.49
Control Delay	102.5	237.3	57.5	259.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	102.5	237.3	57.5	259.3
Queue Length 50th (ft)	~675	~974	355	~727
Queue Length 95th (ft)	m388	#919	#488	#877
Internal Link Dist (ft)	20	600	1418	
Turn Bay Length (ft)			825	825
Base Capacity (vph)	1712	2157	973	797
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.17	1.46	0.95	1.49

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	534	2263	201	385	2090	201	152	567	321	258	621	720
v/c Ratio	1.45	1.18	0.30	1.20	1.14	0.31	0.65	0.37	0.52	1.21	0.60	0.62
Control Delay	261.2	128.8	15.3	169.5	110.4	16.0	79.3	40.5	17.0	184.9	46.4	20.5
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	261.2	128.9	15.3	169.5	110.4	16.0	79.3	40.5	17.0	184.9	46.4	20.5
Queue Length 50th (ft)	~353	~938	57	~226	~839	58	73	154	81	~152	264	188
Queue Length 95th (ft)	#471	#1028	120	#317	#878	115	112	191	178	#246	330	242
Internal Link Dist (ft)		600			2533			848			301	
Turn Bay Length (ft)	250		50	250		150	175		175	225		150
Base Capacity (vph)	368	1910	662	321	1840	642	234	1528	622	213	1041	1167
Starvation Cap Reductn	0	64	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.45	1.23	0.30	1.20	1.14	0.31	0.65	0.37	0.52	1.21	0.60	0.62

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	233	1042	266	110	818	301	777	210	192	425	135
v/c Ratio	0.92	0.89	0.43	0.83	0.88	0.94	0.73	0.37	0.80	0.47	0.27
Control Delay	91.5	48.0	15.9	96.7	52.6	85.1	42.3	13.3	74.8	39.8	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	91.5	48.0	15.9	96.7	52.6	85.1	42.3	13.3	74.8	39.8	7.4
Queue Length 50th (ft)	181	395	68	86	307	232	285	38	146	147	0
Queue Length 95th (ft)	#308	446	128	#191	#397	#360	328	88	#265	200	50
Internal Link Dist (ft)		513			412		1218			422	
Turn Bay Length (ft)	200		100	150		225		100	225		100
Base Capacity (vph)	252	1216	637	133	968	326	1058	573	244	896	501
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.86	0.42	0.83	0.85	0.92	0.73	0.37	0.79	0.47	0.27

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	385	2285	438	321	1927	282	364	601	214	458	675	484
v/c Ratio	1.57	1.38	0.68	1.30	1.17	0.45	1.53	0.51	0.33	1.72	0.56	0.73
Control Delay	309.7	209.0	25.6	206.9	118.5	14.1	295.8	34.1	7.2	373.5	34.4	28.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	309.7	209.0	25.6	206.9	118.5	14.1	295.8	34.1	7.2	373.5	34.4	28.1
Queue Length 50th (ft)	~217	~860	170	~164	~649	59	~203	196	13	~270	223	205
Queue Length 95th (ft)	#289	#858	254	#238	#678	120	#279	236	57	#316	241	258
Internal Link Dist (ft)		2533			1136			1068			1112	
Turn Bay Length (ft)	250		175	250		200	200		150	200		175
Base Capacity (vph)	246	1653	640	246	1653	633	238	1168	649	266	1197	660
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.57	1.38	0.68	1.30	1.17	0.45	1.53	0.51	0.33	1.72	0.56	0.73

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

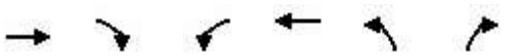
CUMULATIVE YEAR 2042
WORKSHEETS



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	2715	2744	0	787	310
Future Volume (veh/h)	0	2715	2744	0	787	310
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	0	1074	1074	0	1465	1465
Adj Flow Rate, veh/h	0	2951	2983	0	855	337
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	3	3	0	3	3
Cap, veh/h	0	1996	1584	0	484	430
Arrive On Green	0.00	0.54	1.00	0.00	0.35	0.35
Sat Flow, veh/h	0	3996	3126	0	1395	1241
Grp Volume(v), veh/h	0	2951	2983	0	855	337
Grp Sat Flow(s),veh/h/ln	0	924	978	0	1395	1241
Q Serve(g_s), s	0.0	64.8	64.8	0.0	41.6	29.2
Cycle Q Clear(g_c), s	0.0	64.8	64.8	0.0	41.6	29.2
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	1996	1584	0	484	430
V/C Ratio(X)	0.00	1.48	1.88	0.00	1.77	0.78
Avail Cap(c_a), veh/h	0	1996	1584	0	484	430
HCM Platoon Ratio	1.00	1.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	27.6	0.0	0.0	39.2	35.2
Incr Delay (d2), s/veh	0.0	218.2	400.0	0.0	353.9	13.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	42.8	58.7	0.0	61.0	10.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	245.8	400.0	0.0	393.1	48.4
LnGrp LOS	A	F	F	A	F	D
Approach Vol, veh/h		2951	2983		1192	
Approach Delay, s/veh		245.8	400.0		295.6	
Approach LOS		F	F		F	

Timer - Assigned Phs	4	6	8
Phs Duration (G+Y+Rc), s	72.0	48.0	72.0
Change Period (Y+Rc), s	7.2	6.4	7.2
Max Green Setting (Gmax), s	64.8	41.6	64.8
Max Q Clear Time (g_c+I1), s	66.8	43.6	66.8
Green Ext Time (p_c), s	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	318.7
HCM 6th LOS	F



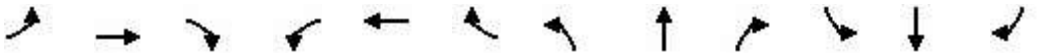
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	2044	0	0	3320	1099	1483
Future Volume (veh/h)	2044	0	0	3320	1099	1483
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1172	0	0	1172	1563	1563
Adj Flow Rate, veh/h	2222	0	0	3609	1195	1612
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	0	0	3	3	3
Cap, veh/h	1616	0	0	2036	1078	870
Arrive On Green	1.00	0.00	0.00	0.50	0.37	0.37
Sat Flow, veh/h	3410	0	0	4360	2887	2331
Grp Volume(v), veh/h	2222	0	0	3609	1195	1612
Grp Sat Flow(s),veh/h/ln	1066	0	0	1008	1444	1165
Q Serve(g_s), s	60.6	0.0	0.0	60.6	44.8	44.8
Cycle Q Clear(g_c), s	60.6	0.0	0.0	60.6	44.8	44.8
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1616	0	0	2036	1078	870
V/C Ratio(X)	1.38	0.00	0.00	1.77	1.11	1.85
Avail Cap(c_a), veh/h	1616	0	0	2036	1078	870
HCM Platoon Ratio	2.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.09	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	29.7	37.6	37.6
Incr Delay (d2), s/veh	172.9	0.0	0.0	347.9	62.3	388.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	25.9	0.0	0.0	62.3	24.2	58.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	172.9	0.0	0.0	377.6	99.9	425.8
LnGrp LOS	F	A	A	F	F	F
Approach Vol, veh/h	2222			3609	2807	
Approach Delay, s/veh	172.9			377.6	287.0	
Approach LOS	F			F	F	

Timer - Assigned Phs	2	4	8
Phs Duration (G+Y+Rc), s	52.0	68.0	68.0
Change Period (Y+Rc), s	* 7.2	* 7.4	* 7.4
Max Green Setting (Gmax), s	* 45	* 61	* 61
Max Q Clear Time (g_c+I1), s	46.8	62.6	62.6
Green Ext Time (p_c), s	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	295.5
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



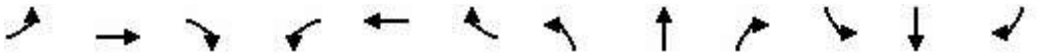
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	840	2289	180	293	2352	262	392	587	313	100	506	581
Future Volume (veh/h)	840	2289	180	293	2352	262	392	587	313	100	506	581
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	913	2488	196	318	2557	285	426	638	340	109	550	632
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	847	2677	831	229	1785	554	475	1537	477	187	774	1291
Arrive On Green	0.25	0.53	0.53	0.07	0.35	0.35	0.14	0.30	0.30	0.05	0.22	0.22
Sat Flow, veh/h	3428	5066	1572	3428	5066	1572	3428	5066	1572	3428	3526	2768
Grp Volume(v), veh/h	913	2488	196	318	2557	285	426	638	340	109	550	632
Grp Sat Flow(s),veh/h/ln	1714	1689	1572	1714	1689	1572	1714	1689	1572	1714	1763	1384
Q Serve(g_s), s	35.8	66.0	9.7	9.7	51.1	20.2	17.7	14.6	27.9	4.5	20.9	7.7
Cycle Q Clear(g_c), s	35.8	66.0	9.7	9.7	51.1	20.2	17.7	14.6	27.9	4.5	20.9	7.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	847	2677	831	229	1785	554	475	1537	477	187	774	1291
V/C Ratio(X)	1.08	0.93	0.24	1.39	1.43	0.51	0.90	0.42	0.71	0.58	0.71	0.49
Avail Cap(c_a), veh/h	847	2677	831	229	1785	554	515	1537	477	189	774	1291
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.6	31.7	18.4	67.7	47.0	35.2	61.4	40.2	44.9	66.9	52.3	17.4
Incr Delay (d2), s/veh	37.5	0.8	0.1	176.5	194.9	0.3	17.5	0.8	8.8	4.4	5.5	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	19.3	25.0	3.4	9.8	52.7	7.6	8.7	6.1	11.7	2.1	9.7	5.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	92.1	32.5	18.5	244.1	241.8	35.5	79.0	41.1	53.6	71.4	57.8	18.8
LnGrp LOS	F	C	B	F	F	D	E	D	D	E	E	B
Approach Vol, veh/h		3597			3160			1404			1291	
Approach Delay, s/veh		46.8			223.4			55.6			39.8	
Approach LOS		D			F			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.8	49.3	16.0	83.4	26.0	37.1	42.6	56.8
Change Period (Y+Rc), s	5.9	5.3	6.3	* 6.3	5.9	5.3	6.3	5.7
Max Green Setting (Gmax), s	8.0	44.0	9.7	* 60	21.8	30.2	18.7	51.1
Max Q Clear Time (g_c+I1), s	6.5	29.9	11.7	68.0	19.7	22.9	37.8	53.1
Green Ext Time (p_c), s	0.0	4.5	0.0	0.0	0.4	3.5	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	106.2
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	138	533	165	257	820	271	243	373	135	328	694	288
Future Volume (veh/h)	138	533	165	257	820	271	243	373	135	328	694	288
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	150	579	179	279	891	295	264	405	147	357	754	313
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	166	1028	459	250	883	292	281	858	383	309	914	408
Arrive On Green	0.09	0.29	0.29	0.14	0.34	0.34	0.16	0.24	0.24	0.17	0.26	0.26
Sat Flow, veh/h	1767	3526	1572	1767	2604	860	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	150	579	179	279	602	584	264	405	147	357	754	313
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1701	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	10.1	16.7	7.3	17.0	40.7	40.7	17.7	11.8	6.7	21.0	24.2	17.1
Cycle Q Clear(g_c), s	10.1	16.7	7.3	17.0	40.7	40.7	17.7	11.8	6.7	21.0	24.2	17.1
Prop In Lane	1.00		1.00	1.00		0.51	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	166	1028	459	250	598	577	281	858	383	309	914	408
V/C Ratio(X)	0.90	0.56	0.39	1.11	1.01	1.01	0.94	0.47	0.38	1.15	0.83	0.77
Avail Cap(c_a), veh/h	166	1028	459	250	598	577	281	858	383	309	914	408
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.8	36.0	15.3	51.5	39.7	39.7	49.9	38.8	19.4	49.5	41.9	24.6
Incr Delay (d2), s/veh	42.6	0.7	0.5	91.1	38.7	40.4	37.5	1.9	2.9	99.8	8.4	13.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.4	7.1	4.0	13.7	23.3	22.8	10.6	5.2	3.7	17.6	11.3	7.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	96.4	36.7	15.8	142.6	78.4	80.1	87.4	40.7	22.3	149.3	50.3	37.6
LnGrp LOS	F	D	B	F	F	F	F	D	C	F	D	D
Approach Vol, veh/h		908			1465			816			1424	
Approach Delay, s/veh		42.5			91.3			52.5			72.3	
Approach LOS		D			F			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.0	34.1	21.0	39.9	23.1	36.0	15.3	45.6
Change Period (Y+Rc), s	4.0	4.9	4.0	4.9	4.0	4.9	4.0	4.9
Max Green Setting (Gmax), s	21.0	29.2	17.0	35.0	19.1	31.1	11.3	40.7
Max Q Clear Time (g_c+I1), s	23.0	13.8	19.0	18.7	19.7	26.2	12.1	42.7
Green Ext Time (p_c), s	0.0	2.6	0.0	3.9	0.0	2.5	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	68.9
HCM 6th LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	273	2169	260	185	2372	452	264	420	193	283	534	272
Future Volume (veh/h)	273	2169	260	185	2372	452	264	420	193	283	534	272
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	297	2358	283	201	2578	491	287	457	210	308	580	296
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	229	1735	539	1471	3546	1101	240	1175	524	260	1175	524
Arrive On Green	0.07	0.34	0.34	0.43	0.70	0.70	0.07	0.33	0.33	0.08	0.33	0.33
Sat Flow, veh/h	3428	5066	1572	3428	5066	1572	3428	3526	1572	3428	3526	1572
Grp Volume(v), veh/h	297	2358	283	201	2578	491	287	457	210	308	580	296
Grp Sat Flow(s),veh/h/ln	1714	1689	1572	1714	1689	1572	1714	1763	1572	1714	1763	1572
Q Serve(g_s), s	8.0	41.1	22.7	4.3	37.3	26.9	8.4	11.9	12.3	9.1	15.8	18.6
Cycle Q Clear(g_c), s	8.0	41.1	22.7	4.3	37.3	26.9	8.4	11.9	12.3	9.1	15.8	18.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	229	1735	539	1471	3546	1101	240	1175	524	260	1175	524
V/C Ratio(X)	1.30	1.36	0.53	0.14	0.73	0.45	1.20	0.39	0.40	1.18	0.49	0.56
Avail Cap(c_a), veh/h	229	1735	539	1471	3546	1101	240	1175	524	260	1175	524
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.0	39.4	54.3	20.8	11.0	21.2	55.8	30.6	30.8	55.5	31.9	32.9
Incr Delay (d2), s/veh	137.8	161.9	0.3	0.0	1.3	1.3	121.4	1.0	2.3	115.2	1.5	4.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.7	42.0	8.7	1.6	11.4	9.4	7.6	5.1	4.8	8.0	6.8	7.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	193.8	201.4	54.7	20.8	12.3	22.5	177.2	31.6	33.1	170.6	33.4	37.2
LnGrp LOS	F	F	D	C	B	C	F	C	C	F	C	D
Approach Vol, veh/h		2938			3270			954			1184	
Approach Delay, s/veh		186.5			14.4			75.7			70.0	
Approach LOS		F			B			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.7	44.9	59.1	46.8	14.0	45.6	14.3	91.6
Change Period (Y+Rc), s	5.6	4.9	6.3	5.7	5.6	* 5.6	6.3	* 6.3
Max Green Setting (Gmax), s	8.4	40.0	8.0	41.1	8.4	* 40	8.0	* 41
Max Q Clear Time (g_c+I1), s	11.1	14.3	6.3	43.1	10.4	20.6	10.0	39.3
Green Ext Time (p_c), s	0.0	3.6	0.1	0.0	0.0	4.6	0.0	1.7

Intersection Summary	
HCM 6th Ctrl Delay	89.9
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	7	28	905	1098	20
Future Vol, veh/h	0	7	28	905	1098	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	175	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	8	30	984	1193	22

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	608	1215	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.96	4.16	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.33	2.23	-	-	-
Pot Cap-1 Maneuver	0	436	564	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	436	564	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.4	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	564	-	436	-	-
HCM Lane V/C Ratio	0.054	-	0.017	-	-
HCM Control Delay (s)	11.7	-	13.4	-	-
HCM Lane LOS	B	-	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.1	-	-

Intersection	
Int Delay, s/veh	2.5

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	28	1014	58	129	879	11	6	0	19	9	1	20
Future Vol, veh/h	28	1014	58	129	879	11	6	0	19	9	1	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	175	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	30	1102	63	140	955	12	7	0	21	10	1	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	967	0	0	1165	0	0	1952	2441	583	1852	2466	484
Stage 1	-	-	-	-	-	-	1194	1194	-	1241	1241	-
Stage 2	-	-	-	-	-	-	758	1247	-	611	1225	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	702	-	-	590	-	-	38	31	453	45	29	526
Stage 1	-	-	-	-	-	-	196	256	-	184	243	-
Stage 2	-	-	-	-	-	-	363	242	-	445	248	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	702	-	-	590	-	-	28	23	453	34	21	526
Mov Cap-2 Maneuver	-	-	-	-	-	-	28	23	-	34	21	-
Stage 1	-	-	-	-	-	-	188	245	-	176	185	-
Stage 2	-	-	-	-	-	-	264	185	-	407	237	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0.3	1.6	55.3	70.4
HCM LOS			F	F

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	98	590	-	-	702	-	-	86
HCM Lane V/C Ratio	0.277	0.238	-	-	0.043	-	-	0.379
HCM Control Delay (s)	55.3	13	-	-	10.4	-	-	70.4
HCM Lane LOS	F	B	-	-	B	-	-	F
HCM 95th %tile Q(veh)	1	0.9	-	-	0.1	-	-	1.5



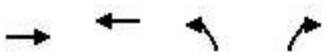
Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	2951	2983	855	337
v/c Ratio	1.49	1.90	1.78	0.79
Control Delay	248.1	422.6	388.7	49.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	248.1	422.6	388.7	49.9
Queue Length 50th (ft)	~918	~1296	~992	233
Queue Length 95th (ft)	#985	m#664	#1235	#383
Internal Link Dist (ft)	372	1	1238	
Turn Bay Length (ft)				275
Base Capacity (vph)	1983	1574	479	429
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.49	1.90	1.78	0.79

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	2222	3609	1195	1612
v/c Ratio	1.38	1.78	1.12	1.85
Control Delay	196.8	378.5	102.1	414.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	196.8	378.5	102.1	414.0
Queue Length 50th (ft)	~835	~1216	~548	~1088
Queue Length 95th (ft)	m255	#1275	#681	#1242
Internal Link Dist (ft)	20	600	1418	
Turn Bay Length (ft)			825	825
Base Capacity (vph)	1606	2024	1068	870
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.38	1.78	1.12	1.85

Intersection Summary

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Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	913	2488	196	318	2557	285	426	638	340	109	550	632
v/c Ratio	2.08	1.19	0.27	1.40	1.44	0.44	0.86	0.42	0.58	0.58	0.74	0.61
Control Delay	525.3	129.5	8.0	251.4	237.2	18.2	78.4	41.3	26.4	79.8	60.1	19.5
Queue Delay	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	525.3	129.7	8.0	251.4	237.2	18.2	78.4	41.3	26.4	79.8	60.1	19.5
Queue Length 50th (ft)	~700	~1036	24	~206	~1198	91	204	176	144	52	259	134
Queue Length 95th (ft)	#834	#1121	77	#307	#1282	176	#282	216	251	87	328	180
Internal Link Dist (ft)		600			2533			848			301	
Turn Bay Length (ft)	250		50	250		150	175		175	225		150
Base Capacity (vph)	438	2087	739	227	1774	651	511	1528	586	187	748	1030
Starvation Cap Reductn	0	144	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	2.08	1.28	0.27	1.40	1.44	0.44	0.83	0.42	0.58	0.58	0.74	0.61

Intersection Summary

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95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	150	579	179	279	1186	264	405	147	357	754	313
v/c Ratio	0.91	0.57	0.33	1.12	1.01	0.95	0.48	0.30	1.17	0.83	0.60
Control Delay	105.1	38.7	12.7	141.7	67.8	93.0	41.0	9.0	148.4	51.1	23.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	105.1	38.7	12.7	141.7	67.8	93.0	41.0	9.0	148.4	51.1	23.8
Queue Length 50th (ft)	117	200	30	~250	~481	205	142	6	~328	291	102
Queue Length 95th (ft)	#244	260	89	#422	#635	#370	192	58	#517	367	200
Internal Link Dist (ft)		513			412		1218			422	
Turn Bay Length (ft)	200		100	150		225		100	225		100
Base Capacity (vph)	164	1022	546	248	1171	278	852	485	306	908	524
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.91	0.57	0.33	1.13	1.01	0.95	0.48	0.30	1.17	0.83	0.60

Intersection Summary

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95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	297	2358	283	201	2578	491	287	457	210	308	580	296
v/c Ratio	1.31	1.37	0.43	0.89	1.50	0.73	1.21	0.39	0.32	1.29	0.50	0.46
Control Delay	212.5	202.1	13.5	92.7	256.9	25.9	172.3	31.9	6.9	203.8	33.7	13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	212.5	202.1	13.5	92.7	256.9	25.9	172.3	31.9	6.9	203.8	33.7	13.5
Queue Length 50th (ft)	~152	~883	58	80	~1012	191	~139	142	10	~157	187	58
Queue Length 95th (ft)	#243	#976	136	#151	#1103	328	#230	190	65	#249	243	139
Internal Link Dist (ft)		2533			1136			1068			1112	
Turn Bay Length (ft)	250		175	250		200	200		150	200		175
Base Capacity (vph)	226	1724	652	226	1724	677	238	1168	649	238	1168	649
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.31	1.37	0.43	0.89	1.50	0.73	1.21	0.39	0.32	1.29	0.50	0.46

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
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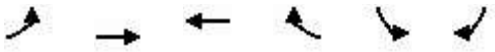
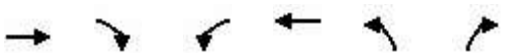
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰	↱
Traffic Volume (veh/h)	0	2914	2337	0	545	182
Future Volume (veh/h)	0	2914	2337	0	545	182
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	0	1074	1074	0	1465	1465
Adj Flow Rate, veh/h	0	3167	2540	0	592	198
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	3	3	0	3	3
Cap, veh/h	0	2150	1706	0	426	379
Arrive On Green	0.00	0.58	1.00	0.00	0.31	0.31
Sat Flow, veh/h	0	3996	3126	0	1395	1241
Grp Volume(v), veh/h	0	3167	2540	0	592	198
Grp Sat Flow(s),veh/h/ln	0	924	978	0	1395	1241
Q Serve(g_s), s	0.0	69.8	69.8	0.0	36.6	15.8
Cycle Q Clear(g_c), s	0.0	69.8	69.8	0.0	36.6	15.8
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2150	1706	0	426	379
V/C Ratio(X)	0.00	1.47	1.49	0.00	1.39	0.52
Avail Cap(c_a), veh/h	0	2150	1706	0	426	379
HCM Platoon Ratio	1.00	1.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	25.1	0.0	0.0	41.7	34.5
Incr Delay (d2), s/veh	0.0	215.6	223.2	0.0	190.0	5.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	45.2	35.3	0.0	34.4	5.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	240.7	223.2	0.0	231.7	39.6
LnGrp LOS	A	F	F	A	F	D
Approach Vol, veh/h		3167	2540		790	
Approach Delay, s/veh		240.7	223.2		183.5	
Approach LOS		F	F		F	

Timer - Assigned Phs	4	6	8
Phs Duration (G+Y+Rc), s	77.0	43.0	77.0
Change Period (Y+Rc), s	7.2	6.4	7.2
Max Green Setting (Gmax), s	69.8	36.6	69.8
Max Q Clear Time (g_c+I1), s	71.8	38.6	71.8
Green Ext Time (p_c), s	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	226.9
HCM 6th LOS	F



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1941	0	0	2994	1052	1245
Future Volume (veh/h)	1941	0	0	2994	1052	1245
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1172	0	0	1172	1563	1563
Adj Flow Rate, veh/h	2110	0	0	3254	1143	1353
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	0	0	3	3	3
Cap, veh/h	1642	0	0	2069	1054	851
Arrive On Green	1.00	0.00	0.00	0.51	0.37	0.37
Sat Flow, veh/h	3410	0	0	4360	2887	2331
Grp Volume(v), veh/h	2110	0	0	3254	1143	1353
Grp Sat Flow(s),veh/h/ln	1066	0	0	1008	1444	1165
Q Serve(g_s), s	61.6	0.0	0.0	61.6	43.8	43.8
Cycle Q Clear(g_c), s	61.6	0.0	0.0	61.6	43.8	43.8
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1642	0	0	2069	1054	851
V/C Ratio(X)	1.28	0.00	0.00	1.57	1.08	1.59
Avail Cap(c_a), veh/h	1642	0	0	2069	1054	851
HCM Platoon Ratio	2.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.09	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	29.2	38.1	38.1
Incr Delay (d2), s/veh	132.9	0.0	0.0	257.8	53.6	271.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	20.2	0.0	0.0	50.3	22.5	43.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	132.9	0.0	0.0	287.0	91.7	309.4
LnGrp LOS	F	A	A	F	F	F
Approach Vol, veh/h	2110			3254	2496	
Approach Delay, s/veh	132.9			287.0	209.7	
Approach LOS	F			F	F	

Timer - Assigned Phs		2		4		8
Phs Duration (G+Y+Rc), s		51.0		69.0		69.0
Change Period (Y+Rc), s		* 7.2		* 7.4		* 7.4
Max Green Setting (Gmax), s		* 44		* 62		* 62
Max Q Clear Time (g_c+I1), s		45.8		63.6		63.6
Green Ext Time (p_c), s		0.0		0.0		0.0

Intersection Summary	
HCM 6th Ctrl Delay	221.1
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	643	2271	271	379	1946	188	252	744	334	326	738	804
Future Volume (veh/h)	643	2271	271	379	1946	188	252	744	334	326	738	804
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	699	2468	295	412	2115	204	274	809	363	354	802	874
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	418	1921	596	759	2404	746	350	1537	477	262	980	1107
Arrive On Green	0.12	0.38	0.38	0.22	0.47	0.47	0.10	0.30	0.30	0.08	0.28	0.28
Sat Flow, veh/h	3428	5066	1572	3428	5066	1572	3428	5066	1572	3428	3526	2768
Grp Volume(v), veh/h	699	2468	295	412	2115	204	274	809	363	354	802	874
Grp Sat Flow(s),veh/h/ln	1714	1689	1572	1714	1689	1572	1714	1689	1572	1714	1763	1384
Q Serve(g_s), s	17.7	55.0	20.8	15.4	54.6	10.9	11.3	19.2	30.3	11.1	30.8	34.7
Cycle Q Clear(g_c), s	17.7	55.0	20.8	15.4	54.6	10.9	11.3	19.2	30.3	11.1	30.8	34.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	418	1921	596	759	2404	746	350	1537	477	262	980	1107
V/C Ratio(X)	1.67	1.28	0.49	0.54	0.88	0.27	0.78	0.53	0.76	1.35	0.82	0.79
Avail Cap(c_a), veh/h	418	1921	596	759	2404	746	350	1537	477	262	980	1107
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	63.7	45.0	34.4	50.0	34.4	21.3	63.5	41.9	45.7	66.9	48.9	30.6
Incr Delay (d2), s/veh	302.6	128.4	0.3	0.1	0.5	0.1	11.0	1.3	10.9	180.1	7.6	5.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	25.1	44.7	7.7	6.5	21.1	3.9	5.4	8.0	12.9	11.3	14.3	11.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	366.2	173.4	34.6	50.0	34.9	21.4	74.5	43.2	56.6	247.0	56.5	36.3
LnGrp LOS	F	F	C	D	C	C	E	D	E	F	E	D
Approach Vol, veh/h		3462			2731			1446			2030	
Approach Delay, s/veh		200.5			36.1			52.5			81.1	
Approach LOS		F			D			D			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.0	49.3	39.0	60.7	20.7	45.6	24.0	75.7
Change Period (Y+Rc), s	5.9	5.3	6.3	5.7	5.9	5.3	6.3	* 6.3
Max Green Setting (Gmax), s	11.1	44.0	11.7	55.0	14.8	40.3	17.7	* 49
Max Q Clear Time (g_c+I1), s	13.1	32.3	17.4	57.0	13.3	36.7	19.7	56.6
Green Ext Time (p_c), s	0.0	5.0	0.0	0.0	0.1	2.6	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	106.9
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

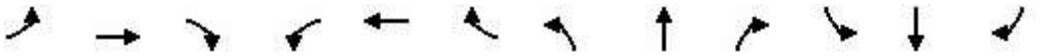
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	261	1059	264	160	819	305	239	928	185	233	504	130
Future Volume (veh/h)	261	1059	264	160	819	305	239	928	185	233	504	130
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	284	1151	287	174	890	332	260	1009	201	253	548	141
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	232	1178	525	180	785	292	232	987	440	218	984	439
Arrive On Green	0.13	0.33	0.33	0.10	0.31	0.31	0.13	0.28	0.28	0.12	0.28	0.28
Sat Flow, veh/h	1767	3526	1572	1767	2516	934	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	284	1151	287	174	623	599	260	1009	201	253	548	141
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1687	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	16.0	39.3	12.5	11.9	38.0	38.0	16.0	34.1	12.9	15.0	16.2	8.6
Cycle Q Clear(g_c), s	16.0	39.3	12.5	11.9	38.0	38.0	16.0	34.1	12.9	15.0	16.2	8.6
Prop In Lane	1.00		1.00	1.00		0.55	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	232	1178	525	180	550	526	232	987	440	218	984	439
V/C Ratio(X)	1.22	0.98	0.55	0.97	1.13	1.14	1.12	1.02	0.46	1.16	0.56	0.32
Avail Cap(c_a), veh/h	232	1178	525	180	550	526	232	987	440	218	984	439
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.9	40.1	15.9	54.5	41.9	41.9	52.9	43.9	36.2	53.4	37.5	34.8
Incr Delay (d2), s/veh	132.7	20.8	1.2	57.3	80.2	83.4	95.1	34.4	3.4	111.8	2.3	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.5	19.8	4.5	8.1	28.2	27.4	13.1	19.1	5.3	13.3	7.1	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	185.6	60.9	17.0	111.8	122.1	125.3	148.0	78.3	39.6	165.2	39.7	36.7
LnGrp LOS	F	E	B	F	F	F	F	F	D	F	D	D
Approach Vol, veh/h		1722			1396			1470			942	
Approach Delay, s/veh		74.1			122.2			85.3			73.0	
Approach LOS		E			F			F			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.9	39.0	17.3	45.6	20.0	38.9	20.0	42.9
Change Period (Y+Rc), s	4.9	* 4.9	4.9	* 4.9	4.0	4.9	4.0	4.9
Max Green Setting (Gmax), s	15.0	* 34	12.4	* 41	16.0	33.1	16.0	37.1
Max Q Clear Time (g_c+I1), s	17.0	36.1	13.9	41.3	18.0	18.2	18.0	40.0
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	3.4	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	89.0
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	336	2198	396	311	1894	349	330	645	216	451	560	290
Future Volume (veh/h)	336	2198	396	311	1894	349	330	645	216	451	560	290
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	365	2389	430	338	2059	379	359	701	235	490	609	315
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	1491	3474	1078	249	1663	516	260	1175	524	269	1205	537
Arrive On Green	0.43	0.69	0.69	0.07	0.33	0.33	0.08	0.33	0.33	0.08	0.34	0.34
Sat Flow, veh/h	3428	5066	1572	3428	5066	1572	3428	3526	1572	3428	3526	1572
Grp Volume(v), veh/h	365	2389	430	338	2059	379	359	701	235	490	609	315
Grp Sat Flow(s),veh/h/ln	1714	1689	1572	1714	1689	1572	1714	1763	1572	1714	1763	1572
Q Serve(g_s), s	8.1	33.6	22.9	8.7	39.4	33.1	9.1	19.9	14.1	9.4	16.5	19.8
Cycle Q Clear(g_c), s	8.1	33.6	22.9	8.7	39.4	33.1	9.1	19.9	14.1	9.4	16.5	19.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	1491	3474	1078	249	1663	516	260	1175	524	269	1205	537
V/C Ratio(X)	0.24	0.69	0.40	1.36	1.24	0.73	1.38	0.60	0.45	1.82	0.51	0.59
Avail Cap(c_a), veh/h	1491	3474	1078	249	1663	516	260	1175	524	269	1205	537
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.4	11.2	21.3	55.6	40.3	59.5	55.5	33.3	31.4	55.3	31.4	32.5
Incr Delay (d2), s/veh	0.0	0.1	0.1	185.8	112.4	9.0	193.6	2.2	2.8	385.3	1.5	4.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	10.1	7.8	10.0	32.7	13.8	10.9	8.6	5.5	18.4	7.1	7.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.4	11.3	21.4	241.4	152.7	68.4	249.1	35.5	34.1	440.6	33.0	37.2
LnGrp LOS	C	B	C	F	F	E	F	D	C	F	C	D
Approach Vol, veh/h		3184			2776			1295			1414	
Approach Delay, s/veh		13.8			152.0			94.5			175.2	
Approach LOS		B			F			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.0	45.6	15.0	89.9	14.7	45.9	59.8	45.1
Change Period (Y+Rc), s	5.6	* 5.6	6.3	* 6.3	5.6	4.9	6.3	5.7
Max Green Setting (Gmax), s	9.4	* 40	8.7	* 39	8.4	41.0	8.7	39.4
Max Q Clear Time (g_c+I1), s	11.4	21.9	10.7	35.6	11.1	21.8	10.1	41.4
Green Ext Time (p_c), s	0.0	5.1	0.0	3.5	0.0	4.9	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	96.4
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	45	12	1175	1249	4
Future Vol, veh/h	0	45	12	1175	1249	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	175	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	49	13	1277	1358	4

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	681	1362	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.96	4.16	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.33	2.23	-	-	-
Pot Cap-1 Maneuver	0	391	495	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	391	495	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.5	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	495	-	391	-	-
HCM Lane V/C Ratio	0.026	-	0.125	-	-
HCM Control Delay (s)	12.5	-	15.5	-	-
HCM Lane LOS	B	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-

Intersection	
Int Delay, s/veh	49.2

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	76	1089	10	73	1177	12	30	1	132	15	0	42
Future Vol, veh/h	76	1089	10	73	1177	12	30	1	132	15	0	42
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	175	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	83	1184	11	79	1279	13	33	1	143	16	0	46

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1292	0	0	1195	0	0	2154	2806	598	2203	2805	646
Stage 1	-	-	-	-	-	-	1356	1356	-	1444	1444	-
Stage 2	-	-	-	-	-	-	798	1450	-	759	1361	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	527	-	-	574	-	-	~ 27	18	443	24	18	412
Stage 1	-	-	-	-	-	-	156	214	-	137	194	-
Stage 2	-	-	-	-	-	-	343	192	-	363	213	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	527	-	-	574	-	-	~ 19	13	443	~ 12	13	412
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 19	13	-	~ 12	13	-
Stage 1	-	-	-	-	-	-	132	180	-	115	167	-
Stage 2	-	-	-	-	-	-	263	166	-	206	180	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0.8	0.7	$ 630.5	$ 459
HCM LOS			F	F

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SERSWLn1
Capacity (veh/h)	83	574	-	-	527	-	- 42
HCM Lane V/C Ratio	2.135	0.138	-	-	0.157	-	- 1.475
HCM Control Delay (s)	$ 630.5	12.3	-	-	13.1	-	- $ 459
HCM Lane LOS	F	B	-	-	B	-	- F
HCM 95th %tile Q(veh)	15.9	0.5	-	-	0.6	-	- 6.2

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



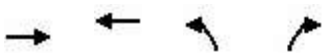
Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	3167	2540	592	198
v/c Ratio	1.48	1.50	1.41	0.52
Control Delay	244.0	243.5	229.9	40.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	244.0	243.5	229.9	40.1
Queue Length 50th (ft)	~983	~997	~614	125
Queue Length 95th (ft)	#1048	m#551	#837	205
Internal Link Dist (ft)	372	1	1238	
Turn Bay Length (ft)				275
Base Capacity (vph)	2137	1696	421	378
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.48	1.50	1.41	0.52

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	2110	3254	1143	1353
v/c Ratio	1.29	1.58	1.09	1.59
Control Delay	156.2	289.8	94.1	299.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	156.2	289.8	94.1	299.2
Queue Length 50th (ft)	~759	~1042	~515	~855
Queue Length 95th (ft)	m234	#1106	#648	#1006
Internal Link Dist (ft)	20	600	1418	
Turn Bay Length (ft)			825	825
Base Capacity (vph)	1632	2057	1044	852
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.29	1.58	1.09	1.59

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	699	2468	295	412	2115	204	274	809	363	354	802	874
v/c Ratio	1.68	1.29	0.45	1.50	1.24	0.34	0.79	0.53	0.60	1.36	0.82	0.76
Control Delay	355.2	172.9	22.9	287.6	155.2	17.9	80.2	43.4	25.8	233.2	57.3	23.8
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	355.2	173.0	22.9	287.6	155.2	17.9	80.2	43.4	25.8	233.2	57.3	23.8
Queue Length 50th (ft)	~496	~1085	128	~277	~906	63	132	232	148	~226	375	238
Queue Length 95th (ft)	#622	#1171	214	#386	#998	133	#197	278	260	#329	457	300
Internal Link Dist (ft)		600			2533			848			301	
Turn Bay Length (ft)	250		50	250		150	175		175	225		150
Base Capacity (vph)	415	1910	662	274	1701	602	347	1528	600	260	974	1152
Starvation Cap Reductn	0	59	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.68	1.33	0.45	1.50	1.24	0.34	0.79	0.53	0.60	1.36	0.82	0.76

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	284	1151	287	174	1222	260	1009	201	253	548	141
v/c Ratio	1.22	0.97	0.46	0.96	1.14	1.12	1.01	0.37	1.16	0.57	0.27
Control Delay	174.8	59.0	17.6	111.5	112.3	141.1	74.6	13.0	155.5	40.0	7.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	174.8	59.0	17.6	111.5	112.3	141.1	74.6	13.0	155.5	40.0	7.6
Queue Length 50th (ft)	~270	458	83	136	~570	~231	~421	33	~231	192	3
Queue Length 95th (ft)	#444	#607	165	#280	#709	#400	#566	97	#397	251	52
Internal Link Dist (ft)		513			412		1218			422	
Turn Bay Length (ft)	200		100	150		225		100	225		100
Base Capacity (vph)	233	1188	626	181	1070	233	996	547	219	966	530
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.22	0.97	0.46	0.96	1.14	1.12	1.01	0.37	1.16	0.57	0.27

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	365	2389	430	338	2059	379	359	701	235	490	609	315
v/c Ratio	1.48	1.45	0.68	1.37	1.25	0.58	1.51	0.60	0.36	1.84	0.51	0.48
Control Delay	276.6	235.9	26.2	233.2	151.2	19.0	287.3	35.9	8.7	424.4	33.3	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	276.6	235.9	26.2	233.2	151.2	19.0	287.3	35.9	8.7	424.4	33.3	14.4
Queue Length 50th (ft)	~201	~922	171	~178	~727	110	~199	237	24	~296	196	69
Queue Length 95th (ft)	#298	#1015	293	#274	#823	213	#297	301	85	#404	253	155
Internal Link Dist (ft)		2533			1136			1068			1112	
Turn Bay Length (ft)	250		175	250		200	200		150	200		175
Base Capacity (vph)	246	1653	633	246	1653	650	238	1168	649	266	1197	660
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.48	1.45	0.68	1.37	1.25	0.58	1.51	0.60	0.36	1.84	0.51	0.48

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

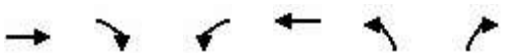
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰	↱
Traffic Volume (veh/h)	0	2762	2757	0	787	310
Future Volume (veh/h)	0	2762	2757	0	787	310
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	0	1074	1074	0	1465	1465
Adj Flow Rate, veh/h	0	3002	2997	0	855	337
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	3	3	0	3	3
Cap, veh/h	0	1996	1584	0	484	430
Arrive On Green	0.00	0.54	1.00	0.00	0.35	0.35
Sat Flow, veh/h	0	3996	3126	0	1395	1241
Grp Volume(v), veh/h	0	3002	2997	0	855	337
Grp Sat Flow(s),veh/h/ln	0	924	978	0	1395	1241
Q Serve(g_s), s	0.0	64.8	64.8	0.0	41.6	29.2
Cycle Q Clear(g_c), s	0.0	64.8	64.8	0.0	41.6	29.2
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	1996	1584	0	484	430
V/C Ratio(X)	0.00	1.50	1.89	0.00	1.77	0.78
Avail Cap(c_a), veh/h	0	1996	1584	0	484	430
HCM Platoon Ratio	1.00	1.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	27.6	0.0	0.0	39.2	35.2
Incr Delay (d2), s/veh	0.0	229.6	404.0	0.0	353.9	13.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	44.3	59.2	0.0	61.0	10.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	257.2	404.0	0.0	393.1	48.4
LnGrp LOS	A	F	F	A	F	D
Approach Vol, veh/h		3002	2997		1192	
Approach Delay, s/veh		257.2	404.0		295.6	
Approach LOS		F	F		F	

Timer - Assigned Phs			4		6	8
Phs Duration (G+Y+Rc), s			72.0		48.0	72.0
Change Period (Y+Rc), s			7.2		6.4	7.2
Max Green Setting (Gmax), s			64.8		41.6	64.8
Max Q Clear Time (g_c+I1), s			66.8		43.6	66.8
Green Ext Time (p_c), s			0.0		0.0	0.0

Intersection Summary		
HCM 6th Ctrl Delay	324.8	
HCM 6th LOS	F	



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	2091	0	0	3351	1099	1546
Future Volume (veh/h)	2091	0	0	3351	1099	1546
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1172	0	0	1172	1563	1563
Adj Flow Rate, veh/h	2273	0	0	3642	1195	1680
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	0	0	3	3	3
Cap, veh/h	1589	0	0	2002	1102	890
Arrive On Green	0.99	0.00	0.00	0.50	0.38	0.38
Sat Flow, veh/h	3410	0	0	4360	2887	2331
Grp Volume(v), veh/h	2273	0	0	3642	1195	1680
Grp Sat Flow(s),veh/h/ln	1066	0	0	1008	1444	1165
Q Serve(g_s), s	59.6	0.0	0.0	59.6	45.8	45.8
Cycle Q Clear(g_c), s	59.6	0.0	0.0	59.6	45.8	45.8
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1589	0	0	2002	1102	890
V/C Ratio(X)	1.43	0.00	0.00	1.82	1.08	1.89
Avail Cap(c_a), veh/h	1589	0	0	2002	1102	890
HCM Platoon Ratio	2.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.09	1.00	1.00
Uniform Delay (d), s/veh	0.4	0.0	0.0	30.2	37.1	37.1
Incr Delay (d2), s/veh	197.4	0.0	0.0	368.7	53.1	404.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	29.1	0.0	0.0	64.2	23.3	62.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	197.8	0.0	0.0	398.9	90.2	441.3
LnGrp LOS	F	A	A	F	F	F
Approach Vol, veh/h	2273			3642	2875	
Approach Delay, s/veh	197.8			398.9	295.3	
Approach LOS	F			F	F	

Timer - Assigned Phs	2	4	8
Phs Duration (G+Y+Rc), s	53.0	67.0	67.0
Change Period (Y+Rc), s	* 7.2	* 7.4	* 7.4
Max Green Setting (Gmax), s	* 46	* 60	* 60
Max Q Clear Time (g_c+I1), s	47.8	61.6	61.6
Green Ext Time (p_c), s	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	313.0
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

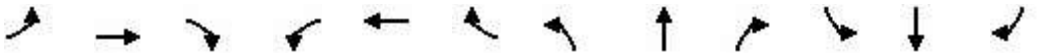
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	840	2399	180	297	2383	262	392	587	326	100	506	581
Future Volume (veh/h)	840	2399	180	297	2383	262	392	587	326	100	506	581
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	913	2608	196	323	2590	285	426	638	354	109	550	632
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	847	2677	831	229	1785	554	475	1537	477	187	774	1291
Arrive On Green	0.25	0.53	0.53	0.07	0.35	0.35	0.14	0.30	0.30	0.05	0.22	0.22
Sat Flow, veh/h	3428	5066	1572	3428	5066	1572	3428	5066	1572	3428	3526	2768
Grp Volume(v), veh/h	913	2608	196	323	2590	285	426	638	354	109	550	632
Grp Sat Flow(s),veh/h/ln	1714	1689	1572	1714	1689	1572	1714	1689	1572	1714	1763	1384
Q Serve(g_s), s	35.8	72.6	9.7	9.7	51.1	20.2	17.7	14.6	29.3	4.5	20.9	7.7
Cycle Q Clear(g_c), s	35.8	72.6	9.7	9.7	51.1	20.2	17.7	14.6	29.3	4.5	20.9	7.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	847	2677	831	229	1785	554	475	1537	477	187	774	1291
V/C Ratio(X)	1.08	0.97	0.24	1.41	1.45	0.51	0.90	0.42	0.74	0.58	0.71	0.49
Avail Cap(c_a), veh/h	847	2677	831	229	1785	554	515	1537	477	189	774	1291
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.6	33.2	18.4	67.7	47.0	35.2	61.4	40.2	45.4	66.9	52.3	17.4
Incr Delay (d2), s/veh	37.5	2.0	0.1	186.2	203.2	0.3	17.5	0.8	10.0	4.4	5.5	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	19.3	27.7	3.4	10.1	54.0	7.6	8.7	6.1	12.4	2.1	9.7	5.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	92.1	35.2	18.5	253.8	250.1	35.5	79.0	41.1	55.4	71.4	57.8	18.8
LnGrp LOS	F	D	B	F	F	D	E	D	E	E	E	B
Approach Vol, veh/h		3717			3198			1418			1291	
Approach Delay, s/veh		48.3			231.4			56.0			39.8	
Approach LOS		D			F			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.8	49.3	16.0	83.4	26.0	37.1	42.6	56.8
Change Period (Y+Rc), s	5.9	5.3	6.3	* 6.3	5.9	5.3	6.3	5.7
Max Green Setting (Gmax), s	8.0	44.0	9.7	* 60	21.8	30.2	18.7	51.1
Max Q Clear Time (g_c+I1), s	6.5	31.3	11.7	74.6	19.7	22.9	37.8	53.1
Green Ext Time (p_c), s	0.0	4.3	0.0	0.0	0.4	3.5	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	109.1
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	138	533	181	292	820	271	247	382	145	328	725	288
Future Volume (veh/h)	138	533	181	292	820	271	247	382	145	328	725	288
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	150	579	197	317	891	295	268	415	158	357	788	313
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	166	1028	459	250	883	292	281	858	383	309	914	408
Arrive On Green	0.09	0.29	0.29	0.14	0.34	0.34	0.16	0.24	0.24	0.17	0.26	0.26
Sat Flow, veh/h	1767	3526	1572	1767	2604	860	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	150	579	197	317	602	584	268	415	158	357	788	313
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1701	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	10.1	16.7	8.2	17.0	40.7	40.7	18.0	12.1	7.2	21.0	25.6	17.1
Cycle Q Clear(g_c), s	10.1	16.7	8.2	17.0	40.7	40.7	18.0	12.1	7.2	21.0	25.6	17.1
Prop In Lane	1.00		1.00	1.00		0.51	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	166	1028	459	250	598	577	281	858	383	309	914	408
V/C Ratio(X)	0.90	0.56	0.43	1.27	1.01	1.01	0.95	0.48	0.41	1.15	0.86	0.77
Avail Cap(c_a), veh/h	166	1028	459	250	598	577	281	858	383	309	914	408
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.8	36.0	15.5	51.5	39.7	39.7	50.0	38.9	19.5	49.5	42.4	24.6
Incr Delay (d2), s/veh	42.6	0.7	0.6	147.6	38.7	40.4	40.9	1.9	3.3	99.8	10.6	13.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.4	7.1	2.9	17.6	23.3	22.8	11.0	5.4	4.1	17.6	12.2	7.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	96.4	36.7	16.1	199.1	78.4	80.1	90.9	40.9	22.8	149.3	53.0	37.6
LnGrp LOS	F	D	B	F	F	F	F	D	C	F	D	D
Approach Vol, veh/h		926			1503			841			1458	
Approach Delay, s/veh		42.0			104.5			53.4			73.2	
Approach LOS		D			F			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.0	34.1	21.0	39.9	23.1	36.0	15.3	45.6
Change Period (Y+Rc), s	4.0	4.9	4.0	4.9	4.0	4.9	4.0	4.9
Max Green Setting (Gmax), s	21.0	29.2	17.0	35.0	19.1	31.1	11.3	40.7
Max Q Clear Time (g_c+I1), s	23.0	14.1	19.0	18.7	20.0	27.6	12.1	42.7
Green Ext Time (p_c), s	0.0	2.7	0.0	3.9	0.0	2.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	73.5
HCM 6th LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	395	2169	260	185	2372	509	264	473	193	299	549	307
Future Volume (veh/h)	395	2169	260	185	2372	509	264	473	193	299	549	307
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	429	2358	283	201	2578	553	287	514	210	325	597	334
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	249	1735	539	1471	3516	1092	240	1175	524	260	1175	524
Arrive On Green	0.07	0.34	0.34	0.43	0.69	0.69	0.07	0.33	0.33	0.08	0.33	0.33
Sat Flow, veh/h	3428	5066	1572	3428	5066	1572	3428	3526	1572	3428	3526	1572
Grp Volume(v), veh/h	429	2358	283	201	2578	553	287	514	210	325	597	334
Grp Sat Flow(s),veh/h/ln	1714	1689	1572	1714	1689	1572	1714	1763	1572	1714	1763	1572
Q Serve(g_s), s	8.7	41.1	22.7	4.3	38.0	32.5	8.4	13.7	12.3	9.1	16.3	21.6
Cycle Q Clear(g_c), s	8.7	41.1	22.7	4.3	38.0	32.5	8.4	13.7	12.3	9.1	16.3	21.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	249	1735	539	1471	3516	1092	240	1175	524	260	1175	524
V/C Ratio(X)	1.73	1.36	0.53	0.14	0.73	0.51	1.20	0.44	0.40	1.25	0.51	0.64
Avail Cap(c_a), veh/h	249	1735	539	1471	3516	1092	240	1175	524	260	1175	524
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.6	39.4	54.3	20.8	11.4	23.1	55.8	31.2	30.8	55.5	32.1	33.9
Incr Delay (d2), s/veh	328.2	161.9	0.3	0.0	1.4	1.7	121.4	1.2	2.3	140.3	1.6	5.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.0	42.0	8.7	1.6	11.7	11.5	7.6	5.9	4.8	8.9	7.0	8.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	383.9	201.4	54.7	20.8	12.8	24.7	177.2	32.4	33.1	195.7	33.7	39.7
LnGrp LOS	F	F	D	C	B	C	F	C	C	F	C	D
Approach Vol, veh/h		3070			3332			1011			1256	
Approach Delay, s/veh		213.4			15.3			73.6			77.2	
Approach LOS		F			B			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.7	44.9	59.1	46.8	14.0	45.6	15.0	90.9
Change Period (Y+Rc), s	5.6	4.9	6.3	5.7	5.6	* 5.6	6.3	* 6.3
Max Green Setting (Gmax), s	8.4	40.0	8.0	41.1	8.4	* 40	8.7	* 40
Max Q Clear Time (g_c+I1), s	11.1	15.7	6.3	43.1	10.4	23.6	10.7	40.0
Green Ext Time (p_c), s	0.0	4.0	0.1	0.0	0.0	4.6	0.0	0.4

Intersection Summary	
HCM 6th Ctrl Delay	101.2
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	43	91	914	1117	83
Future Vol, veh/h	0	43	91	914	1117	83
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	175	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	47	99	993	1214	90

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	652	1304	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.96	4.16	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.33	2.23	-	-	-
Pot Cap-1 Maneuver	0	408	521	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	408	521	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15	1.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	521	-	408	-	-
HCM Lane V/C Ratio	0.19	-	0.115	-	-
HCM Control Delay (s)	13.5	-	15	-	-
HCM Lane LOS	B	-	C	-	-
HCM 95th %tile Q(veh)	0.7	-	0.4	-	-

Intersection	
Int Delay, s/veh	43.2

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	37	1041	75	299	879	11	20	0	58	9	1	20
Future Vol, veh/h	37	1041	75	299	879	11	20	0	58	9	1	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	175	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	40	1132	82	325	955	12	22	0	63	10	1	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	967	0	0	1214	0	0	2381	2870	607	2257	2905	484
Stage 1	-	-	-	-	-	-	1253	1253	-	1611	1611	-
Stage 2	-	-	-	-	-	-	1128	1617	-	646	1294	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	702	-	-	565	-	-	~ 18	16	437	22	15	526
Stage 1	-	-	-	-	-	-	181	240	-	108	160	-
Stage 2	-	-	-	-	-	-	216	159	-	424	229	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	702	-	-	565	-	-	~ 8	6	437	10	6	526
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 8	6	-	10	6	-
Stage 1	-	-	-	-	-	-	171	226	-	102	68	-
Stage 2	-	-	-	-	-	-	87	68	-	342	216	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0.3	4.9	$ 1102.8	$ 458.3
HCM LOS			F	F

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SERSWLn1
Capacity (veh/h)	30	565	-	-	702	-	- 27
HCM Lane V/C Ratio	2.826	0.575	-	-	0.057	-	- 1.208
HCM Control Delay (s)	$ 1102.8	19.6	-	-	10.4	-	-$ 458.3
HCM Lane LOS	F	C	-	-	B	-	- F
HCM 95th %tile Q(veh)	10	3.6	-	-	0.2	-	- 3.9

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



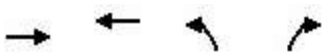
Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	3002	2997	855	337
v/c Ratio	1.51	1.90	1.78	0.79
Control Delay	259.4	426.4	388.7	49.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	259.4	426.4	388.7	49.9
Queue Length 50th (ft)	~941	~1304	~992	233
Queue Length 95th (ft)	#1009	m#658	#1235	#383
Internal Link Dist (ft)	372	1	1238	
Turn Bay Length (ft)				275
Base Capacity (vph)	1983	1574	479	429
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.51	1.90	1.78	0.79

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	2273	3642	1195	1680
v/c Ratio	1.44	1.83	1.09	1.89
Control Delay	222.1	399.4	92.5	430.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	222.1	399.4	92.5	430.9
Queue Length 50th (ft)	~873	~1240	~539	~1143
Queue Length 95th (ft)	m275	#1298	#671	#1296
Internal Link Dist (ft)	20	600	1418	
Turn Bay Length (ft)			825	825
Base Capacity (vph)	1579	1990	1092	888
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.44	1.83	1.09	1.89

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	913	2608	196	323	2590	285	426	638	354	109	550	632
v/c Ratio	2.08	1.25	0.27	1.42	1.46	0.44	0.86	0.42	0.60	0.58	0.74	0.61
Control Delay	525.3	153.3	8.0	259.9	245.1	18.2	78.4	41.3	27.8	79.8	60.1	19.5
Queue Delay	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	525.3	153.4	8.0	259.9	245.1	18.2	78.4	41.3	27.8	79.8	60.1	19.5
Queue Length 50th (ft)	~700	~1122	24	~211	~1221	91	204	176	158	52	259	134
Queue Length 95th (ft)	#834	#1205	77	#312	#1305	176	#282	216	268	87	328	180
Internal Link Dist (ft)		600			2533			848			301	
Turn Bay Length (ft)	250		50	250		150	175		175	225		150
Base Capacity (vph)	438	2087	739	227	1774	651	511	1528	586	187	748	1030
Starvation Cap Reductn	0	137	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	2.08	1.34	0.27	1.42	1.46	0.44	0.83	0.42	0.60	0.58	0.74	0.61

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	150	579	197	317	1186	268	415	158	357	788	313
v/c Ratio	0.91	0.57	0.36	1.28	1.01	0.96	0.49	0.32	1.17	0.87	0.60
Control Delay	105.1	38.7	13.1	194.3	67.8	96.1	41.3	9.4	148.4	53.9	24.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	105.1	38.7	13.1	194.3	67.8	96.1	41.3	9.4	148.4	53.9	24.9
Queue Length 50th (ft)	117	200	34	~311	~481	209	145	8	~328	307	107
Queue Length 95th (ft)	#244	260	97	#492	#635	#378	197	63	#517	#409	206
Internal Link Dist (ft)		513			412		1218			422	
Turn Bay Length (ft)	200		100	150		225		100	225		100
Base Capacity (vph)	164	1022	554	248	1171	278	852	490	306	908	519
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.91	0.57	0.36	1.28	1.01	0.96	0.49	0.32	1.17	0.87	0.60

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	429	2358	283	201	2578	553	287	514	210	325	597	334
v/c Ratio	1.74	1.37	0.43	0.89	1.52	0.81	1.21	0.44	0.32	1.37	0.51	0.51
Control Delay	384.1	202.1	13.5	92.7	268.2	30.6	172.3	32.7	6.9	230.8	34.0	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	384.1	202.1	13.5	92.7	268.2	30.6	172.3	32.7	6.9	230.8	34.0	16.4
Queue Length 50th (ft)	~254	~883	58	80	~1021	233	~139	163	10	~171	194	84
Queue Length 95th (ft)	#357	#976	136	#151	#1112	#399	#230	214	65	#264	251	176
Internal Link Dist (ft)		2533			1136			1068			1112	
Turn Bay Length (ft)	250		175	250		200	200		150	200		175
Base Capacity (vph)	246	1724	652	226	1695	685	238	1168	649	238	1168	649
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.74	1.37	0.43	0.89	1.52	0.81	1.21	0.44	0.32	1.37	0.51	0.51

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

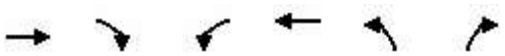
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑↑	↑↑↑		↰	↱
Traffic Volume (veh/h)	0	2935	2391	0	545	182
Future Volume (veh/h)	0	2935	2391	0	545	182
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	0	1074	1074	0	1465	1465
Adj Flow Rate, veh/h	0	3190	2599	0	592	198
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	3	3	0	3	3
Cap, veh/h	0	2150	1706	0	426	379
Arrive On Green	0.00	0.58	1.00	0.00	0.31	0.31
Sat Flow, veh/h	0	3996	3126	0	1395	1241
Grp Volume(v), veh/h	0	3190	2599	0	592	198
Grp Sat Flow(s),veh/h/ln	0	924	978	0	1395	1241
Q Serve(g_s), s	0.0	69.8	69.8	0.0	36.6	15.8
Cycle Q Clear(g_c), s	0.0	69.8	69.8	0.0	36.6	15.8
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2150	1706	0	426	379
V/C Ratio(X)	0.00	1.48	1.52	0.00	1.39	0.52
Avail Cap(c_a), veh/h	0	2150	1706	0	426	379
HCM Platoon Ratio	1.00	1.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	25.1	0.0	0.0	41.7	34.5
Incr Delay (d2), s/veh	0.0	220.4	238.6	0.0	190.0	5.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	45.9	37.7	0.0	34.4	5.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	245.5	238.6	0.0	231.7	39.6
LnGrp LOS	A	F	F	A	F	D
Approach Vol, veh/h		3190	2599		790	
Approach Delay, s/veh		245.5	238.6		183.5	
Approach LOS		F	F		F	

Timer - Assigned Phs	4	6	8
Phs Duration (G+Y+Rc), s	77.0	43.0	77.0
Change Period (Y+Rc), s	7.2	6.4	7.2
Max Green Setting (Gmax), s	69.8	36.6	69.8
Max Q Clear Time (g_c+I1), s	71.8	38.6	71.8
Green Ext Time (p_c), s	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	235.3
HCM 6th LOS	F



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1962	0	0	3121	1052	1273
Future Volume (veh/h)	1962	0	0	3121	1052	1273
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1172	0	0	1172	1563	1563
Adj Flow Rate, veh/h	2133	0	0	3392	1143	1384
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	0	0	3	3	3
Cap, veh/h	1669	0	0	2103	1030	831
Arrive On Green	1.00	0.00	0.00	0.52	0.36	0.36
Sat Flow, veh/h	3410	0	0	4360	2887	2331
Grp Volume(v), veh/h	2133	0	0	3392	1143	1384
Grp Sat Flow(s),veh/h/ln	1066	0	0	1008	1444	1165
Q Serve(g_s), s	62.6	0.0	0.0	62.6	42.8	42.8
Cycle Q Clear(g_c), s	62.6	0.0	0.0	62.6	42.8	42.8
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1669	0	0	2103	1030	831
V/C Ratio(X)	1.28	0.00	0.00	1.61	1.11	1.66
Avail Cap(c_a), veh/h	1669	0	0	2103	1030	831
HCM Platoon Ratio	2.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.09	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	28.7	38.6	38.6
Incr Delay (d2), s/veh	129.9	0.0	0.0	276.0	63.3	304.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	20.1	0.0	0.0	53.7	23.4	46.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	129.9	0.0	0.0	304.7	101.9	343.2
LnGrp LOS	F	A	A	F	F	F
Approach Vol, veh/h	2133			3392	2527	
Approach Delay, s/veh	129.9			304.7	234.0	
Approach LOS	F			F	F	

Timer - Assigned Phs		2		4		8
Phs Duration (G+Y+Rc), s		50.0		70.0		70.0
Change Period (Y+Rc), s		* 7.2		* 7.4		* 7.4
Max Green Setting (Gmax), s		* 43		* 63		* 63
Max Q Clear Time (g_c+I1), s		44.8		64.6		64.6
Green Ext Time (p_c), s		0.0		0.0		0.0

Intersection Summary		
HCM 6th Ctrl Delay	236.2	
HCM 6th LOS	F	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	643	2320	271	393	2073	188	252	744	340	326	738	804
Future Volume (veh/h)	643	2320	271	393	2073	188	252	744	340	326	738	804
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	699	2522	295	427	2253	204	274	809	370	354	802	874
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	418	1921	596	759	2404	746	350	1537	477	262	980	1107
Arrive On Green	0.12	0.38	0.38	0.22	0.47	0.47	0.10	0.30	0.30	0.08	0.28	0.28
Sat Flow, veh/h	3428	5066	1572	3428	5066	1572	3428	5066	1572	3428	3526	2768
Grp Volume(v), veh/h	699	2522	295	427	2253	204	274	809	370	354	802	874
Grp Sat Flow(s),veh/h/ln	1714	1689	1572	1714	1689	1572	1714	1689	1572	1714	1763	1384
Q Serve(g_s), s	17.7	55.0	20.8	16.1	61.0	10.9	11.3	19.2	31.1	11.1	30.8	34.7
Cycle Q Clear(g_c), s	17.7	55.0	20.8	16.1	61.0	10.9	11.3	19.2	31.1	11.1	30.8	34.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	418	1921	596	759	2404	746	350	1537	477	262	980	1107
V/C Ratio(X)	1.67	1.31	0.49	0.56	0.94	0.27	0.78	0.53	0.78	1.35	0.82	0.79
Avail Cap(c_a), veh/h	418	1921	596	759	2404	746	350	1537	477	262	980	1107
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	63.7	45.0	34.4	50.2	36.1	21.3	63.5	41.9	46.0	66.9	48.9	30.6
Incr Delay (d2), s/veh	302.6	141.0	0.3	0.1	1.0	0.1	11.0	1.3	11.7	180.1	7.6	5.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	25.1	47.0	7.7	6.7	23.7	3.9	5.4	8.0	13.3	11.3	14.3	11.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	366.2	186.0	34.6	50.3	37.0	21.4	74.5	43.2	57.7	247.0	56.5	36.3
LnGrp LOS	F	F	C	D	D	C	E	D	E	F	E	D
Approach Vol, veh/h		3516			2884			1453			2030	
Approach Delay, s/veh		209.1			37.9			52.8			81.1	
Approach LOS		F			D			D			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.0	49.3	39.0	60.7	20.7	45.6	24.0	75.7
Change Period (Y+Rc), s	5.9	5.3	6.3	5.7	5.9	5.3	6.3	* 6.3
Max Green Setting (Gmax), s	11.1	44.0	11.7	55.0	14.8	40.3	17.7	* 49
Max Q Clear Time (g_c+I1), s	13.1	33.1	18.1	57.0	13.3	36.7	19.7	63.0
Green Ext Time (p_c), s	0.0	4.8	0.0	0.0	0.1	2.6	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	109.9
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	261	1059	271	175	819	305	257	964	225	233	518	130
Future Volume (veh/h)	261	1059	271	175	819	305	257	964	225	233	518	130
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	284	1151	295	190	890	332	279	1048	245	253	563	141
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	232	1178	525	180	785	292	232	987	440	218	984	439
Arrive On Green	0.13	0.33	0.33	0.10	0.31	0.31	0.13	0.28	0.28	0.12	0.28	0.28
Sat Flow, veh/h	1767	3526	1572	1767	2516	934	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	284	1151	295	190	623	599	279	1048	245	253	563	141
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1687	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	16.0	39.3	13.0	12.4	38.0	38.0	16.0	34.1	16.2	15.0	16.7	8.6
Cycle Q Clear(g_c), s	16.0	39.3	13.0	12.4	38.0	38.0	16.0	34.1	16.2	15.0	16.7	8.6
Prop In Lane	1.00		1.00	1.00		0.55	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	232	1178	525	180	550	526	232	987	440	218	984	439
V/C Ratio(X)	1.22	0.98	0.56	1.06	1.13	1.14	1.20	1.06	0.56	1.16	0.57	0.32
Avail Cap(c_a), veh/h	232	1178	525	180	550	526	232	987	440	218	984	439
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.9	40.1	16.0	54.7	41.9	41.9	52.9	43.9	37.4	53.4	37.7	34.8
Incr Delay (d2), s/veh	132.7	20.8	1.4	82.7	80.2	83.4	124.5	46.5	5.0	111.8	2.4	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.5	19.8	4.7	9.6	28.2	27.4	15.0	20.8	6.7	13.3	7.4	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	185.6	60.9	17.3	137.4	122.1	125.3	177.4	90.4	42.4	165.2	40.1	36.7
LnGrp LOS	F	E	B	F	F	F	F	F	D	F	D	D
Approach Vol, veh/h		1730			1412			1572			957	
Approach Delay, s/veh		73.9			125.5			98.3			72.7	
Approach LOS		E			F			F			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.9	39.0	17.3	45.6	20.0	38.9	20.0	42.9
Change Period (Y+Rc), s	4.9	* 4.9	4.9	* 4.9	4.0	4.9	4.0	4.9
Max Green Setting (Gmax), s	15.0	* 34	12.4	* 41	16.0	33.1	16.0	37.1
Max Q Clear Time (g_c+I1), s	17.0	36.1	14.4	41.3	18.0	18.7	18.0	40.0
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	3.5	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	93.3
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	391	2198	396	311	1894	374	330	669	216	516	622	431
Future Volume (veh/h)	391	2198	396	311	1894	374	330	669	216	516	622	431
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	425	2389	430	338	2059	407	359	727	235	561	676	468
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	1491	3432	1065	249	1621	503	260	1175	524	297	1234	550
Arrive On Green	0.43	0.68	0.68	0.07	0.32	0.32	0.08	0.33	0.33	0.09	0.35	0.35
Sat Flow, veh/h	3428	5066	1572	3428	5066	1572	3428	3526	1572	3428	3526	1572
Grp Volume(v), veh/h	425	2389	430	338	2059	407	359	727	235	561	676	468
Grp Sat Flow(s),veh/h/ln	1714	1689	1572	1714	1689	1572	1714	1763	1572	1714	1763	1572
Q Serve(g_s), s	9.6	34.5	23.3	8.7	38.4	36.4	9.1	20.8	14.1	10.4	18.5	33.1
Cycle Q Clear(g_c), s	9.6	34.5	23.3	8.7	38.4	36.4	9.1	20.8	14.1	10.4	18.5	33.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	1491	3432	1065	249	1621	503	260	1175	524	297	1234	550
V/C Ratio(X)	0.28	0.70	0.40	1.36	1.27	0.81	1.38	0.62	0.45	1.89	0.55	0.85
Avail Cap(c_a), veh/h	1491	3432	1065	249	1621	503	260	1175	524	297	1234	550
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.9	11.8	22.0	55.6	40.8	60.9	55.5	33.6	31.4	54.8	31.4	36.1
Incr Delay (d2), s/veh	0.0	0.1	0.1	185.8	126.6	13.1	193.6	2.4	2.8	412.1	1.8	15.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	10.5	8.0	10.0	34.0	15.6	10.9	9.0	5.5	21.4	8.0	14.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.9	11.9	22.1	241.4	167.4	74.1	249.1	36.0	34.1	466.9	33.1	51.3
LnGrp LOS	C	B	C	F	F	E	F	D	C	F	C	D
Approach Vol, veh/h		3244			2804			1321			1705	
Approach Delay, s/veh		14.6			162.8			93.6			180.8	
Approach LOS		B			F			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.0	45.6	15.0	88.9	14.7	46.9	59.8	44.1
Change Period (Y+Rc), s	5.6	* 5.6	6.3	* 6.3	5.6	4.9	6.3	5.7
Max Green Setting (Gmax), s	10.4	* 40	8.7	* 38	8.4	42.0	8.7	38.4
Max Q Clear Time (g_c+I1), s	12.4	22.8	10.7	36.5	11.1	35.1	11.6	40.4
Green Ext Time (p_c), s	0.0	5.2	0.0	1.8	0.0	3.4	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	103.1
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	190	40	1211	1257	32
Future Vol, veh/h	0	190	40	1211	1257	32
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	175	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	207	43	1316	1366	35

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	701	1401	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.96	4.16	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.33	2.23	-	-	-
Pot Cap-1 Maneuver	0	379	478	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	379	478	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	25.3	0.4	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	478	-	379	-	-
HCM Lane V/C Ratio	0.091	-	0.545	-	-
HCM Control Delay (s)	13.3	-	25.3	-	-
HCM Lane LOS	B	-	D	-	-
HCM 95th %tile Q(veh)	0.3	-	3.1	-	-

Intersection	
Int Delay, s/veh	770.2

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	112	1198	18	149	1177	12	88	1	291	15	0	42
Future Vol, veh/h	112	1198	18	149	1177	12	88	1	291	15	0	42
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	175	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	122	1302	20	162	1279	13	96	1	316	16	0	46

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1292	0	0	1322	0	0	2520	3172	661	2506	3176	646
Stage 1	-	-	-	-	-	-	1556	1556	-	1610	1610	-
Stage 2	-	-	-	-	-	-	964	1616	-	896	1566	-
Critical Hdwy	4.16	-	-	4.16	-	-	7.56	6.56	6.96	7.56	6.56	6.96
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.56	-	6.56	5.56	-
Follow-up Hdwy	2.23	-	-	2.23	-	-	3.53	4.03	3.33	3.53	4.03	3.33
Pot Cap-1 Maneuver	527	-	-	513	-	-	~ 14	10	403	~ 14	10	412
Stage 1	-	-	-	-	-	-	117	171	-	108	160	-
Stage 2	-	-	-	-	-	-	272	159	-	299	169	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	527	-	-	513	-	-	~ 8	5	403	~ 2	5	412
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 8	5	-	~ 2	5	-
Stage 1	-	-	-	-	-	-	~ 90	131	-	83	109	-
Stage 2	-	-	-	-	-	-	165	109	-	49	130	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	1.2	1.7	$ 5595.2	$ 4559.2
HCM LOS			F	F

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SERSWLn1
Capacity (veh/h)	32	513	-	-	527	-	- 7
HCM Lane V/C Ratio	12.908	0.316	-	-	0.231	-	- 8.851
HCM Control Delay (s)	$ 5595.2	15.2	-	-	13.9	-	$ 4559.2
HCM Lane LOS	F	C	-	-	B	-	- F
HCM 95th %tile Q(veh)	50.7	1.3	-	-	0.9	-	- 9.4

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



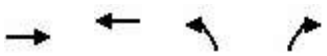
Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	3190	2599	592	198
v/c Ratio	1.49	1.53	1.41	0.52
Control Delay	248.8	259.3	229.9	40.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	248.8	259.3	229.9	40.1
Queue Length 50th (ft)	~993	~1032	~614	125
Queue Length 95th (ft)	#1059	m#547	#837	205
Internal Link Dist (ft)	372	1	1238	
Turn Bay Length (ft)				275
Base Capacity (vph)	2137	1696	421	378
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.49	1.53	1.41	0.52

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	2133	3392	1143	1384
v/c Ratio	1.29	1.62	1.12	1.66
Control Delay	152.4	307.6	103.6	332.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	152.4	307.6	103.6	332.1
Queue Length 50th (ft)	~765	~1099	~525	~893
Queue Length 95th (ft)	m222	#1161	#658	#1044
Internal Link Dist (ft)	20	600	1418	
Turn Bay Length (ft)			825	825
Base Capacity (vph)	1659	2090	1021	832
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.29	1.62	1.12	1.66

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	699	2522	295	427	2253	204	274	809	370	354	802	874
v/c Ratio	1.68	1.32	0.45	1.56	1.32	0.34	0.79	0.53	0.62	1.36	0.82	0.76
Control Delay	355.2	184.8	22.9	309.7	188.7	17.9	80.2	43.4	26.5	233.2	57.3	23.8
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	355.2	184.9	22.9	309.7	188.7	17.9	80.2	43.4	26.5	233.2	57.3	23.8
Queue Length 50th (ft)	~496	~1124	128	~292	~1006	63	132	232	155	~226	375	238
Queue Length 95th (ft)	#622	#1209	214	#402	#1095	133	#197	278	269	#329	457	300
Internal Link Dist (ft)		600			2533			848			301	
Turn Bay Length (ft)	250		50	250		150	175		175	225		150
Base Capacity (vph)	415	1910	662	274	1701	602	347	1528	600	260	974	1152
Starvation Cap Reductn	0	58	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.68	1.36	0.45	1.56	1.32	0.34	0.79	0.53	0.62	1.36	0.82	0.76

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	284	1151	295	190	1222	279	1048	245	253	563	141
v/c Ratio	1.22	0.97	0.47	1.05	1.14	1.20	1.05	0.45	1.16	0.58	0.27
Control Delay	174.8	59.0	18.2	132.5	112.3	167.4	85.0	17.2	155.5	40.4	7.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	174.8	59.0	18.2	132.5	112.3	167.4	85.0	17.2	155.5	40.4	7.6
Queue Length 50th (ft)	~270	458	88	~160	~570	~261	~466	61	~231	198	3
Queue Length 95th (ft)	#444	#607	172	#310	#709	#434	#600	138	#397	258	52
Internal Link Dist (ft)		513			412		1218			422	
Turn Bay Length (ft)	200		100	150		225		100	225		100
Base Capacity (vph)	233	1188	626	181	1070	233	996	547	219	966	530
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.22	0.97	0.47	1.05	1.14	1.20	1.05	0.45	1.16	0.58	0.27

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



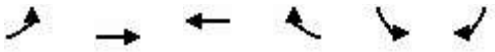
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	425	2389	430	338	2059	407	359	727	235	561	676	468
v/c Ratio	1.73	1.48	0.69	1.37	1.28	0.63	1.51	0.62	0.36	1.91	0.55	0.69
Control Delay	377.2	252.4	27.1	233.2	165.3	20.7	287.3	36.5	8.7	451.2	33.5	25.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	377.2	252.4	27.1	233.2	165.3	20.7	287.3	36.5	8.7	451.2	33.5	25.3
Queue Length 50th (ft)	~250	~934	174	~178	~739	125	~199	247	24	~343	220	185
Queue Length 95th (ft)	#354	#1027	297	#274	#835	237	#297	314	85	#456	281	313
Internal Link Dist (ft)		2533			1136			1068			1112	
Turn Bay Length (ft)	250		175	250		200	200		150	200		175
Base Capacity (vph)	246	1611	621	246	1611	647	238	1168	649	294	1226	674
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.73	1.48	0.69	1.37	1.28	0.63	1.51	0.62	0.36	1.91	0.55	0.69

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

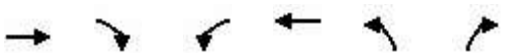
MITIGATION
WORKSHEETS



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	2080	1957	0	411	140
Future Volume (veh/h)	0	2080	1957	0	411	140
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	0	1074	1074	0	1465	1465
Adj Flow Rate, veh/h	0	2122	2174	0	514	175
Peak Hour Factor	0.98	0.98	0.90	0.90	0.80	0.80
Percent Heavy Veh, %	0	3	3	0	3	3
Cap, veh/h	0	2608	2070	0	489	224
Arrive On Green	0.00	0.71	1.00	0.00	0.18	0.18
Sat Flow, veh/h	0	3996	3126	0	2707	1241
Grp Volume(v), veh/h	0	2122	2174	0	514	175
Grp Sat Flow(s),veh/h/ln	0	924	978	0	1353	1241
Q Serve(g_s), s	0.0	47.6	84.7	0.0	21.7	16.1
Cycle Q Clear(g_c), s	0.0	47.6	84.7	0.0	21.7	16.1
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2608	2070	0	489	224
V/C Ratio(X)	0.00	0.81	1.05	0.00	1.05	0.78
Avail Cap(c_a), veh/h	0	2608	2070	0	489	224
HCM Platoon Ratio	1.00	1.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	12.2	0.0	0.0	49.2	46.9
Incr Delay (d2), s/veh	0.0	2.9	34.5	0.0	54.5	23.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	8.0	6.6	0.0	10.8	6.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	15.1	34.5	0.0	103.6	69.9
LnGrp LOS	A	B	F	A	F	E
Approach Vol, veh/h		2122	2174		689	
Approach Delay, s/veh		15.1	34.5		95.1	
Approach LOS		B	C		F	

Timer - Assigned Phs		4		6	8
Phs Duration (G+Y+Rc), s		91.9		28.1	91.9
Change Period (Y+Rc), s		7.2		6.4	7.2
Max Green Setting (Gmax), s		84.7		21.7	84.7
Max Q Clear Time (g_c+I1), s		49.6		23.7	86.7
Green Ext Time (p_c), s		20.9		0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	34.6
HCM 6th LOS	C



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1647	0	0	1996	945	1247
Future Volume (veh/h)	1647	0	0	1996	945	1247
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1172	0	0	1172	1563	1563
Adj Flow Rate, veh/h	1984	0	0	2193	995	1313
Peak Hour Factor	0.83	0.83	0.91	0.91	0.95	0.95
Percent Heavy Veh, %	3	0	0	3	3	3
Cap, veh/h	1669	0	0	2103	1030	1077
Arrive On Green	1.00	0.00	0.00	0.52	0.36	0.36
Sat Flow, veh/h	3410	0	0	4360	2887	3019
Grp Volume(v), veh/h	1984	0	0	2193	995	1313
Grp Sat Flow(s),veh/h/ln	1066	0	0	1008	1444	1006
Q Serve(g_s), s	62.6	0.0	0.0	62.6	40.6	42.8
Cycle Q Clear(g_c), s	62.6	0.0	0.0	62.6	40.6	42.8
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1669	0	0	2103	1030	1077
V/C Ratio(X)	1.19	0.00	0.00	1.04	0.97	1.22
Avail Cap(c_a), veh/h	1669	0	0	2103	1030	1077
HCM Platoon Ratio	2.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.25	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	28.7	37.9	38.6
Incr Delay (d2), s/veh	91.3	0.0	0.0	23.5	21.0	107.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	14.1	0.0	0.0	16.8	16.6	20.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	91.3	0.0	0.0	52.2	58.9	145.8
LnGrp LOS	F	A	A	F	E	F
Approach Vol, veh/h	1984			2193	2308	
Approach Delay, s/veh	91.3			52.2	108.4	
Approach LOS	F			D	F	

Timer - Assigned Phs	2	4	8
Phs Duration (G+Y+Rc), s	50.0	70.0	70.0
Change Period (Y+Rc), s	* 7.2	* 7.4	* 7.4
Max Green Setting (Gmax), s	* 43	* 63	* 63
Max Q Clear Time (g_c+I1), s	44.8	64.6	64.6
Green Ext Time (p_c), s	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	84.1
HCM 6th LOS	F

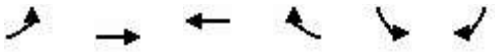
Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	33	532	65	299	679	11	20	0	58	8	1	20
Future Volume (veh/h)	33	532	65	299	679	11	20	0	58	8	1	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	38	619	76	332	754	12	38	0	112	12	2	30
Peak Hour Factor	0.86	0.86	0.86	0.90	0.90	0.90	0.52	0.52	0.52	0.66	0.66	0.66
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	75	974	119	423	1793	29	145	14	159	141	37	154
Arrive On Green	0.04	0.31	0.31	0.24	0.50	0.50	0.14	0.00	0.14	0.14	0.14	0.14
Sat Flow, veh/h	1767	3161	387	1767	3552	57	286	105	1154	250	272	1117
Grp Volume(v), veh/h	38	345	350	332	374	392	150	0	0	44	0	0
Grp Sat Flow(s),veh/h/ln	1767	1763	1786	1767	1763	1845	1545	0	0	1638	0	0
Q Serve(g_s), s	0.9	7.2	7.2	7.5	5.7	5.7	2.4	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.9	7.2	7.2	7.5	5.7	5.7	3.9	0.0	0.0	1.0	0.0	0.0
Prop In Lane	1.00		0.22	1.00		0.03	0.25		0.75	0.27		0.68
Lane Grp Cap(c), veh/h	75	543	550	423	890	931	318	0	0	332	0	0
V/C Ratio(X)	0.51	0.63	0.64	0.79	0.42	0.42	0.47	0.00	0.00	0.13	0.00	0.00
Avail Cap(c_a), veh/h	268	1214	1230	1176	2120	2219	764	0	0	770	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	20.1	12.7	12.8	15.3	6.7	6.7	17.6	0.0	0.0	16.4	0.0	0.0
Incr Delay (d2), s/veh	5.2	1.2	1.2	3.3	0.3	0.3	1.1	0.0	0.0	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	2.3	2.3	2.7	1.3	1.4	1.3	0.0	0.0	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.3	14.0	14.0	18.5	7.0	7.0	18.7	0.0	0.0	16.5	0.0	0.0
LnGrp LOS	C	B	B	B	A	A	B	A	A	B	A	A
Approach Vol, veh/h		733			1098			150			44	
Approach Delay, s/veh		14.6			10.5			18.7			16.5	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.3	26.1		10.4	14.7	17.7		10.4				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	6.5	51.5		18.5	28.5	29.5		18.5				
Max Q Clear Time (g_c+I1), s	2.9	7.7		5.9	9.5	9.2		3.0				
Green Ext Time (p_c), s	0.0	5.0		0.6	0.9	4.0		0.1				

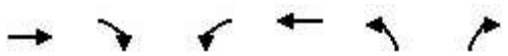
Intersection Summary			
HCM 6th Ctrl Delay		12.7	
HCM 6th LOS		B	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	2405	2119	0	284	148
Future Volume (veh/h)	0	2405	2119	0	284	148
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	0	1074	1074	0	1465	1465
Adj Flow Rate, veh/h	0	2733	2381	0	369	192
Peak Hour Factor	0.88	0.88	0.89	0.89	0.77	0.77
Percent Heavy Veh, %	0	3	3	0	3	3
Cap, veh/h	0	2756	2187	0	381	175
Arrive On Green	0.00	0.75	1.00	0.00	0.14	0.14
Sat Flow, veh/h	0	3996	3126	0	2707	1241
Grp Volume(v), veh/h	0	2733	2381	0	369	192
Grp Sat Flow(s),veh/h/ln	0	924	978	0	1353	1241
Q Serve(g_s), s	0.0	86.6	89.5	0.0	16.3	16.9
Cycle Q Clear(g_c), s	0.0	86.6	89.5	0.0	16.3	16.9
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2756	2187	0	381	175
V/C Ratio(X)	0.00	0.99	1.09	0.00	0.97	1.10
Avail Cap(c_a), veh/h	0	2756	2187	0	381	175
HCM Platoon Ratio	1.00	1.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	14.9	0.0	0.0	51.3	51.5
Incr Delay (d2), s/veh	0.0	15.3	48.2	0.0	38.7	96.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	15.2	9.8	0.0	7.4	9.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	30.2	48.2	0.0	90.0	148.3
LnGrp LOS	A	C	F	A	F	F
Approach Vol, veh/h		2733	2381		561	
Approach Delay, s/veh		30.2	48.2		110.0	
Approach LOS		C	D		F	

Timer - Assigned Phs		4		6	8
Phs Duration (G+Y+Rc), s		96.7		23.3	96.7
Change Period (Y+Rc), s		7.2		6.4	7.2
Max Green Setting (Gmax), s		89.5		16.9	89.5
Max Q Clear Time (g_c+I1), s		88.6		18.9	91.5
Green Ext Time (p_c), s		0.9		0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	45.6
HCM 6th LOS	D



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1586	0	0	2401	811	1023
Future Volume (veh/h)	1586	0	0	2401	811	1023
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1172	0	0	1172	1563	1563
Adj Flow Rate, veh/h	1934	0	0	2893	891	1124
Peak Hour Factor	0.82	0.82	0.83	0.83	0.91	0.91
Percent Heavy Veh, %	3	0	0	3	3	3
Cap, veh/h	1882	0	0	2372	837	876
Arrive On Green	1.00	0.00	0.00	0.59	0.29	0.29
Sat Flow, veh/h	3410	0	0	4360	2887	3019
Grp Volume(v), veh/h	1934	0	0	2893	891	1124
Grp Sat Flow(s),veh/h/ln	1066	0	0	1008	1444	1006
Q Serve(g_s), s	70.6	0.0	0.0	70.6	34.8	34.8
Cycle Q Clear(g_c), s	70.6	0.0	0.0	70.6	34.8	34.8
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1882	0	0	2372	837	876
V/C Ratio(X)	1.03	0.00	0.00	1.22	1.06	1.28
Avail Cap(c_a), veh/h	1882	0	0	2372	837	876
HCM Platoon Ratio	2.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.20	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	24.7	42.6	42.6
Incr Delay (d2), s/veh	28.1	0.0	0.0	99.7	49.6	136.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.9	0.0	0.0	30.7	17.6	19.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	28.1	0.0	0.0	124.4	92.2	179.0
LnGrp LOS	F	A	A	F	F	F
Approach Vol, veh/h	1934			2893	2015	
Approach Delay, s/veh	28.1			124.4	140.6	
Approach LOS	C			F	F	

Timer - Assigned Phs	2	4	8
Phs Duration (G+Y+Rc), s	42.0	78.0	78.0
Change Period (Y+Rc), s	* 7.2	* 7.4	* 7.4
Max Green Setting (Gmax), s	* 35	* 71	* 71
Max Q Clear Time (g_c+I1), s	36.8	72.6	72.6
Green Ext Time (p_c), s	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	102.0
HCM 6th LOS	F

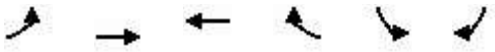
Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	107	845	14	149	818	12	77	1	291	15	0	32
Future Volume (veh/h)	107	845	14	149	818	12	77	1	291	15	0	32
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	127	1006	17	184	1010	15	115	1	434	22	0	46
Peak Hour Factor	0.84	0.84	0.84	0.81	0.81	0.81	0.67	0.67	0.67	0.69	0.69	0.69
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	204	1181	20	222	1220	18	156	19	456	164	27	278
Arrive On Green	0.12	0.33	0.33	0.13	0.34	0.34	0.38	0.38	0.38	0.38	0.00	0.38
Sat Flow, veh/h	1767	3548	60	1767	3556	53	273	51	1211	280	72	737
Grp Volume(v), veh/h	127	500	523	184	501	524	550	0	0	68	0	0
Grp Sat Flow(s),veh/h/ln	1767	1763	1845	1767	1763	1846	1535	0	0	1090	0	0
Q Serve(g_s), s	5.6	21.7	21.7	8.3	21.4	21.4	24.1	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	5.6	21.7	21.7	8.3	21.4	21.4	28.5	0.0	0.0	2.2	0.0	0.0
Prop In Lane	1.00		0.03	1.00		0.03	0.21		0.79	0.32		0.68
Lane Grp Cap(c), veh/h	204	587	614	222	605	633	631	0	0	469	0	0
V/C Ratio(X)	0.62	0.85	0.85	0.83	0.83	0.83	0.87	0.00	0.00	0.15	0.00	0.00
Avail Cap(c_a), veh/h	218	673	704	295	750	785	643	0	0	478	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	34.6	25.5	25.5	35.0	24.7	24.7	24.7	0.0	0.0	16.6	0.0	0.0
Incr Delay (d2), s/veh	4.9	9.3	8.9	13.5	6.3	6.1	12.3	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	9.8	10.2	4.2	9.2	9.6	11.8	0.0	0.0	0.8	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.5	34.8	34.4	48.5	31.0	30.8	37.0	0.0	0.0	16.8	0.0	0.0
LnGrp LOS	D	C	C	D	C	C	D	A	A	B	A	A
Approach Vol, veh/h		1150			1209			550			68	
Approach Delay, s/veh		35.1			33.6			37.0			16.8	
Approach LOS		D			C			D			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	14.0	32.6		35.4	14.8	31.8		35.4				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	10.1	34.9		31.5	13.7	31.3		31.5				
Max Q Clear Time (g_c+I1), s	7.6	23.4		30.5	10.3	23.7		4.2				
Green Ext Time (p_c), s	0.1	4.8		0.4	0.1	3.6		0.4				

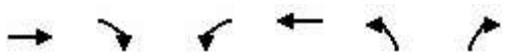
Intersection Summary	
HCM 6th Ctrl Delay	34.4
HCM 6th LOS	C



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	2176	2101	0	476	232
Future Volume (veh/h)	0	2176	2101	0	476	232
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	0	1074	1074	0	1465	1465
Adj Flow Rate, veh/h	0	2220	2334	0	595	290
Peak Hour Factor	0.98	0.98	0.90	0.90	0.80	0.80
Percent Heavy Veh, %	0	3	3	0	3	3
Cap, veh/h	0	2608	2070	0	489	224
Arrive On Green	0.00	0.71	1.00	0.00	0.18	0.18
Sat Flow, veh/h	0	3996	3126	0	2707	1241
Grp Volume(v), veh/h	0	2220	2334	0	595	290
Grp Sat Flow(s),veh/h/ln	0	924	978	0	1353	1241
Q Serve(g_s), s	0.0	53.1	84.7	0.0	21.7	21.7
Cycle Q Clear(g_c), s	0.0	53.1	84.7	0.0	21.7	21.7
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2608	2070	0	489	224
V/C Ratio(X)	0.00	0.85	1.13	0.00	1.22	1.29
Avail Cap(c_a), veh/h	0	2608	2070	0	489	224
HCM Platoon Ratio	1.00	1.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	13.0	0.0	0.0	49.2	49.1
Incr Delay (d2), s/veh	0.0	3.7	64.3	0.0	114.6	160.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	9.0	12.3	0.0	14.9	16.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	16.7	64.3	0.0	163.8	209.5
LnGrp LOS	A	B	F	A	F	F
Approach Vol, veh/h		2220	2334		885	
Approach Delay, s/veh		16.7	64.3		178.8	
Approach LOS		B	E		F	

Timer - Assigned Phs		4		6	8
Phs Duration (G+Y+Rc), s		91.9		28.1	91.9
Change Period (Y+Rc), s		7.2		6.4	7.2
Max Green Setting (Gmax), s		84.7		21.7	84.7
Max Q Clear Time (g_c+I1), s		55.1		23.7	86.7
Green Ext Time (p_c), s		19.9		0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	63.5
HCM 6th LOS	E



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1722	0	0	2232	965	1314
Future Volume (veh/h)	1722	0	0	2232	965	1314
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1172	0	0	1172	1563	1563
Adj Flow Rate, veh/h	2075	0	0	2453	1016	1383
Peak Hour Factor	0.83	0.83	0.91	0.91	0.95	0.95
Percent Heavy Veh, %	3	0	0	3	3	3
Cap, veh/h	1669	0	0	2103	1030	1077
Arrive On Green	1.00	0.00	0.00	0.52	0.36	0.36
Sat Flow, veh/h	3410	0	0	4360	2887	3019
Grp Volume(v), veh/h	2075	0	0	2453	1016	1383
Grp Sat Flow(s),veh/h/ln	1066	0	0	1008	1444	1006
Q Serve(g_s), s	62.6	0.0	0.0	62.6	41.9	42.8
Cycle Q Clear(g_c), s	62.6	0.0	0.0	62.6	41.9	42.8
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1669	0	0	2103	1030	1077
V/C Ratio(X)	1.24	0.00	0.00	1.17	0.99	1.28
Avail Cap(c_a), veh/h	1669	0	0	2103	1030	1077
HCM Platoon Ratio	2.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.12	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	28.7	38.3	38.6
Incr Delay (d2), s/veh	114.7	0.0	0.0	75.6	25.0	135.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	17.7	0.0	0.0	24.4	17.6	23.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	114.7	0.0	0.0	104.3	63.3	173.7
LnGrp LOS	F	A	A	F	E	F
Approach Vol, veh/h	2075			2453	2399	
Approach Delay, s/veh	114.7			104.3	127.0	
Approach LOS	F			F	F	

Timer - Assigned Phs	2	4	8
Phs Duration (G+Y+Rc), s	50.0	70.0	70.0
Change Period (Y+Rc), s	* 7.2	* 7.4	* 7.4
Max Green Setting (Gmax), s	* 43	* 63	* 63
Max Q Clear Time (g_c+I1), s	44.8	64.6	64.6
Green Ext Time (p_c), s	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	115.3
HCM 6th LOS	F

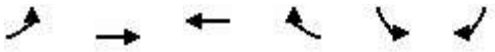
Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	33	598	67	299	705	11	20	0	58	8	1	20
Future Volume (veh/h)	33	598	67	299	705	11	20	0	58	8	1	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	38	695	78	332	783	12	38	0	112	12	2	30
Peak Hour Factor	0.86	0.86	0.86	0.90	0.90	0.90	0.52	0.52	0.52	0.66	0.66	0.66
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	74	1049	118	419	1860	29	139	15	157	135	38	152
Arrive On Green	0.04	0.33	0.33	0.24	0.52	0.52	0.14	0.00	0.14	0.14	0.14	0.14
Sat Flow, veh/h	1767	3195	358	1767	3554	54	284	107	1154	246	275	1117
Grp Volume(v), veh/h	38	383	390	332	388	407	150	0	0	44	0	0
Grp Sat Flow(s),veh/h/ln	1767	1763	1791	1767	1763	1846	1546	0	0	1639	0	0
Q Serve(g_s), s	1.0	8.4	8.5	8.0	6.1	6.1	2.6	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	1.0	8.4	8.5	8.0	6.1	6.1	4.2	0.0	0.0	1.1	0.0	0.0
Prop In Lane	1.00		0.20	1.00		0.03	0.25		0.75	0.27		0.68
Lane Grp Cap(c), veh/h	74	579	588	419	923	966	311	0	0	325	0	0
V/C Ratio(X)	0.51	0.66	0.66	0.79	0.42	0.42	0.48	0.00	0.00	0.14	0.00	0.00
Avail Cap(c_a), veh/h	254	1149	1167	1113	2006	2100	723	0	0	730	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	21.2	13.0	13.0	16.2	6.6	6.6	18.6	0.0	0.0	17.3	0.0	0.0
Incr Delay (d2), s/veh	5.4	1.3	1.3	3.4	0.3	0.3	1.2	0.0	0.0	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	2.7	2.7	3.0	1.4	1.5	1.4	0.0	0.0	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.6	14.3	14.3	19.7	6.9	6.9	19.8	0.0	0.0	17.5	0.0	0.0
LnGrp LOS	C	B	B	B	A	A	B	A	A	B	A	A
Approach Vol, veh/h		811			1127			150			44	
Approach Delay, s/veh		14.9			10.7			19.8			17.5	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.4	28.2		10.7	15.2	19.4		10.7				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	6.5	51.5		18.5	28.5	29.5		18.5				
Max Q Clear Time (g_c+I1), s	3.0	8.1		6.2	10.0	10.5		3.1				
Green Ext Time (p_c), s	0.0	5.3		0.6	0.9	4.4		0.1				

Intersection Summary		
HCM 6th Ctrl Delay		13.1
HCM 6th LOS		B



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	2503	2158	0	318	159
Future Volume (veh/h)	0	2503	2158	0	318	159
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	0	1074	1074	0	1465	1465
Adj Flow Rate, veh/h	0	2844	2425	0	413	206
Peak Hour Factor	0.88	0.88	0.89	0.89	0.77	0.77
Percent Heavy Veh, %	0	3	3	0	3	3
Cap, veh/h	0	2756	2187	0	381	175
Arrive On Green	0.00	0.75	1.00	0.00	0.14	0.14
Sat Flow, veh/h	0	3996	3126	0	2707	1241
Grp Volume(v), veh/h	0	2844	2425	0	413	206
Grp Sat Flow(s),veh/h/ln	0	924	978	0	1353	1241
Q Serve(g_s), s	0.0	89.5	89.5	0.0	16.9	16.9
Cycle Q Clear(g_c), s	0.0	89.5	89.5	0.0	16.9	16.9
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2756	2187	0	381	175
V/C Ratio(X)	0.00	1.03	1.11	0.00	1.08	1.18
Avail Cap(c_a), veh/h	0	2756	2187	0	381	175
HCM Platoon Ratio	1.00	1.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	15.2	0.0	0.0	51.5	51.5
Incr Delay (d2), s/veh	0.0	26.0	56.2	0.0	70.3	124.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	17.7	11.4	0.0	9.3	11.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	41.2	56.2	0.0	121.9	175.7
LnGrp LOS	A	F	F	A	F	F
Approach Vol, veh/h		2844	2425		619	
Approach Delay, s/veh		41.2	56.2		139.8	
Approach LOS		D	E		F	

Timer - Assigned Phs			4		6	8
Phs Duration (G+Y+Rc), s			96.7		23.3	96.7
Change Period (Y+Rc), s			7.2		6.4	7.2
Max Green Setting (Gmax), s			89.5		16.9	89.5
Max Q Clear Time (g_c+I1), s			91.5		18.9	91.5
Green Ext Time (p_c), s			0.0		0.0	0.0

Intersection Summary		
HCM 6th Ctrl Delay		57.8
HCM 6th LOS		E

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1646	0	0	2621	838	1083
Future Volume (veh/h)	1646	0	0	2621	838	1083
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1172	0	0	1172	1563	1563
Adj Flow Rate, veh/h	2007	0	0	3158	921	1190
Peak Hour Factor	0.82	0.82	0.83	0.83	0.91	0.91
Percent Heavy Veh, %	3	0	0	3	3	3
Cap, veh/h	1882	0	0	2372	837	876
Arrive On Green	1.00	0.00	0.00	0.59	0.29	0.29
Sat Flow, veh/h	3410	0	0	4360	2887	3019
Grp Volume(v), veh/h	2007	0	0	3158	921	1190
Grp Sat Flow(s),veh/h/ln	1066	0	0	1008	1444	1006
Q Serve(g_s), s	70.6	0.0	0.0	70.6	34.8	34.8
Cycle Q Clear(g_c), s	70.6	0.0	0.0	70.6	34.8	34.8
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1882	0	0	2372	837	876
V/C Ratio(X)	1.07	0.00	0.00	1.33	1.10	1.36
Avail Cap(c_a), veh/h	1882	0	0	2372	837	876
HCM Platoon Ratio	2.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.13	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	24.7	42.6	42.6
Incr Delay (d2), s/veh	41.0	0.0	0.0	149.6	62.1	169.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.1	0.0	0.0	38.9	19.1	22.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	41.0	0.0	0.0	174.3	104.7	211.6
LnGrp LOS	F	A	A	F	F	F
Approach Vol, veh/h	2007			3158	2111	
Approach Delay, s/veh	41.0			174.3	165.0	
Approach LOS	D			F	F	

Timer - Assigned Phs	2	4	8
Phs Duration (G+Y+Rc), s	42.0	78.0	78.0
Change Period (Y+Rc), s	* 7.2	* 7.4	* 7.4
Max Green Setting (Gmax), s	* 35	* 71	* 71
Max Q Clear Time (g_c+I1), s	36.8	72.6	72.6
Green Ext Time (p_c), s	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	134.8
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	107	889	14	149	866	12	77	1	291	15	0	32
Future Volume (veh/h)	107	889	14	149	866	12	77	1	291	15	0	32
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	127	1058	17	184	1069	15	115	1	434	22	0	46
Peak Hour Factor	0.84	0.84	0.84	0.81	0.81	0.81	0.67	0.67	0.67	0.69	0.69	0.69
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	196	1209	19	222	1262	18	154	19	453	160	27	272
Arrive On Green	0.11	0.34	0.34	0.13	0.35	0.35	0.37	0.37	0.37	0.37	0.00	0.37
Sat Flow, veh/h	1767	3551	57	1767	3559	50	274	50	1211	277	71	729
Grp Volume(v), veh/h	127	525	550	184	529	555	550	0	0	68	0	0
Grp Sat Flow(s),veh/h/ln	1767	1763	1845	1767	1763	1847	1535	0	0	1077	0	0
Q Serve(g_s), s	5.8	23.5	23.5	8.5	23.3	23.3	25.1	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	5.8	23.5	23.5	8.5	23.3	23.3	29.4	0.0	0.0	2.3	0.0	0.0
Prop In Lane	1.00		0.03	1.00		0.03	0.21		0.79	0.32		0.68
Lane Grp Cap(c), veh/h	196	600	628	222	625	655	625	0	0	459	0	0
V/C Ratio(X)	0.65	0.88	0.88	0.83	0.85	0.85	0.88	0.00	0.00	0.15	0.00	0.00
Avail Cap(c_a), veh/h	212	656	687	288	731	766	627	0	0	460	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	35.8	26.1	26.1	35.9	25.0	25.0	25.6	0.0	0.0	17.2	0.0	0.0
Incr Delay (d2), s/veh	6.0	11.9	11.5	14.5	8.1	7.8	13.6	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	11.0	11.4	4.4	10.3	10.7	12.4	0.0	0.0	0.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.8	38.0	37.5	50.4	33.1	32.8	39.2	0.0	0.0	17.3	0.0	0.0
LnGrp LOS	D	D	D	D	C	C	D	A	A	B	A	A
Approach Vol, veh/h		1202			1268			550			68	
Approach Delay, s/veh		38.2			35.5			39.2			17.3	
Approach LOS		D			D			D			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.9	34.3		35.9	15.0	33.1		35.9				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	10.1	34.9		31.5	13.7	31.3		31.5				
Max Q Clear Time (g_c+I1), s	7.8	25.3		31.4	10.5	25.5		4.3				
Green Ext Time (p_c), s	0.1	4.5		0.0	0.1	3.1		0.4				

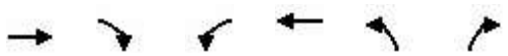
Intersection Summary			
HCM 6th Ctrl Delay		36.8	
HCM 6th LOS		D	



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	2762	2757	0	787	310
Future Volume (veh/h)	0	2762	2757	0	787	310
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	0	1074	1074	0	1465	1465
Adj Flow Rate, veh/h	0	3002	2997	0	855	337
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	3	3	0	3	3
Cap, veh/h	0	2396	1901	0	645	296
Arrive On Green	0.00	0.65	1.00	0.00	0.24	0.24
Sat Flow, veh/h	0	3996	3126	0	2707	1241
Grp Volume(v), veh/h	0	3002	2997	0	855	337
Grp Sat Flow(s),veh/h/ln	0	924	978	0	1353	1241
Q Serve(g_s), s	0.0	77.8	77.8	0.0	28.6	28.6
Cycle Q Clear(g_c), s	0.0	77.8	77.8	0.0	28.6	28.6
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2396	1901	0	645	296
V/C Ratio(X)	0.00	1.25	1.58	0.00	1.33	1.14
Avail Cap(c_a), veh/h	0	2396	1901	0	645	296
HCM Platoon Ratio	1.00	1.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	21.1	0.0	0.0	45.7	45.7
Incr Delay (d2), s/veh	0.0	117.4	261.9	0.0	157.0	95.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	33.1	46.1	0.0	23.3	16.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	138.5	261.9	0.0	202.7	141.0
LnGrp LOS	A	F	F	A	F	F
Approach Vol, veh/h		3002	2997		1192	
Approach Delay, s/veh		138.5	261.9		185.3	
Approach LOS		F	F		F	

Timer - Assigned Phs	4	6	8
Phs Duration (G+Y+Rc), s	85.0	35.0	85.0
Change Period (Y+Rc), s	7.2	6.4	7.2
Max Green Setting (Gmax), s	77.8	28.6	77.8
Max Q Clear Time (g_c+I1), s	79.8	30.6	79.8
Green Ext Time (p_c), s	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	197.7
HCM 6th LOS	F



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	2091	0	0	3351	1099	1546
Future Volume (veh/h)	2091	0	0	3351	1099	1546
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1172	0	0	1172	1563	1563
Adj Flow Rate, veh/h	2273	0	0	3642	1195	1680
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	0	0	3	3	3
Cap, veh/h	1749	0	0	2204	958	1001
Arrive On Green	1.00	0.00	0.00	0.55	0.33	0.33
Sat Flow, veh/h	3410	0	0	4360	2887	3019
Grp Volume(v), veh/h	2273	0	0	3642	1195	1680
Grp Sat Flow(s),veh/h/ln	1066	0	0	1008	1444	1006
Q Serve(g_s), s	65.6	0.0	0.0	65.6	39.8	39.8
Cycle Q Clear(g_c), s	65.6	0.0	0.0	65.6	39.8	39.8
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1749	0	0	2204	958	1001
V/C Ratio(X)	1.30	0.00	0.00	1.65	1.25	1.68
Avail Cap(c_a), veh/h	1749	0	0	2204	958	1001
HCM Platoon Ratio	2.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.09	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	27.2	40.1	40.1
Incr Delay (d2), s/veh	139.2	0.0	0.0	293.8	120.4	309.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	22.5	0.0	0.0	58.7	29.4	38.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	139.2	0.0	0.0	321.0	160.5	349.5
LnGrp LOS	F	A	A	F	F	F
Approach Vol, veh/h	2273			3642	2875	
Approach Delay, s/veh	139.2			321.0	270.9	
Approach LOS	F			F	F	

Timer - Assigned Phs	2	4	8
Phs Duration (G+Y+Rc), s	47.0	73.0	73.0
Change Period (Y+Rc), s	* 7.2	* 7.4	* 7.4
Max Green Setting (Gmax), s	* 40	* 66	* 66
Max Q Clear Time (g_c+I1), s	41.8	67.6	67.6
Green Ext Time (p_c), s	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	257.6
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	138	533	181	292	820	271	247	382	145	328	725	288
Future Volume (veh/h)	138	533	181	292	820	271	247	382	145	328	725	288
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	150	579	197	317	891	295	268	415	158	357	788	313
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	179	844	377	285	1056	471	296	921	411	316	962	429
Arrive On Green	0.10	0.24	0.24	0.16	0.30	0.30	0.17	0.26	0.26	0.18	0.27	0.27
Sat Flow, veh/h	1767	3526	1572	1767	3526	1572	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	150	579	197	317	891	295	268	415	158	357	788	313
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1572	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	9.3	16.7	12.2	18.0	26.5	18.1	16.6	11.0	9.2	20.0	23.4	20.2
Cycle Q Clear(g_c), s	9.3	16.7	12.2	18.0	26.5	18.1	16.6	11.0	9.2	20.0	23.4	20.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	179	844	377	285	1056	471	296	921	411	316	962	429
V/C Ratio(X)	0.84	0.69	0.52	1.11	0.84	0.63	0.91	0.45	0.38	1.13	0.82	0.73
Avail Cap(c_a), veh/h	221	1104	492	285	1230	549	307	921	411	316	962	429
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	49.3	38.7	37.0	46.9	36.7	33.8	45.7	34.6	33.9	45.9	38.0	36.9
Incr Delay (d2), s/veh	20.3	1.2	1.1	87.4	4.9	1.7	28.3	1.6	2.7	90.1	7.7	10.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	7.2	4.7	14.6	11.7	6.9	9.4	4.8	3.8	16.4	10.8	8.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	69.7	39.8	38.1	134.3	41.6	35.5	74.0	36.2	36.6	136.0	45.8	47.3
LnGrp LOS	E	D	D	F	D	D	E	D	D	F	D	D
Approach Vol, veh/h		926			1503			841			1458	
Approach Delay, s/veh		44.3			60.0			48.3			68.2	
Approach LOS		D			E			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.0	34.1	22.0	31.7	22.7	35.4	15.3	38.4
Change Period (Y+Rc), s	4.0	4.9	4.0	4.9	4.0	4.9	4.0	4.9
Max Green Setting (Gmax), s	20.0	29.2	18.0	35.0	19.4	29.8	14.0	39.0
Max Q Clear Time (g_c+I1), s	22.0	13.0	20.0	18.7	18.6	25.4	11.3	28.5
Green Ext Time (p_c), s	0.0	2.8	0.0	3.9	0.1	2.4	0.1	5.0

Intersection Summary	
HCM 6th Ctrl Delay	57.4
HCM 6th LOS	E

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	37	1041	75	299	879	11	20	0	58	9	1	20
Future Volume (veh/h)	37	1041	75	299	879	11	20	0	58	9	1	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	40	1132	82	325	955	12	22	0	63	10	1	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	518	1518	110	393	1370	17	107	6	91	112	16	87
Arrive On Green	0.29	0.46	0.46	0.22	0.38	0.38	0.08	0.00	0.08	0.08	0.08	0.08
Sat Flow, veh/h	1767	3334	241	1767	3565	45	323	80	1153	350	205	1110
Grp Volume(v), veh/h	40	598	616	325	472	495	85	0	0	33	0	0
Grp Sat Flow(s),veh/h/ln	1767	1763	1812	1767	1763	1847	1555	0	0	1665	0	0
Q Serve(g_s), s	0.9	15.5	15.5	9.7	12.5	12.5	1.9	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.9	15.5	15.5	9.7	12.5	12.5	2.9	0.0	0.0	1.0	0.0	0.0
Prop In Lane	1.00		0.13	1.00		0.02	0.26		0.74	0.30		0.67
Lane Grp Cap(c), veh/h	518	802	825	393	677	710	204	0	0	216	0	0
V/C Ratio(X)	0.08	0.75	0.75	0.83	0.70	0.70	0.42	0.00	0.00	0.15	0.00	0.00
Avail Cap(c_a), veh/h	518	1165	1197	695	1655	1734	580	0	0	587	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	14.1	12.4	12.5	20.5	14.3	14.3	24.8	0.0	0.0	24.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	1.5	1.5	4.5	1.3	1.2	1.4	0.0	0.0	0.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	4.9	5.0	3.9	4.2	4.4	1.1	0.0	0.0	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.2	14.0	14.0	25.0	15.6	15.6	26.2	0.0	0.0	24.3	0.0	0.0
LnGrp LOS	B	B	B	C	B	B	C	A	A	C	A	A
Approach Vol, veh/h		1254			1292			85			33	
Approach Delay, s/veh		14.0			18.0			26.2			24.3	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	20.8	25.8		8.9	16.8	29.7		8.9				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	6.4	52.0		18.1	21.8	36.6		18.1				
Max Q Clear Time (g_c+I1), s	2.9	14.5		4.9	11.7	17.5		3.0				
Green Ext Time (p_c), s	0.0	6.8		0.3	0.7	7.7		0.1				

Intersection Summary			
HCM 6th Ctrl Delay		16.4	
HCM 6th LOS		B	



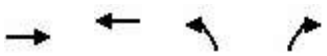
Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	3002	2997	855	337
v/c Ratio	1.26	1.59	1.34	1.14
Control Delay	144.0	281.4	199.4	136.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	144.0	281.4	199.4	136.7
Queue Length 50th (ft)	~848	~1215	~444	~304
Queue Length 95th (ft)	#915	m#587	#570	#493
Internal Link Dist (ft)	372	1	1238	
Turn Bay Length (ft)			275	275
Base Capacity (vph)	2381	1890	639	296
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.26	1.59	1.34	1.14

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	2273	3642	1195	1680
v/c Ratio	1.31	1.66	1.26	1.67
Control Delay	163.8	324.3	160.3	336.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	163.8	324.3	160.3	336.7
Queue Length 50th (ft)	~830	~1193	~598	~839
Queue Length 95th (ft)	m#535	#1251	#731	#957
Internal Link Dist (ft)	20	600	1418	
Turn Bay Length (ft)			825	825
Base Capacity (vph)	1738	2191	949	1003
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.31	1.66	1.26	1.67

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	150	579	197	317	891	295	268	415	158	357	788	313
v/c Ratio	0.77	0.63	0.39	1.16	0.83	0.51	0.92	0.47	0.31	1.17	0.86	0.60
Control Delay	75.7	40.7	13.6	148.6	44.9	19.9	85.1	39.5	9.3	150.3	52.5	25.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.7	40.7	13.6	148.6	44.9	19.9	85.1	39.5	9.3	150.3	52.5	25.2
Queue Length 50th (ft)	114	200	34	~299	327	92	208	145	8	~340	312	110
Queue Length 95th (ft)	#212	260	97	#480	407	178	#375	197	63	#529	#425	211
Internal Link Dist (ft)		513			412			1218			422	
Turn Bay Length (ft)	200		100	150		100	225		100	225		100
Base Capacity (vph)	213	1065	571	273	1187	623	295	888	504	304	915	520
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.54	0.35	1.16	0.75	0.47	0.91	0.47	0.31	1.17	0.86	0.60

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	SEL	SET	NWL	NWT	NET	SWT
Lane Group Flow (vph)	40	1214	325	967	85	33
v/c Ratio	0.13	0.74	0.69	0.40	0.32	0.19
Control Delay	24.5	19.1	33.3	10.2	6.2	21.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.5	19.1	33.3	10.2	6.2	21.6
Queue Length 50th (ft)	17	223	134	43	0	5
Queue Length 95th (ft)	39	336	236	238	19	31
Internal Link Dist (ft)		369		1112	95	63
Turn Bay Length (ft)	125		175			
Base Capacity (vph)	323	2078	600	2739	516	451
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.58	0.54	0.35	0.16	0.07

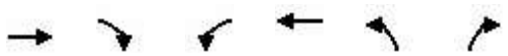
Intersection Summary



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	2935	2391	0	545	182
Future Volume (veh/h)	0	2935	2391	0	545	182
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	0	1074	1074	0	1465	1465
Adj Flow Rate, veh/h	0	3190	2599	0	592	198
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	3	3	0	3	3
Cap, veh/h	0	2150	1706	0	826	379
Arrive On Green	0.00	0.58	1.00	0.00	0.31	0.31
Sat Flow, veh/h	0	3996	3126	0	2707	1241
Grp Volume(v), veh/h	0	3190	2599	0	592	198
Grp Sat Flow(s),veh/h/ln	0	924	978	0	1353	1241
Q Serve(g_s), s	0.0	69.8	69.8	0.0	23.3	15.8
Cycle Q Clear(g_c), s	0.0	69.8	69.8	0.0	23.3	15.8
Prop In Lane	0.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	0	2150	1706	0	826	379
V/C Ratio(X)	0.00	1.48	1.52	0.00	0.72	0.52
Avail Cap(c_a), veh/h	0	2150	1706	0	826	379
HCM Platoon Ratio	1.00	1.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	25.1	0.0	0.0	37.1	34.5
Incr Delay (d2), s/veh	0.0	220.4	238.6	0.0	5.3	5.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	45.9	37.7	0.0	8.0	5.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	245.5	238.6	0.0	42.4	39.6
LnGrp LOS	A	F	F	A	D	D
Approach Vol, veh/h		3190	2599		790	
Approach Delay, s/veh		245.5	238.6		41.7	
Approach LOS		F	F		D	

Timer - Assigned Phs		4		6	8
Phs Duration (G+Y+Rc), s		77.0		43.0	77.0
Change Period (Y+Rc), s		7.2		6.4	7.2
Max Green Setting (Gmax), s		69.8		36.6	69.8
Max Q Clear Time (g_c+I1), s		71.8		25.3	71.8
Green Ext Time (p_c), s		0.0		2.3	0.0

Intersection Summary	
HCM 6th Ctrl Delay	218.3
HCM 6th LOS	F



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1962	0	0	3121	1052	1273
Future Volume (veh/h)	1962	0	0	3121	1052	1273
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1172	0	0	1172	1563	1563
Adj Flow Rate, veh/h	2133	0	0	3392	1143	1384
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	0	0	3	3	3
Cap, veh/h	1669	0	0	2103	1030	1077
Arrive On Green	1.00	0.00	0.00	0.52	0.36	0.36
Sat Flow, veh/h	3410	0	0	4360	2887	3019
Grp Volume(v), veh/h	2133	0	0	3392	1143	1384
Grp Sat Flow(s),veh/h/ln	1066	0	0	1008	1444	1006
Q Serve(g_s), s	62.6	0.0	0.0	62.6	42.8	42.8
Cycle Q Clear(g_c), s	62.6	0.0	0.0	62.6	42.8	42.8
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	1669	0	0	2103	1030	1077
V/C Ratio(X)	1.28	0.00	0.00	1.61	1.11	1.29
Avail Cap(c_a), veh/h	1669	0	0	2103	1030	1077
HCM Platoon Ratio	2.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.09	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	28.7	38.6	38.6
Incr Delay (d2), s/veh	129.9	0.0	0.0	276.0	63.3	135.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	20.1	0.0	0.0	53.7	23.4	23.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	129.9	0.0	0.0	304.7	101.9	174.1
LnGrp LOS	F	A	A	F	F	F
Approach Vol, veh/h	2133			3392	2527	
Approach Delay, s/veh	129.9			304.7	141.4	
Approach LOS	F			F	F	

Timer - Assigned Phs	2	4	8
Phs Duration (G+Y+Rc), s	50.0	70.0	70.0
Change Period (Y+Rc), s	* 7.2	* 7.4	* 7.4
Max Green Setting (Gmax), s	* 43	* 63	* 63
Max Q Clear Time (g_c+I1), s	44.8	64.6	64.6
Green Ext Time (p_c), s	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	207.2
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	261	1059	271	175	819	305	257	964	225	233	518	130
Future Volume (veh/h)	261	1059	271	175	819	305	257	964	225	233	518	130
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	284	1151	295	190	890	332	279	1048	245	253	563	141
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	276	1131	505	186	951	424	294	994	444	243	919	410
Arrive On Green	0.16	0.32	0.32	0.11	0.27	0.27	0.17	0.28	0.28	0.14	0.26	0.26
Sat Flow, veh/h	1767	3526	1572	1767	3526	1572	1767	3526	1572	1767	3526	1572
Grp Volume(v), veh/h	284	1151	295	190	890	332	279	1048	245	253	563	141
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1572	1767	1763	1572	1767	1763	1572
Q Serve(g_s), s	18.9	38.8	12.3	12.7	29.8	23.6	18.9	34.1	16.0	16.6	17.0	6.1
Cycle Q Clear(g_c), s	18.9	38.8	12.3	12.7	29.8	23.6	18.9	34.1	16.0	16.6	17.0	6.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	276	1131	505	186	951	424	294	994	444	243	919	410
V/C Ratio(X)	1.03	1.02	0.58	1.02	0.94	0.78	0.95	1.05	0.55	1.04	0.61	0.34
Avail Cap(c_a), veh/h	276	1131	505	186	962	429	294	994	444	243	919	410
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.0	41.0	14.4	54.1	43.1	40.9	49.9	43.4	36.9	52.2	39.3	17.2
Incr Delay (d2), s/veh	61.8	31.2	1.7	72.3	15.7	9.0	39.1	43.8	4.9	69.4	3.0	2.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.9	21.1	4.4	9.3	14.7	10.0	11.3	20.4	6.6	11.9	7.6	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	112.8	72.2	16.1	126.4	58.9	49.9	89.0	87.2	41.8	121.5	42.4	19.5
LnGrp LOS	F	F	B	F	E	D	F	F	D	F	D	B
Approach Vol, veh/h		1730			1412			1572			957	
Approach Delay, s/veh		69.3			65.8			80.5			59.9	
Approach LOS		E			E			F			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	21.5	39.0	16.7	43.7	24.1	36.4	22.9	37.5
Change Period (Y+Rc), s	4.9	* 4.9	4.0	4.9	4.0	4.9	4.0	4.9
Max Green Setting (Gmax), s	16.6	* 34	12.7	38.8	20.1	30.6	18.5	33.0
Max Q Clear Time (g_c+I1), s	18.6	36.1	14.7	40.8	20.9	19.0	20.9	31.8
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	3.1	0.0	0.8

Intersection Summary	
HCM 6th Ctrl Delay	70.0
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	112	1198	18	149	1177	12	88	1	291	15	0	42
Future Volume (veh/h)	112	1198	18	149	1177	12	88	1	291	15	0	42
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	122	1302	20	162	1279	13	96	1	316	16	0	46
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	197	1526	23	199	1540	16	141	19	341	128	29	291
Arrive On Green	0.11	0.43	0.43	0.11	0.43	0.43	0.29	0.29	0.29	0.29	0.00	0.29
Sat Flow, veh/h	1767	3554	55	1767	3575	36	295	66	1173	248	100	1002
Grp Volume(v), veh/h	122	646	676	162	630	662	413	0	0	62	0	0
Grp Sat Flow(s),veh/h/ln	1767	1763	1846	1767	1763	1849	1534	0	0	1350	0	0
Q Serve(g_s), s	5.3	26.6	26.7	7.2	25.6	25.6	17.2	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	5.3	26.6	26.7	7.2	25.6	25.6	21.1	0.0	0.0	2.3	0.0	0.0
Prop In Lane	1.00		0.03	1.00		0.02	0.23		0.77	0.26		0.74
Lane Grp Cap(c), veh/h	197	757	793	199	759	796	501	0	0	448	0	0
V/C Ratio(X)	0.62	0.85	0.85	0.81	0.83	0.83	0.82	0.00	0.00	0.14	0.00	0.00
Avail Cap(c_a), veh/h	212	862	903	273	923	968	520	0	0	466	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	34.2	20.7	20.7	35.0	20.4	20.4	27.7	0.0	0.0	21.1	0.0	0.0
Incr Delay (d2), s/veh	4.8	7.5	7.2	12.4	5.5	5.2	10.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	11.2	11.7	3.6	10.4	10.9	8.8	0.0	0.0	0.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.0	28.2	28.0	47.4	25.8	25.6	37.8	0.0	0.0	21.3	0.0	0.0
LnGrp LOS	D	C	C	D	C	C	D	A	A	C	A	A
Approach Vol, veh/h		1444			1454			413			62	
Approach Delay, s/veh		29.0			28.1			37.8			21.3	
Approach LOS		C			C			D			C	

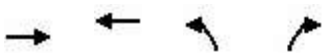
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.5	39.3		28.0	13.6	39.2		28.0				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	9.7	42.3		24.5	12.5	39.5		24.5				
Max Q Clear Time (g_c+I1), s	7.3	27.6		23.1	9.2	28.7		4.3				
Green Ext Time (p_c), s	0.1	7.2		0.4	0.1	6.0		0.3				

Intersection Summary			
HCM 6th Ctrl Delay		29.6	
HCM 6th LOS		C	



Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	3190	2599	592	198
v/c Ratio	1.49	1.53	0.72	0.52
Control Delay	248.8	259.3	43.2	40.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	248.8	259.3	43.2	40.1
Queue Length 50th (ft)	~993	~1032	210	125
Queue Length 95th (ft)	#1059	m#547	277	205
Internal Link Dist (ft)	372	1	1238	
Turn Bay Length (ft)			275	275
Base Capacity (vph)	2137	1696	818	378
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.49	1.53	0.72	0.52

Intersection Summary
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBT	WBT	NBL	NBR
Lane Group Flow (vph)	2133	3392	1143	1384
v/c Ratio	1.29	1.62	1.12	1.28
Control Delay	152.8	307.6	103.6	168.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	152.8	307.6	103.6	168.4
Queue Length 50th (ft)	~765	~1099	~525	~599
Queue Length 95th (ft)	m287	#1161	#658	#716
Internal Link Dist (ft)	20	600	1418	
Turn Bay Length (ft)			825	825
Base Capacity (vph)	1659	2090	1021	1078
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.29	1.62	1.12	1.28

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	284	1151	295	190	890	332	279	1048	245	253	563	141
v/c Ratio	1.04	1.02	0.49	1.03	0.93	0.59	0.95	1.05	0.45	1.05	0.63	0.28
Control Delay	116.2	71.2	20.3	126.1	58.8	21.7	91.7	85.0	17.2	120.3	43.4	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	116.2	71.2	20.3	126.1	58.8	21.7	91.7	85.0	17.2	120.3	43.4	8.1
Queue Length 50th (ft)	~240	~482	96	~157	353	100	217	~466	61	~212	204	4
Queue Length 95th (ft)	#414	#631	182	#307	#475	200	#386	#600	138	#379	266	54
Internal Link Dist (ft)		513			412			1218			422	
Turn Bay Length (ft)	200		100	150		100	225		100	225		100
Base Capacity (vph)	272	1133	598	185	963	560	293	996	547	242	893	500
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.04	1.02	0.49	1.03	0.92	0.59	0.95	1.05	0.45	1.05	0.63	0.28

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	SEL	SET	NWL	NWT	NET	SWT
Lane Group Flow (vph)	122	1322	162	1292	413	62
v/c Ratio	0.55	0.84	0.65	0.73	0.85	0.15
Control Delay	47.2	26.6	48.6	20.8	34.2	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.2	26.6	48.6	20.8	34.2	0.8
Queue Length 50th (ft)	62	317	84	305	123	0
Queue Length 95th (ft)	#142	442	#171	399	#270	1
Internal Link Dist (ft)		369		1112	95	63
Turn Bay Length (ft)	125		175			
Base Capacity (vph)	239	1807	286	1934	601	520
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.73	0.57	0.67	0.69	0.12

Intersection Summary

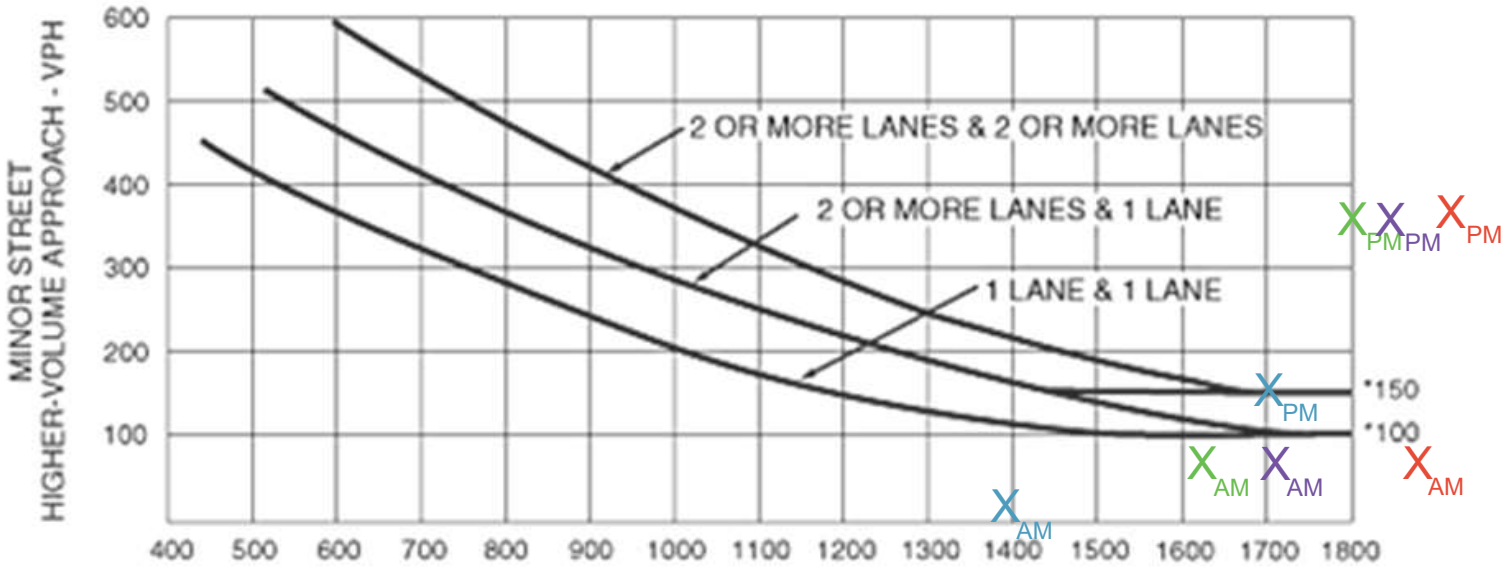
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

APPENDIX G

Signal Warrant Worksheets

FIRST STREET / LOCUST AVENUE

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

LEGEND
X_{AM} X_{PM} Existing
X_{AM} X_{PM} Existing Plus Project
X_{AM} X_{PM} Near-Term Plus Project
X_{AM} X_{PM} Cumulative Year 2042 Plus Project

APPENDIX H

Approved Trip Generation/Distribution Assumptions Memo

MEMORANDUM

DATE: October 8, 2019

TO: City of Fresno, Public Works Department: Harmanjit Dhaliwal, PE
City of Fresno, Public Works Department: Jill Gormley, TE, City Traffic Engineer / Traffic Operations & Planning Manager

FROM: Jason Ellard, Transportation Engineer, VRPA Technologies, Inc.

SUBJECT: Kaiser Permanente - Fresno Medical Office Building Traffic Impact Study (TIS) Assumptions Memorandum

VRPA Technologies, Inc. (VRPA) prepared the following Assumptions Memorandum, which includes trip generation and trip distribution, for the proposed Kaiser Permanente Fresno Medical Office Building ("Project") in the City of Fresno. This document is intended to be used by City staff in approving a final scope of work for the required Project traffic analysis.

The Project consists of the development of a 145,000 square feet medical office building to be located west of the Locust Avenue and First Street intersection. Site access will be provided at the intersections of Locust Avenue and First Street and Private Driveway (north of Locust Avenue) and First Street.

PROPOSED STUDY AREA

The proposed study intersections and street and highway segments to be evaluated in the traffic study are listed below.

Intersections

- ✓ Alluvial Avenue / First Street
- ✓ Locust Avenue / First Street
- ✓ Herndon Avenue / First Street
- ✓ Herndon Avenue / Fresno Street
- ✓ Herndon Avenue / SR 41 NB Off Ramp
- ✓ Herndon Avenue / SR 41 SB Off Ramp

Street Segments

- ✓ First Street between:
  - Alluvial Avenue and Locust Avenue
  - Locust Avenue and Herndon Avenue

- ✓ Herndon Avenue between:
  - Fresno Street and First Street

PROPOSED STUDY SCENARIOS

The traffic study for the Project proposes to include level of service (LOS) analysis for a weekday AM and PM peak hour for the following traffic scenarios.

- ✓ Existing Conditions

  The first step toward assessing Project traffic impacts is to assess existing traffic conditions. Existing peak hour turning movements will be collected at each study intersections for the AM and PM peak hour.

- ✓ Existing Plus Project

  VRPA will identify Existing Conditions Plus Project traffic considering the existing peak hour volumes and the Projects trip generation as discussed later in this document.

- ✓ Near-Term (Opening Year 2022) Plus Project

  VRPA will identify Near-Term (Opening Year 2022) traffic impacts on the specified highway and street/road facilities, and intersections in the Study Area. VRPA will apply an appropriate annual growth rate (Fresno COG model) to existing traffic counts (as adjusted), determined in consultation with City of Fresno staff, to reflect opening year conditions.

  VRPA will work with City of Fresno staff to identify cumulative projects that will affect the study area. During the traffic modeling process (discussed below), VRPA will confirm with the Fresno COG that all of the applicable cumulative projects are included in the model's land use assumptions. Any projects not included will either be added to the model by Fresno COG, or manually accounted for in the future forecasts by VRPA.

  For the Near-Term (Opening Year 2022) analysis, VRPA will estimate peak hour trip generation manually and add all applicable cumulative project trips to traffic volumes using relevant traffic analyses and EIRs prepared for these projects or the latest ITE Trip Generation Manual.

  VRPA will identify short- and long-term planned/programmed highway and street/road improvements along the study facilities. Short-term highway and street/road improvement projects are improvements that will be constructed within one to three (1-3) years of the present. Such improvement projects may provide relief or enhance traffic impacts associated with the Project or other cumulative projects. Long-term highway and street/road improvement projects will be identified and considered during the near-term and Year 2042 impact analysis. Only improvement projects that are fully funded will be assumed as planned roadway projects for purposes of the analysis.

✓ Cumulative Year 2042 Without Project

VRPA proposes to utilize the Fresno COG travel demand model to obtain future year traffic forecasts for the Cumulative Year 2042 Without Project scenario.

VRPA will formally request a model run from Fresno COG for the future year (2042) and the existing year (2019) to serve as the baseline for development of future forecasts. Once both model runs are received, VRPA will compare the peak hour traffic volumes between both models and determine the incremental growth in the study area. The incremental growth (incremental method) will then be applied to the existing traffic counts to determine the Cumulative Year 2042 Without Project traffic volumes for use in the TIS analysis.

✓ Cumulative Year 2042 Plus Project

VRPA will identify Cumulative Year 2042 Plus Project traffic considering the Cumulative Year 2042 Without Project peak hour volumes and the Projects trip generation as discussed later in this document.

TRIP GENERATION METHODOLOGY

To assess the impacts that the Project may have on the surrounding roadway network, the first step is to determine Project trip generation. Project trip generation was determined using trip generation rates from the Institute of Transportation Engineers (ITE) Trip Generation Manual (10th Edition). Trips associated with the 145,000-square foot medical office development was derived from the Medical-Dental Office Building (720) Land Use in the ITE Trip Generation Manual. The considerations described above led to the recommended trip generation for weekday AM (7:00-9:00am) and PM (4:00-6:00pm) peak hours shown in Table 1.

TRIP DISTRIBUTION

Project trip distribution is shown in Figure 1 and is based upon a select zone run prepared by the Fresno Council of Governments (Fresno COG), as well as engineering judgement, prevailing traffic patterns in the study area, complementary land uses, major routes, and population centers.

Project traffic as shown in Table 1 was distributed to the roadway system using the trip distribution percentages shown in Figure 1. Project traffic is shown in Figure2.

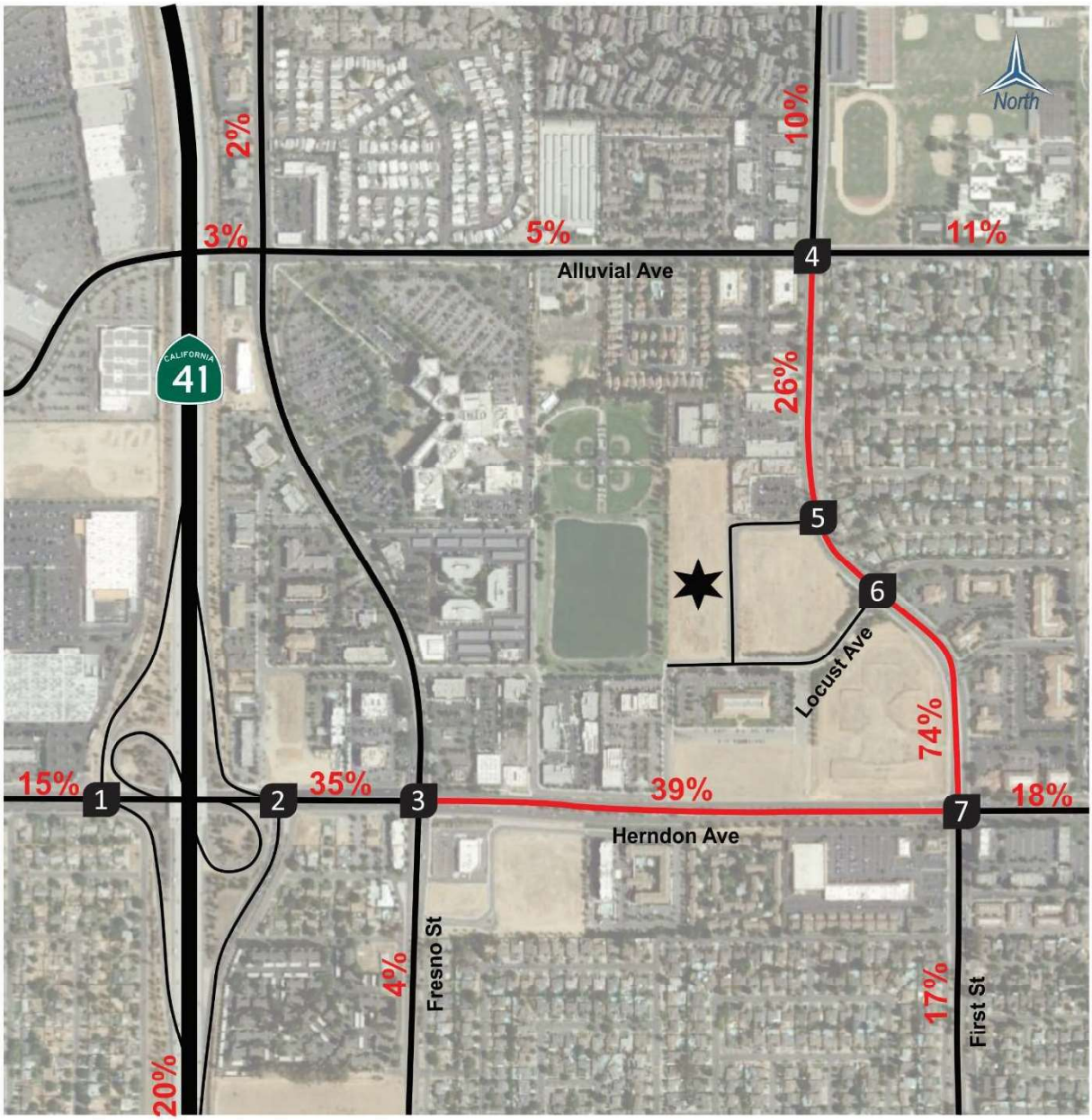
Table 1
Project Trip Generation

LAND USE	Quantity	DAILY TRIP ENDS (ADT)		WEEKDAY AM PEAK HOUR					WEEKDAY PM PEAK HOUR				
		RATE	VOLUME	RATE	IN:OUT SPLIT	VOLUME			RATE	IN:OUT SPLIT	VOLUME		
						IN	OUT	TOTAL			IN	OUT	TOTAL
Medical Office (720)	145.000 k.s.f	34.8	5,046	2.78	78:22	314	89	403	3.46	28:72	140	362	502
TOTAL TRIP GENERATION			**5,046**			**314**	**89**	**403**			**140**	**362**	**502**

Source: Generation factors from ITE Trip Generation Manual, 10th Edition.
Trip ends are one-way traffic movements, entering or leaving.
The numbers in parenthesis are ITE land use codes.

Kaiser Permanente - Fresno Medical Office Building
Project Trip Distribution

Figure 1



Kaiser Permanente - Fresno Medical Office Building
Project Peak Hour Trips

Figure 2



INTERSECTION AND SEGMENT ANALYSIS

Intersections

All intersection LOS analyses will be estimated using Synchro 10 Software. The following inputs and parameters will be applied in order to accurately determine the travel delay and LOS for each study intersection:

- ✓ VRPA will conduct a field study of the specified intersections and segments to verify lane geometry and intersection control as well as to obtain other pertinent data such as signal timing and phasing, where applicable.
- ✓ Peak hour factors (PHF) for each intersection approach will be obtained from existing traffic counts and utilized for Existing Conditions, Existing Plus Project, and Near-term (Opening Year 2022) Conditions. For all future scenarios, a PHF of 0.92 will be applied
- ✓ Existing left- and right-turn storage pockets will be measured from aerial photography and incorporated into the synchro analysis
- ✓ Roadway link speed limits will be observed in the field and input into the Synchro network to determine roadway link speeds
- ✓ The Right Turn On Red parameter will be set to "Yes"
- ✓ Lead-lag optimize will be set to "Fixed"
- ✓ Traffic signals (where applicable) will be analyzed as "actuated and uncoordinated"
- ✓ All intersection cycle lengths will be assumed to be 90 seconds initially and will be adjusted if needed. All offsets will be optimized.
- ✓ Heavy vehicle percentages will be applied based on the Highway Capacity Manual (HCM)
- ✓ HCM 6th Edition outputs for delay and level of service will be utilized in the results
- ✓ Queuing conditions for left and right-turn lanes at all study intersections will be based upon Synchro outputs or Section 400 of Caltrans' Highway Design Manual. Synchro provides 95th percentile maximum queue lengths in feet which represents the maximum back of queue with 95th percentile traffic volumes

Segment Analysis

All segment LOS analyses will be estimated using the Modified HCM-Based Level of Service Tables for the peak hours or the Highway Capacity Software (HCS) depending upon City staff's preference.

SIGNIFICANCE CRITERIA

The City of Fresno's General Plan (Adopted December 18, 2014), policy number MT-1-n, identifies a peak hour LOS standard of D or better for all roadway areas outside of identified Activity Center and Bus Rapid Transit Corridor districts, unless the City Traffic Engineer determines that mitigation to maintain this LOS would be infeasible and/or conflict with the achievement of other General Plan policies.

Based on the 2002 Caltrans *Guide for the Preparation of Traffic Impact Studies*, the LOS for operating State highway facilities is based on Measures of Effectiveness (MOE) identified in the Highway Capacity Manual (HCM). Caltrans endeavors to maintain a target LOS at the transition between LOS "C" and LOS "D" on State highway facilities; however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS. If an existing State highway facility is operating at less than this target LOS, the existing MOE should be

maintained. In general, the region-wide goal for an acceptable LOS on all freeways, roadways segments, and intersections is “D”. For undeveloped or not densely developed locations, the goal may be to achieve LOS “C”.

Where LOS estimates exceed minimum LOS standards, VRPA will develop appropriate mitigation measures. Such measures may include, but are not limited to roadway/highway widening, traffic controls, turn pockets, alignment improvements, and any other improvements that would solve potential traffic problems. This task will include determining the required storage length of intersection turn lanes based on Caltrans’ Highway Design Manual Methodologies.

If you have any questions or require further information, please contact me at (559) 271-1200 extension 2.

Sincerely,



Mr. Jason Ellard
Transportation Engineer