Appendix G
Preliminary Hydrology and WQMP

Preliminary Hydrology Report

Pilot Perris

APN: 329-250-011 & 329-250-012

March 2022

PREPARED FOR:

Pilot Travel Centers LLC
5508 Lonas Drive
Knoxville, TN 37909
(865) 588-7488

PREPARED BY:

Kimley»Horn
3880 Lemon Street, Suite 420
Riverside, CA 92501
(951) 543-9868

KHA Project # 095426010

Certification by Engineer

3/22/22

Shea-Michael Anti, PE Date

REGISTERED PROFESSIONAL ENGINEER

SHEA-MICHAEL ANTI

RCE NO. 78274

CIVIL

STATE OF CALIFORNIA

Contents

Appendices

References

Hydrology Manual. Riverside County Flood Control and Water Conservation District, April 1978.

100.0 Introduction

Kimley-Horn and Associates has been retained to prepare a Preliminary Hydrology Report for the proposed Pilot Travel Center in Perris, California. The purpose of this report is to demonstrate preliminary analysis of the hydrologic and hydraulic conditions associated with the development of the project site. To do so, the following is the scope of this report:

- Discuss the pre-development discharge patterns and points
- Discuss the post-development discharge patterns and points
- Determine the pre-development flow rates for the 10-year and 100-year events
- Determine the post-development unmitigated flow rates for the 10-year and 100-year events
- Analyze the required post-development onsite mitigation for the 100-year event

Even though this report discusses stormwater, this report is not a Stormwater Pollution Prevention Plan (SWPPP), a Groundwater Study, a Geotechnical Report, nor a Water Quality Management Plan (WQMP). Each of these separate reports discusses separate aspects of stormwater. Portions of the Geotechnical Report are utilized and referenced for the purpose of this report. Similarly, the requirements of the WQMP are considered for the stormwater mitigation and sizing of outlet structures for this project.

100.1 Project Description

The existing vacant lot will be developed into the proposed Pilot Travel Center. The proposed development will include a proposed building with a restaurant, drive thru, and proposed fueling areas. Site improvements will include landscaping, concrete hardscape, and asphalt paving. The associated improvements include, but are not limited to onsite grading, domestic water service, sanitary sewer service, storm drain infrastructure, concrete and asphalt pavement, landscaping, and irrigation. The total project makes up nearly 14.0-acres. The project will not be phased.

100.2 Location

The site is located northwest of Ethanac Road and Trumble Road in the City of Perris, within Riverside County. The project site is bordered by Interstate 215 to the west, a vacant property to the north, Trumble Road to the east, and Ethanac Road to the south. For reference, see Appendix A Location Map.

100.3 Methodology

The hydrologic and hydraulic analyses were completed following the methods outlined in the RCFC & WCD Hydrology Manual. The rational method was used to estimate time of concentrations and peak flow rates generated from the existing and proposed 10-year and 100-year storm events. The synthetic unit hydrograph method was used to determine the onsite existing and proposed hydrographs for the 1, 3, 6 and 24-hour durations of the 100-year storm event. The CivilDesign Engineering Software – 2018 Version 9.0 was used to complete the rational method and synthetic unit hydrograph analyses. The results of the rational method analyses are included in Appendix I and the results of the synthetic unit hydrograph analyses are included in Appendix J. Bentley's FlowMaster was used to complete the hydraulic analyses for the offsite drainage ditch and culvert using the Federal Highway Administration HEC-22 method. The results of the analyses are included in Appendix L. Complete onsite and offsite drainage system analyses will be provided in the Final Hydrology Report.

For the rational method analysis, the rainfall data incorporated into CivilDesign from the Riverside County Flood Control and Water Conservation District Hydrology Manual was used. The rainfall data for the Perris Valley area was utilized due to the location of the project site. For the synthetic unit hydrograph analysis, the rainfall data from NOAA Atlas 14 for Moreno Valley, CA was used. See Appendix D and E for rainfall data.

The type of soil and soil conditions are major factors affecting infiltration/detention and resultant storm water runoff. The Natural Resources Conservation Service (NRCS) has classified soil into one general hydrologic soil group for comparing infiltration and runoff rates. The group is based on properties that influence runoff, such as water infiltration rate, texture, natural discharge, and moisture condition. The runoff potential is based on the amount of runoff at the end of a long duration storm that occurs after wetting and swelling of the soil not protected by vegetation. Using the United States Department of Agriculture Natural Resources Conservation Service Web Soil Survey online tool, it was determined the predominant hydrologic soil group classification onsite is D. Based on Plate C-1.42 of the Hydrology Manual, the site soils is type D as well. Soil type D is defined as soils having poor infiltration rates (high runoff potential). Based on the Geotechnical Engineering Percolation/Infiltration Test Report prepared by Geotechnical Solutions, Inc the proposed site experiences a percolation rate of 1.14 in/hr on average. The reported infiltration rate based on the Porchet Method was determined to be 0.05 in/hr (without a factor of safety applied). See Appendix D and F for the soil information.

In addition, antecedent moisture condition (AMC) II was used to calculate the 10-year and (AMC) III was used to calculate the 100-year peak flows and runoff based on the hydrology manual. The land use for the proposed drainage subareas were selected based on the percent impervious that characterizes each subarea in the proposed conditions. See Appendix D Plate D-5.6 for the impervious percentages that correspond to each land use.

100.4 Drainage Characteristics

The site is mainly located in Zone X per the Federal Emergency Management Administration (FEMA) Flood Insurance Rate Map (FIRM) panel 06065C2055H and 06065C2060H, dated August 18, 2014. For reference, see FIRM Map in Appendix B. Flood Zone X is defined by FEMA as the area determined to be outside the 100-year flood. No portion of the site is located within the special flood hazard area inundated by the 100-year flood.

100.4.1 Pre-development Condition

Under the existing condition, the project site drains northwest. The existing condition of the project site is vacant and land cover consists mostly of annual grass. Under existing conditions, the project site was subdivided into two drainage areas (A-1 and A-2). Both A-1 and A-2 confluence and sheet flow out along the western boundary into an existing natural swale. The existing natural swale also accepts additional flows from an existing headwall southwest of the project site. The swale flows north and is intercepted by an existing double 6'x5' RCB culvert near Illinois Avenue and Interstate 215. Flows from the existing culvert are conveyed west across Interstate 215 and then continue west through existing drainage facilities until discharging into the San Jacinto River.

Under existing conditions, the project site accepts some offsite flows from the adjacent vacant properties on the east. Offsite runoff flows through the site, confluence with the onsite flows, and sheet flow out along the western boundary. Ultimately, existing storm water discharge from offsite and onsite areas are intercepted by the existing double 6'x5' RCB culvert and are tributary to the San Jacinto River.

Table 1 shows a summary of the Onsite Pre-development Flows. See Appendix H for Existing Drainage Maps and Appendix I for Rational Calculations.

Table 1: 100-year Onsite Pre-development Flows

Area Description	Area (acres)	Q_{10} (cfs)	Q_{100} (cfs)
A-1, A-2	13.97	12.72	20.43

100.4.2 Post-development Condition

Similar to existing condition, the post-developed project site will predominantly drain northwest to maintain the existing flow pattern to the maximum extent possible. The proposed development includes the construction of the proposed Pilot Perris Travel Center. The proposed site will encompass one (1) new building with a restaurant, drive thru, and fueling areas. The site will include landscaping, concrete hardscape, asphalt parking, a new concrete channel, a drainage ditch for offsite flows, and a bio-retention basin. See Appendix C for Construction Plans.

Per the Romoland Master Drainage Plan (MDP), originally prepared in April 1988 and revised in March 2006, the development of our project site requires the construction of a drainage facility along the west (specifically lateral A-11A). Lateral A-11A includes a concrete channel from the southwest corner of our site to the existing culvert near Illinois Avenue. The planned Lateral A-11A was planned to accept the flows from our project site along with the offsite flows that our project site accepts and the flows tributary to the northern property. The flows tributary to our project site are shown as areas W-1, W-2, and W-3 of the MDP in Appendix G. Although the hydrology of the MDP shows that the calculated channel flows are planned to accept developed areas, the planned developed flow from our site was 20.3 cfs which is nearly the same as our calculated onsite pre-development flow (20.4 cfs). Therefore, the proposed discharge from the project site will be mitigated to release the same flows as in the undeveloped condition in order to stay consistent with the planned flows from the site in the MDP.

Under proposed conditions, the project site will not obstruct conveyance of the existing offsite flows. Under the developed condition, the offsite runoff will be accepted from the existing cross gutter near the intersection of Trumble Road and Ethanac Road. The project is proposing a drainage ditch along the south that flows west and into the proposed channel. The proposed ditch is anticipated to convey 32 cfs of offsite runoff per the Romoland MDP.

Additionally, the proposed development does not plan to alter the existing natural swale west of the project site. This existing swale is within Caltrans right-of-way and will not be disturbed. Under the proposed condition, the existing swale will only be conveying tributary flows from Caltrans right-of-way and from the existing headwall southwest of the project site.

The developed project site includes fourteen (14) drainage areas. Drainage Areas A-1 through A-8 include most of the proposed development. Runoff from A-1 through A-8 predominantly drain in a northwest direction and are conveyed by a proposed storm drain system into a proposed bio-retention basin west of the project site. The bio-retention area (A-9) also contributes to the flows into the basin. Discharge from the basin will be controlled by an outlet structure and, due to the basin bottom elevation and the need for an underdrain system, flows will be pumped to discharge into the proposed channel (MDP Lateral A-11A). Drainage areas A-10 and A-11 include the proposed drainage ditch that will convey offsite flows. Drainage area A-12 includes the proposed channel. Drainage area A-13 and A-14 are driveway areas that were unfeasible to capture onsite and will drain toward the adjacent streets which ultimately drain into the proposed channel. Ultimately, all of the proposed onsite drainage areas are tributary to the proposed channel as planned in the Romoland MDP.

Table 2 shows a summary of the Onsite Post-development Flows (unmitigated). See Appendix H for Proposed Drainage Maps and Appendix I for Rational Calculations.

Table 2: Onsite Post-development Flows (unmitigated)

Area Description	Area (acres)	Q_{10} (cfs)	Q_{100} (cfs)
A-1 to A-12	13.88	17.62	26.92

100.5 Stormwater Mitigation

The proposed development intends to coincide with the planned discharge flows from the Romoland MDP. Per the MDP, the planned discharge from our site is 20.3 cfs which nearly coincides with the onsite pre-development 100-year discharge of the site (20.4 cfs). Since our resulting unmitigated post-development flows exceed the existing flows, stormwater mitigation will be required. The proposed development is proposing a bio-retention basin (A-9) for dual purposes: stormwater quality treatment and mitigation. The volume of storage provided in the basin along with the size of the outflow riser structure is intended to restrict peak flows in the proposed condition to levels equal to or less than the existing flows. The existing and proposed unit hydrographs for the 1-hr, 3-hr, 6-hr and 24-hr durations of the 100-year storm event were compared in order to determine the required retention volume. The required retention volume was governed by the 100 year-24 hour storm. To estimate the retention volume required for preliminary purposes, the incremental storage (volume) in which the proposed unit hydrograph flows exceeded the existing unit hydrograph flows was calculated for each time step. These incremental volumes were added to determine the total estimated retention volume. Since the basin outlet riser structures will be sized in the Final Report, an additional 20% was added to the calculated retention volumes to account for the efficiency of the outlet structures. Through the mitigation that the proposed basin will provide, the proposed development is not expected to cause a significant impact to downstream systems. See Appendix J and K for the retention and proposed volume calculations. Table 3 shows a summary of the estimated retention volume required compared to the proposed retention volume provided.

Table 3: Estimated Retention Volume Required vs. Proposed Retention Volume Provided

Area	Estimated Volume Increase (cf)	Estimated Retention Volume Required (cf)	Proposed Basin Volume (cf)
A (Onsite)	30,475	36,569	225,788

100.6 Hydraulic Analysis

The calculated peak flows form the analyses discussed above will be used to size the onsite drainage devices. The offsite concrete channel size was determined in the MDP as shown in Appendix G. The proposed offsite drainage ditch and culvert were preliminarily sized to assure offsite flows are able to be properly conveyed through the site. Preliminary sizing calculations are included in Appendix L for reference. All remaining drainage devices will be sized in the Final Hydrology Report.

100.7 Conclusion

In conclusion, the following was covered in this report:

- The pre-development discharge patterns and points were analyzed
- The post-development discharge patterns and points were analyzed
- The pre-development flow rates for the 10-year and 100-year events were determined
- The post-development unmitigated flows for the 10-year and 100-year events were determined
- The required stormwater mitigation for the 100-year event was determined

As discussed in the contents of this report, the development of the existing site into the proposed development is not expected to cause a significant impact to downstream systems for storms up to the 100-year condition.

Appendix A

Location Map


Illinois Ave
Case Rd
Case Rd
215
Trumble Rd
Sherman Rd
PROJECT SITE
Ethanac Rd
Ethanac Rd
Encanto Dr
Trumble Rd
Sherman Rd
Patricia Ln
Google Earth
Image Landsat / Copernicus
1000 ft
N

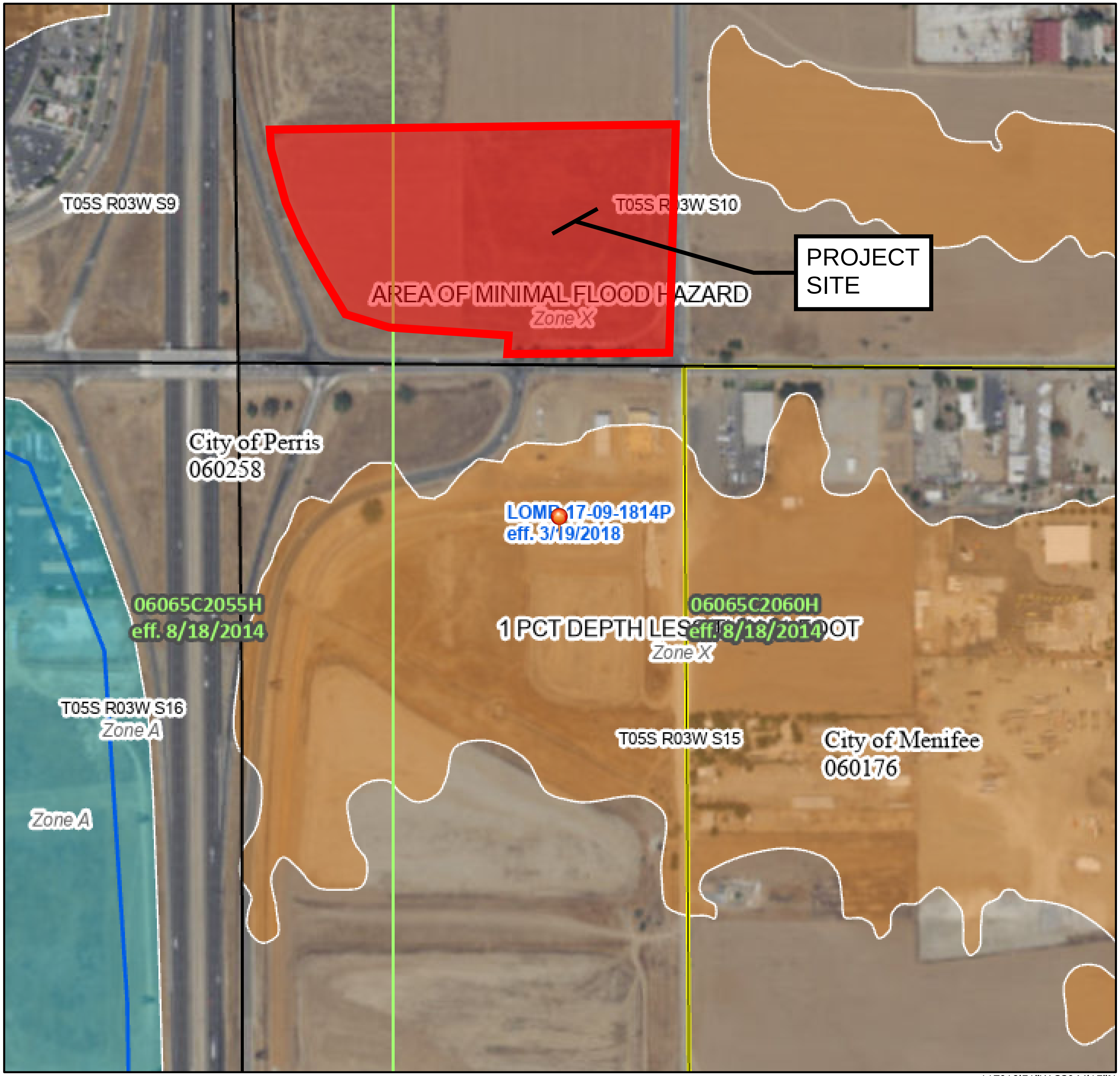
Appendix B

FIRM Map

National Flood Hazard Layer FIRMette

FEMA

117°11'28"W 33°44'45"N



117°10'51"W 33°44'15"N

Feet 0 250 500 1,000 1,500 2,000

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- B 20.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 8/17/2021 at 12:07 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix C

Construction Plans

CITY OF PERRIS
PRELIMINARY GRADING PLANS
PILOT PERRIS
ETHANAC ROAD AND TRUMBLE ROAD

PROJECT TEAM

OWNER/DEVELOPER
PILOT TRAVEL CENTERS LLC
5508 LONAS DRIVE
KNOXVILLE, TN 37909
(865) 588-7488

SURVEYOR
LG LAND SURVEYING, INC
30355 CALLE FELIZ TER
VALLEY CENTER, CA 92082
ATTN: JOHN GERVAIS, PLS 8674
(619) 535-1172
JOHN@LGLSINC.COM
DATE OF FIELD SURVEY: 07/13/2021

CIVIL ENGINEER
SHEA-MICHAEL ANTI. PE, LSIT, QSP/QSD
KIMLEY-HORN AND ASSOCIATES, INC.
3880 LEMON STREET, SUITE 420,
RIVERSIDE, CA 92501
(951) 335-8272
SHEA.ANTI@KIMLEY-HORN.COM

GEOTECHNICAL CONSULTANT
GEOTECHNICAL SOLUTIONS, INC
27 MAUCHLY #210
IRVINE, CA 92618
PROJECT No.: G-5908-01
DATED: JUNE 11, 2021

UTILITY PURVEYORS

WATER
EASTERN MUNICIPAL WATER DISTRICT
P.O. BOX 8300
2270 TRUMBLE ROAD PERRIS, CA
92572 (951) 928-3777

ELECTRICITY
SOUTHERN CALIFORNIA EDISON
26100 MENIFEE ROAD MENIFEE,
CA 92585
PHONE: (800) 655-4555

TELEPHONE/CABLE
FRONTIER COMMUNICATIONS
E 3RD ST PERRIS,
CA, 92570
PHONE: (909) 793-2826

SEWER
EASTERN MUNICIPAL WATER DISTRICT
P.O. BOX 8300
2270 TRUMBLE ROAD
PERRIS, CA 92572
(951) 928-3777

GAS
SOUTHERN CALIFORNIA GAS
1981 W. LUGONIA AVENUE
REDLANDS, CA 92374
PHONE: (800) 427-2200

PRIVATE ENGINEER'S NOTICE TO CONTRACTOR:

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. THESE LOCATIONS ARE APPROXIMATE AND SHALL BE CONFIRMED IN THE FIELD BY THE CONTRACTOR SO THAT ANY NECESSARY ADJUSTMENTS CAN BE MADE IN ALIGNMENT AND/OR GRADE OF THE PROPOSED IMPROVEMENTS. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PREVENT ANY UTILITY LINES SHOWN AND ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THESE PLANS.

ACTUAL THICKNESS OR BASE MATERIAL TO BE DETERMINED BY THE SOILS TEST AND RECOMMENDED BY THE SOILS ENGINEER.

CARE SHOULD BE TAKEN TO PREVENT GRADED DITCHES AND SWALES FROM UNDERMINING STREET IMPROVEMENTS.

ATTENTION CONTRACTORS:

CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND SHALL REPORT ALL DISCREPANCIES TO THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK.

CONSTRUCTION CONTRACTOR AGREES THAT, IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS. CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

BASIS OF BEARINGS:

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CENTERLINE OF TRUMBLE ROAD PER RS 85/71, I.E. N00°13'05"E.

FLOOD ZONE INFORMATION

THE LAND SHOWN IS MAINLY LOCATED IN FLOOD ZONE "X" BEING DESCRIBED AS AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN. PER FLOOD INSURANCE RATE MAP (FIRM) - COMMUNITY PANEL NUMBER 06065C2055H AND 06065C2060H, DATED AUGUST 18, 2014.

BUILDING NOTE:

ALL INFORMATION WITH BUILDING (INCLUDING SETBACKS AND FINISH FLOOR ELEVATIONS) IS FOR REFERENCE ONLY AND THE APPROVAL OF THESE GRADING PLANS DO NOT INCLUDE ANY PROVISIONS ASSOCIATED WITH BUILDINGS.

NOTE:

A PRE-GRADING/PRE-CONSTRUCTION MEETING AND SITE INSPECTION SHALL BE ARRANGED FOR BY THE SITE DEVELOPER PRIOR TO COMMENCING GRADING OPERATIONS. THOSE PARTIES REQUIRED TO ATTEND THE PRE-CONSTRUCTION MEETING SHALL INCLUDE BUT ARE NOT LIMITED TO THE DEVELOPER, PROJECT SUPERINTENDENT, ENGINEER OF RECORD, SOIL ENGINEER, GRADING CONTRACTOR, THE UNDERGROUND UTILITIES CONTRACTOR AND CITY INSPECTOR. THE FOCUS OF THE PRE-CONSTRUCTION MEETING SHALL BE TO DISCUSS THE VARIOUS ASPECTS AND RESPONSIBILITIES OF THE GRADING PROJECT AND TO PROVIDE AN APPROXIMATE TIME-TABLE FOR THE COMPLETION OF ROUGH GRADING. ARRANGE FOR A PRE-GRADING/PRE-CONSTRUCTION MEETING BY CALLING THE CITY OFFICE RESPONSIBLE FOR PROVIDING YOUR GRADING AND BUILDING INSPECTIONS. CALL CITY DISPATCH AT (951) 943-6504 TO SETUP PRE-CONSTRUCTION MEETING.

NO WORK SHALL COMMENCE WITHIN THE ROAD RIGHT-OF-WAY (R/W) PRIOR TO ISSUANCE OF AN ENCROACHMENT PERMIT BY CITY OF PERRIS.

PROJECT WILL COMPLY WITH PM10 REQUIREMENTS.

NOTIFICATIONS:

AT LEAST 48 HOURS PRIOR TO COMMENCING CONSTRUCTION, CONTRACTOR SHALL NOTIFY:

1. EASTERN MUNICIPAL WATER DISTRICT (FIELD ENGINEERING DEPARTMENT) — (951) 928-3777, EXT 4830
2. CITY OF PERRIS — (951) 943-5003
3. UNDERGROUND SERVICE ALERT (USA) — 1(800) 227-2600 OR 811
4. ALL OTHER AFFECTED UTILITIES AND PERMIT AGENCIES:
   A. THE GAS COMPANY — 1-800-427-2200
   B. SO. CAL EDISON (USA) — 1-800-684-8123
   C. VERIZON — 1-800-483-4000
   D. TIME WARNER CABLE — 1-887-475-3127

LEGAL DESCRIPTION

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF PERRIS, IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

PARCEL A:

LOT 13 OF WATERS HOMESTEAD, A SUBDIVISION OF THE SOUTHWEST QUARTER OF SECTION 10, TOWNSHIP 5 SOUTH, RANGE 3 WEST, SAN BERNARDINO BASE AND MERIDIAN, AS SHOWN BY MAP OF SAID SUBDIVISION ON FILE IN BOOK 14, PAGE 681, SAN DIEGO COUNTY RECORDS.

EXCEPT FROM SAID LOT 13 THAT PORTION THEREOF GRANTED TO THE STATE OF CALIFORNIA FOR FREEWAY PURPOSES BY DEED RECORDED JULY 3, 1951 IN BOOK 1284, PAGE 162, OFFICIAL RECORDS, RIVERSIDE COUNTY RECORDS.

ALSO EXCEPT THOSE PORTIONS OF LOT 13 OF WATERS HOMESTEAD, A SUBDIVISION OF THE SOUTHWEST QUARTER OF SECTION 10, TOWNSHIP 5 SOUTH, RANGE 3 WEST, SAN BERNARDINO BASE AND MERIDIAN, AS SHOWN BY MAP OF SAID SUBDIVISION ON FILE IN BOOK 14, PAGE 681 OF MAPS, SAN DIEGO COUNTY RECORDS, LYING WESTERLY AND SOUTHERLY OF THE FOLLOWING DESCRIBED LINE:

BEGINNING ON THE NORTHERLY LINE OF SAID LOT 12, DISTANT ALONG SAID NORTHERLY LINE SOUTH 89° 17' 04" EAST 50.61 FEET FROM THE WESTERLY LINE OF SAID SECTION;
THENCE COURSE (1) SOUTH 0° 21' 45" EAST 82.75 FEET;
THENCE ALONG A TANGENT CURVE CONCAVE EASTERLY WITH A RADIUS OF 2947 FEET, THROUGH AN ANGLE OF 3° 11' 29", 164.15 FEET;
THENCE ALONG A COMPOUND CURVE CONCAVE EASTERLY WITH A RADIUS OF 2197 FEET FROM A TANGENT BEARING SOUTH 3° 33' 14" EAST, THROUGH AN ANGLE OF 15° 40' 18", 600.93 FEET;
THENCE SOUTH 19° 13' 32" EAST 67.41 FEET;
THENCE SOUTH 28° 16' 41" EAST 298.72 FEET;
THENCE SOUTH 58° 11' 26" EAST, 50.93 FEET;
THENCE SOUTH 82° 01' 10" EAST 438.46 FEET;
THENCE COURSE (2) CONTINUING SOUTH 82° 01' 10" EAST 207.28 FEET;
THENCE COURSE (3) SOUTH 0° 46' 23" WEST 24.30 FEET TO THE SOUTHERLY LINE OF SAID LOT 14, AS CONVEYED TO THE STATE OF CALIFORNIA BY DEED RECORDED JUNE 18, 1965 AS INSTRUMENT NO. 70888 OF OFFICIAL RECORDS OF RIVERSIDE COUNTY.

APN: 329-250-011

PARCEL B:

LOT 14 OF WATERS HOMESTEAD, A SUBDIVISION OF THE SOUTHWEST QUARTER OF SECTION 10, TOWNSHIP 5 SOUTH, RANGE 3 WEST, SAN BERNARDINO BASE AND MERIDIAN, AS SHOWN BY MAP OF SAID SUBDIVISION ON FILE IN BOOK 14, PAGE 681, SAN DIEGO COUNTY RECORDS.

EXCEPT THE EASTERLY RECTANGULAR 30 FEET OF SAID LOT 14, AS GRANTED TO COUNTY OF RIVERSIDE BY DEED RECORDED AUGUST 16, 1950 IN BOOK 1197, PAGE 206 AND BY DEED RECORDED AUGUST 16, 1950 IN BOOK 1197, PAGE 229, BOTH OF OFFICIAL RECORDS, RIVERSIDE COUNTY RECORDS.

EXCEPT THOSE PORTIONS OF LOT 14 OF WATERS HOMESTEAD, A SUBDIVISION OF THE SOUTHWEST QUARTER OF SECTION 10, TOWNSHIP 5 SOUTH, RANGE 3 WEST, SAN BERNARDINO BASE AND MERIDIAN, AS SHOWN BY MAP OF SAID SUBDIVISION ON FILE IN BOOK 14, PAGE 681 OF MAPS, SAN DIEGO COUNTY RECORDS, LYING WESTERLY AND SOUTHERLY OF THE FOLLOWING DESCRIBED LINE:

BEGINNING ON THE NORTHERLY LINE OF SAID LOT 12, DISTANT ALONG SAID NORTHERLY LINE SOUTH 89° 17' 04" EAST 50.61 FEET FROM THE WESTERLY LINE OF SAID SECTION;
THENCE COURSE (1) SOUTH 0° 21' 45" EAST 82.75 FEET;
THENCE ALONG A TANGENT CURVE CONCAVE EASTERLY WITH A RADIUS OF 2947 FEET, THROUGH AN ANGLE OF 3° 11' 29", 164.15 FEET;
THENCE ALONG A COMPOUND CURVE CONCAVE EASTERLY WITH A RADIUS OF 2197 FEET FROM A TANGENT BEARING SOUTH 3° 33' 14" EAST, THROUGH AN ANGLE OF 15° 40' 18", 600.93 FEET;
THENCE SOUTH 19° 13' 32" EAST 67.41 FEET;
THENCE SOUTH 28° 16' 41" EAST 298.72 FEET; THENCE SOUTH 58° 11' 26" EAST, 50.93 FEET;
THENCE SOUTH 82° 01' 10" EAST 438.46 FEET;
THENCE COURSE (2) CONTINUING SOUTH 82° 01' 10" EAST 207.28 FEET;
THENCE COURSE (3) SOUTH 0° 46' 23" WEST 24.30 FEET TO THE SOUTHERLY LINE OF SAID LOT 14, AS CONVEYED TO THE STATE OF CALIFORNIA BY DEED RECORDED JUNE 18, 1965 AS INSTRUMENT NO. 70888 OF OFFICIAL RECORDS OF RIVERSIDE COUNTY.

APN: 329-250-012

ESTIMATED EARTHWORK QUANTITIES

CUT: 21,176 CY
FILL: 20,864 CY
NET: 312 CY CUT

NOTE:
THE ABOVE QUANTITIES ARE APPROXIMATE AND FOR PERMIT PROCESS ONLY. QUANTITIES HAVE BEEN CALCULATED FROM EXISTING GRADE SURFACE TO PROPOSED FINAL GRADE. QUANTITIES ACCOUNT FOR THICKNESS OF PAVEMENT SECTIONS, BUILDING SLAB, AND DETENTION SYSTEMS. THEY DO NOT REFLECT SHRINKAGE, SWELL, SUBSIDENCE AND REMOVAL OF EXISTING BUILDING STRUCTURES AND SURFACE IMPROVEMENTS.

THE CONTRACTOR SHALL RELY ON THEIR OWN EARTHWORK ESTIMATES FOR BIDDING PURPOSES.

STATEMENT BY ENGINEER OF RECORD

ALL EASEMENTS SHOWN ON THIS PLAN ARE PER THE ALTA PREPARED BY LG LAND SURVEYING DATED 07/13/21.

APPLICABLE CODES:

ALL NEW CONSTRUCTION SHALL MEET OR EXCEED THE MINIMUM REQUIREMENTS OF THE CALIFORNIA BUILDING CODE 2016 EDITION THAT INCLUDE THE BUILDING, PLUMBING, MECHANICAL, ELECTRICAL, FIRE AND ENERGY COMMISSION SERIES. IN CASES WHERE THE CODES MAY CONFLICT WITH THE PROVISIONS IN THESE PLANS OR SPECIFICATIONS, THE MORE RESTRICTIVE PROVISIONS SHALL GOVERN.

ABBREVIATIONS

AB	AGGREGATE BASE
AC	ASPHALT
AHJ	AUTHORITY HAVING JURISDICTION
BC	BACK OF CURB
BS	BOTTOM OF STAIR
BLDG	BUILDING
BW	BACK OF WALK
CAB	COMPACTED AGGREGATE BASE
CB	CATCH BASIN
CF	CURB FACE
C/L	CENTERLINE
CONC.	CONCRETE
CONST.	CONSTRUCT, CONSTRUCTION
CSG	COMPACTED SUBGRADE
DF	DEEPENED FOOTING
DI	DRAIN INLET
DW	DOMESTIC WATER
E	EAST
EG	EDGE OF GUTTER
ELEC	ELECTRIC
EP	EDGE OF PAVEMENT
FF	FINISHED FLOOR
FG	FINISHED GRADE
FL	FLOW LINE
FS	FINISHED SURFACE
FW	FIRE WATER
G	GAS
GB	GRADE BREAK
HP	HIGH POINT
INV	INVERT
IRR	IRRIGATION WATER
JS	JUNCTION STRUCTURE
L	LENGTH
LP	LOW POINT
MH	MANHOLE
N	NORTH
PCC	PORTLAND CEMENT CONCRETE
P/L	PROPERTY LINE
PUE	PUBLIC UTILITY EASEMENT
PVC	POLYVINYL CHLORIDE
R	RADIUS OR RIDGE
RD	ROOF DRAIN
RW	RECLAIMED WATER
ROW	RIGHT-OF-WAY
S	SLOPE GRADIENT
SD	STORM DRAIN
STA	STATION
SS	SANITARY SEWER
SPPWC	STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
SW	SIDE WALK
T	TELEPHONE
TC	TOP OF CURB
TS	TOP OF STAIR
VIF	VERIFY IN FIELD
W	WATER OR WEST
XXX.XX	PROPOSED ELEVATION
(XXX.XX)	EXISTING ELEVATION

SHEET INDEX

SHEET INDEX	
SHEET NUMBER	SHEET TITLE
1	COVER SHEET
2	GENERAL NOTES
3	SITE PLAN
4	SITE PLAN
5	HORIZONTAL CONTROL PLAN
6	HORIZONTAL CONTROL PLAN
7	SIGNING, STRIPING, AND PAVEMENT PLAN
8	SIGNING, STRIPING, AND PAVEMENT PLAN
9	GRADING PLAN
10	GRADING PLAN
11	UTILITY PLAN
12	UTILITY PLAN BLOW UPS
13	STORM DRAIN PLAN
14	STORM DRAIN PLAN BLOW UPS
15	LANDSCAPE PLAN
16	LANDSCAPE PLAN

SITE DATA

APN'S: 329-250-011 AND 329-250-012

GROSS PARCEL	±14.4	ACRES
DISTURBED	±14.4	ACRES
TOTAL PERVIOUS	±4.5	ACRES
TOTAL IMPERVIOUS (INCLUDING BUILDING)	±9.9	ACRES

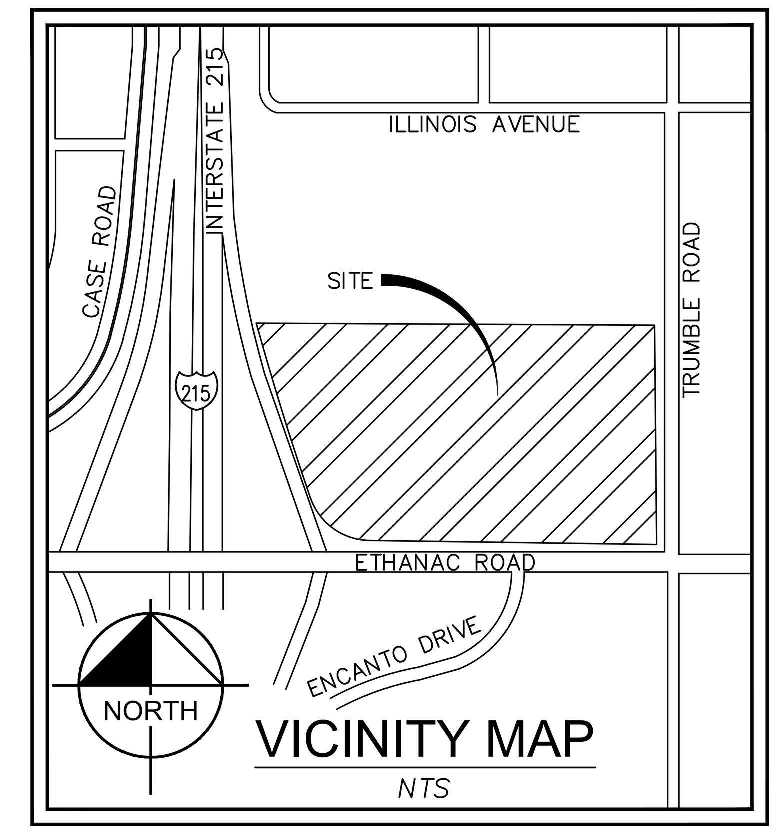
TOTAL GROSS FLOOR AREA: 13,980 SF

EXISTING: COMMERCIAL COMMUNITY (CC)

PROPOSED: COMMERCIAL COMMUNITY (CC)

PARKING PROVIDED:

STANDARD	88	SPACES
ACCESSIBLE	5	SPACES
TRUCK	116	SPACES
BICYCLE SPACES	2	PROPOSED



VICINITY MAP
NTS

LEGEND

PROPERTY LINE CIVIL
CENTERLINE
SETBACKS
EASEMENT LINE
LIMITS OF WORK LINE
SS — PROPOSED SANITARY SEWER PIPE
SD — PROPOSED STORM DRAIN PIPE
AIR — PROPOSED AIR
W — PROPOSED WATER PIPE
OWS — PROPOSED OIL WATER SEPARATOR
UGT — PROPOSED TELEPHONE LINE
UE — PROPOSED UNDERGROUND ELECTRIC
GB — GRADE BREAK
R — RIDGE LINE
ACCESSIBLE ROUTE
-x-x-x- FENCE
PARKING COUNT
(1422.27 TC) (1421.77 TP) — PROPOSED ELEVATION
1422.27 TC 1421.77 TP — EXISTING ELEVATION
1.2% — SLOPE

HEAVY DUTY CONCRETE PAVEMENT
HEAVY DUTY ASPHALT PAVEMENT
STANDARD DUTY ASPHALT PAVEMENT
LANDSCAPE/PLANTER AREA
DETECTABLE WARNINGS

GEOTECHNICAL REPORT

THE GEOTECHNICAL EVALUATION REPORT TRAVEL PLAZA PERRIS PROJECT NO. G-5908-01 DATED JUNE 11, 2021 PREPARED BY GEOTECHNICAL SOLUTIONS, INC. AND ALL ADDENDA SHALL BE CONSIDERED PART OF THESE CONSTRUCTION DOCUMENTS. THE PROJECT IS CONSISTENT WITH SOILS REPORT REQUIREMENTS AND RECOMMENDATIONS; AS WELL AS, ALL REQUIRED TESTS, INSPECTIONS AND REPORTS WILL BE CONDUCTED AS NECESSARY.

GEOTECHNICAL ENGINEER OF RECORD
GEOTECHNICAL SOLUTIONS, INC

DECLARATION OF ENGINEER OF RECORD

I HEREBY DECLARE THAT IN MY PROFESSIONAL OPINION, THE DESIGN OF THE IMPROVEMENTS AS SHOWN ON THESE PLANS COMPLIES WITH THE CURRENT PROFESSIONAL ENGINEERING STANDARDS AND PRACTICES. AS THE ENGINEER IN RESPONSIBLE CHARGE OF THE DESIGN OF THESE IMPROVEMENTS, I ACCEPT FULL RESPONSIBILITY FOR SUCH DESIGN. I UNDERSTAND AND ACKNOWLEDGE THAT THE PLAN CHECK OF THESE PLANS BY THE CITY OF PERRIS IS A REVIEW FOR THE LIMITED PURPOSE OF ENSURING THAT THESE PLANS COMPLY WITH CITY PROCEDURES AND OTHER APPLICABLE CODES AND ORDINANCES. THE PLAN REVIEW PROCESS IS NOT A DETERMINATION OF THE TECHNICAL ADEQUACY OF THE DESIGN OF THE IMPROVEMENTS. SUCH PLAN CHECK DOES NOT THEREFORE RELIEVE ME OF MY DESIGN RESPONSIBILITY.

SIGNATURE ______ DATE 2/27/2022
LICENSE NO. 78274 EXP. 9/30/2023

REGISTERED PROFESSIONAL ENGINEER SHEA-MICHAEL ANTI RCE NO. 78274 CIVIL STATE OF CALIFORNIA
2/27/2022

811
Know what's below. Call before you dig.
DIAL TOLL FREE 811
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

BENCH MARK:
COUNTY OF RIVERSIDE BENCHMARK "M 21-1 RESET", 373 FEET EAST ALONG ETHANAC ROAD FROM THE INTERSECTION OF ETHANAC ROAD AND THE SOUTHBOUND LANES OF HIGHWAY 395. 150 FEET SOUTH OF ETHANAC ROAD. 50 FEET SOUTHEAST OF THE NORTHEAST CORNER OF A 6 FOOT CHAIN LINK RIGHT-OF-WAY FENCE. 1 FOOT NORTHEAST OF AN ANGLE-POINT IN THE RIGHT-OF-WAY FENCE. 2 FEET NORTH OF A MARKER POST. A BRASS DISK STAMPED "M-21-1 RESET" SET IN THE TOP OF A CONCRETE POST 3 INCHES ABOVE GROUND. EL = 1421.891 NGVD 29 (5/85)

MARK	BY	DATE	REVISIONS	APPR	DATE
	ENGINEER				CITY

CITY OF PERRIS
APPROVED BY:
CONTRACT CITY ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER SHEA-MICHAEL ANTI RCE NO. 78274 CIVIL STATE OF CALIFORNIA

Kimley»Horn
765 THE CITY DRIVE SUITE 200, ORANGE, CA 92868
PHONE: 714-939-1030

PREPARED BY:
SHEA-MICHAEL ANTI R.C.E. 78274 2/27/2022 DATE

COVER SHEET
PRELIMINARY PRECISE GRADING PLAN
PILOT PERRIS
ETHANAC ROAD AND TRUMBLE ROAD
APN: 329-250-011 & 329-250-012

PROJECT NUMBER: 095426010

SHEET NO. 1
OF 16 SHTS
FILE NO.:

GENERAL NOTES:

1. NOTIFY CITY ENGINEER, CITY OF PERRIS, AT (951) 943-6504, AT LEAST 24 HOURS PRIOR TO START OF CONSTRUCTION.
2. PROOF ROLL BUILDING AND ALL PARKING AREAS. NOTIFY ARCHITECT OF ALL UNACCEPTABLE AREAS.
3. EDGE OF NEW PAVEMENT TO BE FLUSH WITH EXISTING PAVEMENT.
4. ALL SIDEWALK, CURB AND GUTTER, STREET PAVING, CURB CUTS, DRIVEWAY APPROACHES, ACCESSIBLE RAMPS, ETC. CONSTRUCTED OUTSIDE THE PROPERTY LINE IN THE RIGHT-OF-WAY SHALL CONFORM TO ALL MUNICIPAL AND/OR STATE SPECIFICATIONS AND REQUIREMENTS.
5. FOR AREAS OUTSIDE THE PROPERTY LINES, REPAIR AND REPLACE ALL DAMAGE DONE TO EXISTING ELEMENTS (SIDEWALKS, PAVING, LANDSCAPING, ETC.) AS REQUIRED BY OWNERS AND/OR GOVERNING AUTHORITY.
6. FOR PROPOSED UTILITY LOCATIONS, SEE UTILITY PLAN.
7. ALL DIMENSIONS REFER TO THE FACE OF CURB UNLESS OTHERWISE NOTED.
8. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS PRIOR TO ORDERING MATERIALS AND STARTING WORK, AND NOTIFY ENGINEER OF ANY DISCREPANCIES IMMEDIATELY.
9. CONTRACTOR SHALL ENSURE CLEAN JOINTS AND PROTECT PAVEMENT WHEREVER PROPOSED PAVEMENT MATCHES EXISTING PAVEMENT.
10. REFER TO ARCHITECTURAL PLANS FOR SIGN DETAILS. SEE MEP PLANS FOR SITE ELECTRICAL DRAWINGS.
11. REFER TO ARCHITECTURAL AND STRUCTURAL PLANS TO VERIFY ALL BUILDING DIMENSIONS.
12. ANY WORK IN THE RIGHT-OF-WAY SHALL BE APPROVED BY THE CITY ENGINEER.
13. ALL EARTHWORK TO COMPLY WITH RECOMMENDATIONS IN GEOTECHNICAL REPORT.
14. ALL PAINT STRIPING TO BE TWO COATS.
15. ALL PROPERTY LINES, EASEMENTS AND BUILDING, EXISTING AND PROPOSED, ARE SHOWN ON THIS SITE PLAN.
16. THE CONTRACTOR AND SUBCONTRACTORS SHOULD BE FAMILIAR WITH ALL STATE AND LOCAL REQUIREMENTS RELATED TO SITE CONSTRUCTION ACTIVITIES PRIOR TO COMMENCING WORK. ALL WORK SHALL CONFORM AS APPLICABLE TO THESE GOVERNING STANDARDS AND SPECIFICATIONS.
17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING ALL MATERIAL AND LABOR TO CONSTRUCT THE FACILITY AS SHOWN AND DESCRIBED IN THE CONSTRUCTION DOCUMENTS IN ACCORDANCE WITH THE APPROPRIATE APPROVING AUTHORITIES, SPECIFICATIONS AND REQUIREMENTS. CONTRACTOR SHALL CLEAR AND GRUB ALL AREAS UNLESS OTHERWISE INDICATED, REMOVING TREES, STUMPS, ROOTS, MUCK, EXISTING PAVEMENT AND ALL OTHER DELETERIOUS MATERIAL.
18. EXISTING UTILITIES SHOWN ARE LOCATED ACCORDING TO THE INFORMATION AVAILABLE TO THE ENGINEER AT THE TIME OF THE TOPOGRAPHIC SURVEY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR THE ENGINEER. GUARANTEE IS NOT MADE THAT ALL EXISTING UNDERGROUND UTILITIES ARE SHOWN OR THAT THE LOCATION OF THOSE SHOWN ARE ENTIRELY ACCURATE. FINDING THE ACTUAL LOCATION OF ANY EXISTING UTILITIES IS THE CONTRACTOR'S RESPONSIBILITY AND SHALL BE DONE BEFORE COMMENCING ANY WORK IN THE VICINITY. FURTHERMORE, THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES DUE TO THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES. THE OWNER OR ENGINEER WILL ASSUME NO LIABILITY FOR ANY DAMAGES SUSTAINED OR COST INCURRED BECAUSE OF THE OPERATIONS IN THE VICINITY OF EXISTING UTILITIES OR STRUCTURES, NOR FOR TEMPORARY BRACING AND SHORING OF SAME. IF IT IS NECESSARY TO SHORE, BRACE, SWING OR RELOCATE A UTILITY, THE UTILITY COMPANY OR DEPARTMENT AFFECTED SHALL BE CONTACTED AND THEIR PERMISSION OBTAINED REGARDING THE METHOD TO USE FOR SUCH WORK.
19. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONTACT THE VARIOUS UTILITY COMPANIES WHICH MAY HAVE BURIED OR AERIAL UTILITIES WITHIN OR NEAR THE CONSTRUCTION AREA BEFORE COMMENCING WORK. THE CONTRACTOR SHALL PROVIDE 48 HOURS MINIMUM NOTICE TO ALL UTILITY COMPANIES PRIOR TO BEGINNING CONSTRUCTION. AN APPROXIMATE LIST OF THE UTILITY COMPANIES WHICH THE CONTRACTOR MUST CALL BEFORE COMMENCING WORK IS PROVIDED ON THE UTILITY SHEET OF THESE CONSTRUCTION PLANS. THIS LIST SERVES AS A GUIDE ONLY AND IS NOT INTENDED TO LIMIT THE UTILITY COMPANIES WHICH THE CONTRACTOR MAY WISH TO NOTIFY.
20. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL REQUIRED CONSTRUCTION PERMITS AND BONDS IF REQUIRED PRIOR TO CONSTRUCTION.
21. THE CONTRACTOR SHALL HAVE AVAILABLE AT THE JOB SITE AT ALL TIMES ONE COPY OF THE CONSTRUCTION DOCUMENTS INCLUDING PLANS, SPECIFICATIONS, GEOTECHNICAL REPORT AND SPECIAL CONDITIONS AND COPIES OF ANY REQUIRED CONSTRUCTION PERMITS.
22. ANY DISCREPANCIES ON THE DRAWINGS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE OWNER AND ENGINEER BEFORE COMMENCING WORK. NO FIELD CHANGES OR DEVIATIONS FROM DESIGN ARE TO BE MADE WITHOUT PRIOR APPROVAL OF THE OWNER AND NOTIFICATION TO THE ENGINEER.
23. ALL COPIES OF COMPACTION, CONCRETE AND OTHER REQUIRED TEST RESULTS ARE TO BE SENT TO THE OWNER AND DESIGN ENGINEER OF RECORD DIRECTLY FROM THE TESTING AGENCY.
24. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SUBMITTING TO THE ENGINEER A CERTIFIED RECORD SURVEY SIGNED AND SEALED BY A PROFESSIONAL LAND SURVEYOR REGISTERED IN THE STATE OF ARIZONA DEPICTING THE ACTUAL FIELD LOCATION OF ALL CONSTRUCTED IMPROVEMENTS THAT ARE REQUIRED BY THE JURISDICTIONAL AGENCIES FOR THE CERTIFICATION PROCESS. ALL SURVEY COSTS WILL BE THE CONTRACTORS RESPONSIBILITY.
25. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DOCUMENTING AND MAINTAINING AS-BUILT INFORMATION WHICH SHALL BE RECORDED AS CONSTRUCTION PROGRESSES OR AT THE COMPLETION OF APPROPRIATE CONSTRUCTION INTERVALS AND SHALL BE RESPONSIBLE FOR PROVIDING AS-BUILT DRAWINGS TO THE OWNER FOR THE PURPOSE OF CERTIFICATION TO JURISDICTIONAL AGENCIES AS REQUIRED. ALL AS-BUILT DATA SHALL BE COLLECTED BY A STATE OF CALIFORNIA PROFESSIONAL LAND SURVEYOR WHOSE SERVICES ARE ENGAGED BY THE CONTRACTOR.
26. ANY WELLS DISCOVERED ON SITE THAT WILL HAVE NO USE MUST BE PLUGGED BY A LICENSED WELL DRILLING CONTRACTOR IN A MANNER APPROVED BY ALL JURISDICTIONAL AGENCIES. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ANY WELL ABANDONMENT PERMITS REQUIRED.
27. ANY WELL DISCOVERED DURING EARTH MOVING OR EXCAVATION SHALL BE REPORTED TO THE APPROPRIATE JURISDICTIONAL AGENCIES WITHIN 24 HOURS AFTER DISCOVERY IS MADE.
28. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THAT THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS DO NOT CONFLICT WITH ANY KNOWN EXISTING OR OTHER PROPOSED IMPROVEMENTS. IF ANY CONFLICTS ARE DISCOVERED, THE CONTRACTOR SHALL NOTIFY THE OWNER PRIOR TO INSTALLATION OF ANY PORTION OF THE SITE WORK THAT WOULD BE AFFECTED. FAILURE TO NOTIFY OWNER OF AN IDENTIFIABLE CONFLICT PRIOR TO PROCEEDING WITH INSTALLATION RELIEVES OWNER OF ANY OBLIGATION TO PAY FOR A RELATED CHANGE ORDER.
29. ANY EXISTING UTILITY, WHICH IS TO BE EXTENDED, WHICH IS THE CONNECTION POINT FOR NEW UNDERGROUND UTILITIES, OR WHICH NEW FACILITIES CROSS, SHALL BE EXPOSED BY THE CONTRACTOR PRIOR TO PLACEMENT OF THE NEW UTILITIES. COST OF SUCH EXCAVATION AND SUBSEQUENT BACKFILL SHALL BE INCLUDED IN THE PRICES PAID FOR THE VARIOUS ITEMS OF WORK. THE ELEVATIONS AND LOCATIONS OF THE EXISTING FACILITIES WILL BE CHECKED BY THE PUBLIC WORKS INSPECTOR AND THE ENGINEER. IF IN THE OPINION OF THE INSPECTOR A CONFLICT EXISTS, THEN THE ENGINEER SHALL MAKE ANY NEEDED GRADE AND/ OR ALIGNMENT ADJUSTMENTS AND REVISE THE PLANS ACCORDINGLY. ALL GRAVITY FLOW PIPELINES TO BE LAID UPGRADE FROM THE LOWEST POINT STARTING AT THE END OF EXISTING IMPROVEMENTS. THE CONTRACTOR SHALL NOTIFY THE ENGINEER AT LEAST 24 HOURS PRIOR TO BACKFILLING OF ANY PIPE WHICH STUBS TO A FUTURE PHASE OF CONSTRUCTION FOR INVERT VERIFICATION. TOLERANCE SHALL BE IN ACCORDANCE WITH CITY STANDARD SPECIFICATIONS.

GENERAL NOTES CONTINUATION:

1. ALL WORK TO BE PERFORMED PER CITY OF PERRIS, RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT (R.C.T.D.), EASTERN MUNICIPAL WATER DISTRICT (E.M.W.D), CALTRANS AND THE 2009 MANUAL ON UNIFORM CONTROL DEVICES (M.U.T.C.D.) STANDARDS WITH CALIFORNIA SUPPLEMENT.
2. NOTIFY CITY ENGINEER, CITY OF PERRIS, AT (951) 943-6504, AT LEAST 24 HOURS PRIOR TO START OF CONSTRUCTION.
3. CONTRACTOR IS REQUIRED TO LOCATE AND ADJUST TO GRADE ALL EXISTING MANHOLES, METERS, AND VALVE COVERS FOR WATER, SEWER, TELEPHONE, ELECTRIC, CABLE TV AND OTHER FACILITIES AS REQUIRED (WHEATEAR CALLED-OUT OR NOT ON PLANS).
4. ALL STRIPING & LEGENDS SHALL BE REPLACED IN ACCORDANCE WITH THE STRIPING PLANS HEREIN. ALL STRIPING TO BE PAINT (TWO COATS) AND ALL MARKINGS (INCLUDING CROSSWALKS) TO BE THERMOPLASTIC ALL STRIPING AND PAVEMENT MARKINGS TO BE PER 2006 M.U.T.C.D. STANDARDS WITH CALIFORNIA SUPPLEMENT.
5. ALL EXISTING A.C. AND CONCRETE TO BE SAW-CUT WHERE WIDENING IS TO TAKE PLACE OR ADJACENT TO WHERE CONCRETE IS TO BE CONSTRUCTED (1' MINIMUM).
6. ANY STOCKPILE OR STORAGE YARD ON PRIVATE PROPERTY MUST HAVE CITY'S AND OWNER'S APPROVAL.
7. THE CITY INSPECTOR WILL MARK ALL CONCRETE REMOVALS PRIOR TO CONSTRUCTION ALL CONCRETE WILL BE SAW-CUT WHERE REQUIRED PRIOR TO BEING REMOVED.
8. CONTRACTOR SHALL VERIFY THE EXISTENCE OF EXISTING SURVEY MONUMENTS AND PROTECT THEM IN PLACE. ANY SURVEY MONUMENTS MISSING AND/OR DAMAGED DURING CONSTRUCTION WILL HAVE TO BE RESET PRIOR TO PROJECT COMPETITION BY A QUALIFIED REGISTERED SURVEYOR.
9. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROTECT THE NEW WORK, FROM VANDALISM UNTIL THE IMPROVEMENTS HAVE BEEN ACCEPTED BY THE CITY AND A NOTICE OF COMPLETION MUST BE FILED.
10. ALL ASPHALT REMOVALS TO BE MARKED BY THE CITY INSPECTOR PRIOR TO CONTRACTOR BEGINNING WORK ON THAT PARTICULAR STREET SEGMENT.
11. CONTRACTOR SHALL CONTACT UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA AND OTHER UTILITY COMPANIES AS NEEDED TO COORDINATE FOR PROTECTION AND/OR ADJUSTMENTS OF UTILITIES, AS REQUIRED.
12. CONTRACTOR TO VISIT THE SITE AND FAMILIARIZE HIMSELF WITH THE WORK AND AREA PRIOR TO BIDDING AND NOTIFY THE CITY OF DISCREPANCIES.
13. ALL DIMENSIONS ARE APPROXIMATE CONTRACTOR TO VERIFY IN FIELD.
14. CONTRACTOR IS RESPONSIBLE TO PROVIDE ALL TRAFFIC CONTROL DEVICES AS NEEDED AND PROVIDE TWO-WAY ACCESS AT ALL TIMES THROUGH THE SITE. THE CONTRACTOR SHALL MAINTAIN THESE DEVICES AT ALL TIMES INCLUDING HOLIDAYS AND WEEKENDS. FLAGMAN SHALL BE UTILIZED AS REQUIRED TO PROVIDE TWO-WAY TRAFFIC DURING CONSTRUCTION.
15. CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL IN COMPLIANCE WITH WATCH MANUAL, 2009 M.U.T.C.D., OR CURRENT EDITION, AND THE TRAFFIC PLANS PROVIDED HEREIN.
16. THE CONTRACTOR SHALL APPLY TO, AND BE ISSUED A NO FEE ENCROACHMENT PERMIT BY THE CITY OF PERRIS BEFORE BEGINNING ANY WORK WITH AN EXISTING CITY MAINTAINED PUBLIC STREET AND FOR UTILITY WORK WITHIN OFFERS OF DEDICATION FOR PUBLIC USE.
17. EXISTING PUBLIC STREETS, SHALL REMAIN OPEN TO THE PUBLIC DURING CONSTRUCTION AND SHALL BE MAINTAINED BY THE CONTRACTOR UNLESS OTHERWISE PROVIDED IN THE PLANS AND SPECIFICATIONS. PUBLIC INCONVENIENCE WILL BE MINIMIZED AT ALL TIMES AND SUCH STREETS SHALL BE LEFT FREE OF DIRT AND DEBRIS AT THE END OF EACH WORKING DAY UNLESS PERMISSION IS OTHERWISE GRANTED BY THE CITY ENGINEER.
18. THE CONTRACTOR IS RESPONSIBLE FOR CLEARING AND GRUBBING THE PROPOSED WORK AREA AND DISPOSAL OF EXCESS OR UNDESIRABLE MATERIAL CONTRACTOR SHALL RELOCATE OR CAUSE TO BE RELOCATED EXISTING CONFLICTING UTILITIES IF REQUIRED BY CONTRACT.
19. ANY PROPOSED DEVIATION FROM THESE PLANS BY THE CONTRACTOR MUST MET CITY'S APPROVAL. THE CONTRACTOR IS RESPONSIBLE TO REIMBURSE THE CITY FOR ANY RELATED COST TO THE CITY ASSOCIATED WITH SUCH CHANGE. IN THIS EVENT, NO INCREASE IN CONTRACTOR'S COST WILL BE APPROVED.
20. CONTRACTOR IS REQUIRED TO INSTALL BLUE REFLECTIVE PAVEMENT AT ALL FIRE HYDRANT LOCATION IN THE WORK AREA.
21. THE CONTRACTOR IS REQUIRED TO REMOVE ALL CONFLICTING STRIPING AND LEGENDS BY WET SANDBLASTING.
22. APPLY WEED KILL TO ALL EXISTING WEEDS BETWEEN 1-3 WEEKS PRIOR TO CONSTRUCTION AND REMOVE WEEDS. WEEDS SHALL BE REMOVED FROM ALL EXISTING PAVEMENT, MEDIANS, CURB AND GUTTER, SIDEWALK (BETWEEN CURB AND SIDEWALK) AND WHEREVER IMPROVEMENTS ARE PROPOSED, AND UP TO 4.0' BEHIND E.P. OR CURB WHEN NO SIDEWALK EXISTS.
23. CONTRACTOR SHALL REPLACE ALL STRIPING, LEGENDS, AND SIGNS IF THEY ARE DAMAGED DURING CONSTRUCTION AT NO EXTRA COST TO THE CITY. EXISTING STRIPING WITHIN PROJECT VICINITY THAT BECOME DULL, SHALL BE REFRESHED AS DIRECTED BY THE CITY ENGINEER. CONFLICTING SIGNS SHALL BE REMOVED AS DIRECTED BY THE CITY ENGINEER OR HIS REPRESENTATIVE.
24. EXISTING TO PROPOSED CONCRETE PAVEMENT JOINTS SHALL BE CONSTRUCTED PER CALTRANS REVISED STANDARD PLAN RSP P10. 1 INCH MINIMUM DIAMETER DOWEL BARS SHALL BE USED AND AS APPROVED BY THE CITY ENGINEER.
25. ALL GRADING AND CONSTRUCTION ACTIVITIES SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECTS SWPPP AND NOI. REFER TO NPDES NOTED ON EROSION CONTROL PLANS.
26. ALL STREET SECTION ARE MINIMUM REQUIREMENTS, ADDITIONAL SOILS TESTS SHALL BE TAKEN AFTER ROUGH GRADING TO DETERMINE THE RECOMMENDED STREET SECTIONS REQUIREMENTS. USE RIVERSIDE COUNTY STD 401 IF EXPANSIVE SOILS ARE ENCOUNTERED.
27. ON-SITE LIGHTING, LANDSCAPE, AND LAYOUT TO BE APPROVED BY THE CITY OF PERRIS PLANNING DEPARTMENT.
28. WALLS/FENCE REQUIRE A SEPARATE PERMIT.
29. HAULING ROUTE SHALL BE SUBMITTED FOR APPROVAL BY THE CITY ENGINEER PRIOR TO START OF THE IMPORTATION/EXPORTATION OF DIRT.

CITY OF PERRIS WQMP INSPECTION NOTIFICATION REQUIREMENTS:

1. GENERAL CONTRACTOR IS RESPONSIBLE TO CALL FOR WQMP (WATER QUALITY MANAGEMENT PLAN) INSPECTIONS. A MINIMUM OF TWO (2) WQMP INSPECTIONS ARE REQUIRED IN THE FOLLOWING ORDER:

   A. AT THE TIME OF PRECISE GRADE AND CONSTRUCTION OF FLOW-BASED/VOLUME BASED BMP'S, AND/OR INSTALLATION OF STORM DRAIN AND WQMP EQUIPMENT, WHEN THE TRENCHES ARE STILL OPEN; AND

   B. AT FINAL INSPECTION, WHEN ALL PLANT MATERIALS, STRUCTURAL TREATMENT CONTROL BMP'S, STENCILING, EMPLOYEE SOURCE CONTROL HANDBOOKS, AND WQMP EQUIPMENT HAVE BEEN INSTALLED AND ARE FULLY OPERATIONAL.

2. A WRITTEN CLEARANCE LETTER SHALL BE SIGNED BY THE CITY'S ENGINEERING DEPARTMENT TO SIGNIFY APPROVAL OF WQMP SITE DESIGN, SOURCE CONTROL AND TREATMENT CONTROL BMP'S (BEST MANAGEMENT PRACTICES). THIS LETTER WILL NEED TO BE PRESENTED TO BUILDING AND SAFETY DEPARTMENT AS PART OF THE FINAL APPROVALS.

UTILITY NOTES:

1. THE CONTRACTOR SHALL CONSTRUCT GRAVITY SEWER LATERALS, CLEANOUTS, GRAVITY SEWER LINES, AND DOMESTIC WATER AND FIRE PROTECTION SYSTEM AS SHOWN ON THESE PLANS. THE CONTRACTOR SHALL FURNISH ALL NECESSARY MATERIALS, EQUIPMENT, MACHINERY, TOOLS, MEANS OF TRANSPORTATION AND LABOR NECESSARY TO COMPLETE THE WORK IN FULL AND COMPLETE ACCORDANCE WITH THE SHOWN, DESCRIBED AND REASONABLY INTENDED REQUIREMENTS OF THE CONTRACT DOCUMENTS AND JURISDICTIONAL AGENCY REQUIREMENTS. IN THE EVENT THAT THE CONTRACT DOCUMENTS AND THE JURISDICTIONAL AGENCY REQUIREMENTS ARE NOT IN AGREEMENT, THE MOST STRINGENT SHALL GOVERN.
2. ALL EXISTING UNDERGROUND UTILITY LOCATIONS SHOWN ARE APPROXIMATE THE CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS FOR UTILITY LOCATION AND COORDINATION IN ACCORDANCE WITH THE NOTES CONTAINED IN THE GENERAL CONSTRUCTION SECTION OF THIS SHEET.
3. THE CONTRACTOR SHALL RESTORE ALL DISTURBED VEGETATION IN KIND, UNLESS SHOWN OTHERWISE.
4. DEFLECTION OF PIPE JOINTS AND CURVATURE OF PIPE SHALL NOT EXCEED THE MANUFACTURER'S SPECIFICATIONS. SECURELY CLOSE ALL OPEN ENDS OF PIPE AND FITTINGS WITH A WATERTIGHT PLUG WHEN WORK IS NOT IN PROGRESS. THE INTERIOR OF ALL PIPES SHALL BE CLEAN AND JOINT SURFACES WIPED CLEAN AND DRY AFTER THE PIPE HAS BEEN LOWERED INTO THE TRENCH. VALVES SHALL BE PLUMB AND LOCATED ACCORDING TO THE PLANS.
5. ALL PHASES OF INSTALLATION, INCLUDING UNLOADING, TRENCHING, LAYING AND BACK FILLING, SHALL BE DONE IN A FIRST CLASS WORKMANLIKE MANNER. ALL PIPE AND FITTINGS SHALL BE CAREFULLY STORED FOLLOWING MANUFACTURER'S RECOMMENDATIONS. ANY PIPE OR FITTING WHICH IS DAMAGED OR WHICH HAS FLAWS OR IMPERFECTIONS WHICH, IN THE OPINION OF THE ENGINEER OR OWNER, RENDERS IT UNFIT FOR USE, SHALL NOT BE USED. ANY PIPE NOT SATISFACTORY FOR USE SHALL BE CLEARLY MARKED AND IMMEDIATELY REMOVED FROM THE JOB SITE, AND SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
6. WATER FOR FIRE FIGHTING SHALL BE AVAILABLE FOR USE PRIOR TO COMBUSTIBLES BEING BROUGHT ON SITE.
7. ALL UTILITY AND STORM DRAIN TRENCHES LOCATED UNDER AREAS TO RECEIVE PAVING SHALL BE COMPLETELY BACK FILLED IN ACCORDANCE WITH THE GOVERNING JURISDICTIONAL AGENCY'S SPECIFICATIONS. IN THE EVENT THAT THE CONTRACT DOCUMENTS AND THE JURISDICTIONAL AGENCY REQUIREMENTS ARE NOT IN AGREEMENT, THE MOST STRINGENT SHALL GOVERN.
8. CONTRACTOR SHALL PERFORM, AT HIS OWN EXPENSE, ANY AND ALL TESTS REQUIRED BY THE SPECIFICATIONS AND/OR ANY AGENCY HAVING JURISDICTION. THESE TESTS MAY INCLUDE, BUT MAY NOT BE LIMITED TO, INFILTRATION AND EXFILTRATION, TELEVISION INSPECTION AND A MANDREL TEST ON GRAVITY SEWER. A COPY OF THE TEST RESULTS SHALL BE PROVIDED TO THE UTILITY PROVIDER, OWNER AND JURISDICTIONAL AGENCY AS REQUIRED.
9. THE EXISTING UTILITIES SHOWN ON THE PLAN ARE BASED ON AVAILABLE RECORDS. THE CONTRACTOR MUST FIELD DETERMINE THE LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO ANY CONSTRUCTION. REPORT DISCREPANCIES AND POTENTIAL CONFLICTS WITH PROPOSED UTILITIES TO ENGINEER PRIOR TO INSTALLATION OF ANY PIPING.
10. DIMENSIONS PROVIDED ARE TO OUTSIDE PIPE DIAMETERS.
11. ALL WATER LINES ARE TO BE BURIED A MINIMUM OF 40" DEEP, MEASURED TO TOP OF PIPE.
12. WATER PIPE TRENCHING PER EMWD STANDARD DETAIL B-408.
13. SEWER PIPE TRENCHING PER EMWD STANDARD DETAIL SB-157 AND SB-158.
14. CONFIRM UTILITY TIE-IN POINTS IN FIELD AND WITH MEP PLANS PRIOR TO CONSTRUCTION.

DEMOLITION NOTES:

1. REFER TO THE TOPOGRAPHIC SURVEY FOR ADDITIONAL DETAILS OF EXISTING STRUCTURES, ETC., LOCATED WITHIN THE PROJECT SITE. UNLESS OTHERWISE NOTED, ALL EXISTING BUILDINGS, STRUCTURES, SLABS, CONCRETE, ASPHALT, DEBRIS PILES, SIGNS, AND ALL APPURTENANCES ARE TO BE REMOVED FROM THE SITE BY THE CONTRACTOR AND PROPERLY DISPOSED OF IN A LEGAL MANNER AS PART OF THIS CONTRACT. SOME ITEMS TO BE REMOVED MAY NOT BE DEPICTED ON THE TOPOGRAPHIC SURVEY. REFER TO THE DEMOLITION PLAN FOR THE LIMITS OF ASPHALT REMOVAL (THE EXISTING PARKING LOT IS TO REMAIN). IT IS THE CONTRACTOR'S RESPONSIBILITY TO VISIT THE SITE AND DETERMINE THE FULL EXTENT OF ITEMS TO BE REMOVED. IF ANY ITEMS ARE IN QUESTION, THE CONTRACTOR SHALL CONTACT THE OWNER PRIOR TO REMOVAL OF SAID ITEMS.
2. THE CONTRACTOR SHALL CLEAR THE PROJECT SITE AREA WITHIN THE CONFINES OF THE DEMOLITION LIMIT LINE. THE CONTRACTOR SHALL CAP IN PLACE ALL EXISTING UTILITIES AT THE DEMOLITION LIMIT LINE, UNLESS NOTED ON THE PLAN. THE CONTRACTOR SHALL DEMOLISH AND LEGALLY REMOVE/DISPOSE OF ITEMS FROM THE SITE, INCLUDING ALL EXISTING UTILITY STRUCTURES, PLANTERS, TREES, AND ALL OTHER SITE FEATURES, UNLESS OTHERWISE NOTED ON THE PLAN.
3. DEMOLITION OF PAVEMENT INCLUDES PAVEMENT THICKNESS, REBAR IF ENCOUNTERED, AND BASE COURSE.
4. REMOVAL OF LANDSCAPING SHALL INCLUDE ROOTS AND ORGANIC MATERIAL.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ANY AND ALL PERMITS AND SHALL PAY ALL FEES NECESSARY FOR ENCROACHMENT, GRADING, DEMOLITION, AND DISPOSAL OF SAID MATERIALS AS REQUIRED BY PRIVATE, LOCAL AND STATE JURISDICTIONS.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR A SITE INSPECTION TO FULLY ACKNOWLEDGE THE EXTENT OF DEMOLITION WORK.
7. THE CONTRACTOR SHALL VERIFY AND LOCATE ALL EXISTING ABOVE AND UNDERGROUND UTILITIES. LOCATIONS SHOWN ON THE PLANS ARE APPROXIMATE AND ARE SHOWN FOR GENERAL INFORMATION ONLY. CONTRACTOR SHALL ADJUST TO GRADE ANY EXISTING UTILITIES TO REMAIN.
8. DAMAGE TO ANY EXISTING UTILITIES AND SERVICES TO REMAIN SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. CONTRACTOR SHALL REPAIR AND/OR REPLACE IN KIND.
9. EROSION CONTROL MEASURES SHALL BE IMPLEMENTED TO PREVENT DEBRIS AND UNSUITABLE MATERIALS FROM ENTERING SANITARY SEWERS AND STREETS.
10. DUST CONTROL MEASURES SHALL BE IMPLEMENTED DURING DEMOLITION.
11. DEMOLITION IS LIMITED TO WITHIN THE DEMOLITION LIMIT LINE UNLESS OTHERWISE NOTED.
12. CONTRACTOR SHALL REMOVE DEMOLISHED MATERIALS FROM THE SITE AS WORK PROGRESSES.
13. THE DRAWINGS MAY NOT INDICATE IN DETAIL ALL DEMOLITION WORK TO BE PERFORMED. THE CONTRACTOR SHALL EXAMINE EXISTING CONDITIONS TO DETERMINE THE FULL EXTENT OF DEMOLITION.
14. ALL DEMOLITION SHALL COMPLY WITH CHAPTER 24 AND ARTICLE 87 OF THE CALIFORNIA FIRE CODE.
15. CONTRACTOR TO USE CARE IN HANDLING DEBRIS FROM SITE TO ENSURE THE SAFETY OF THE PUBLIC. HAUL ROUTE TO BE CLOSELY MONITORED FOR DEBRIS OR MATERIALS TRACKED ONTO ADJOINING ROADWAYS, SIDEWALKS, ETC. ROADWAYS AND WALKWAYS TO BE CLEARED DAILY OR AS NECESSARY TO MAINTAIN PUBLIC SAFETY.
16. SEE EROSION CONTROL PLAN FOR EROSION PREVENTION.
17. CONTRACTOR TO INSTALL CHAIN LINK FENCE WITH MESH SCREEN TO PROTECT PUBLIC FROM ENTERING CONSTRUCTION AREA.
18. CONTINUOUS ACCESS SHALL BE MAINTAINED FOR SURROUNDING PROPERTIES AT ALL TIMES DURING DEMOLITION OF EXISTING FACILITIES.
19. MONITORING WELLS TO BE REMOVED PRIOR TO BEGINNING OF CONSTRUCTION.
20. FULL DEMOLITION LIMITS DUE TO CONSTRUCTION OF UTILITIES IS NOT SHOWN. CONTRACTOR TO REFER TO SHEET C3 AND UTILITY PLANS TO DETERMINE LIMITS. CONTRACTOR TO USE CAUTION AROUND EXISTING UTILITIES.
21. A CITY-APPROVED WASTE HAULER SHALL BE USED FOR ALL CONSTRUCTION/OTHER WASTE DISPOSAL.
22. CONTRACTOR SHALL ADJUST TO GRADE ANY EXISTING UTILITIES TO REMAIN.

PAVING, GRADING AND DRAINAGE NOTES:

1. ALL PAVING, CONSTRUCTION, MATERIALS, AND WORKMANSHIP WITHIN JURISDICTION'S RIGHT-OF-WAY SHALL BE IN ACCORDANCE WITH LOCAL OR COUNTY SPECIFICATIONS AND STANDARDS (LATEST EDITION) OR SPPWS SPECIFICATIONS AND STANDARDS (LATEST EDITION) IF NOT COVERED BY LOCAL OR COUNTY REGULATIONS.
2. ALL UNPAVED AREAS IN EXISTING RIGHTS-OF-WAY DISTURBED BY CONSTRUCTION SHALL BE REGRADED AND REPAIRED TO EXISTING CONDITION OR BETTER.
3. TRAFFIC CONTROL ON ALL CALTRANS, LOCAL AND COUNTY RIGHTS-OF-WAY SHALL MEET THE REQUIREMENTS OF THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (U.S. DOT/FHA) AND THE REQUIREMENTS OF THE STATE AND ANY LOCAL AGENCY HAVING JURISDICTION. IN THE EVENT THAT THE CONTRACT DOCUMENTS AND THE JURISDICTIONAL AGENCY REQUIREMENTS ARE NOT IN AGREEMENT, THE MOST STRINGENT SHALL GOVERN.
4. THE CONTRACTOR SHALL GRADE THE SITE TO THE ELEVATIONS INDICATED AND SHALL REGRADE WASHOUTS WHERE THEY OCCUR AFTER EVERY RAINFALL UNTIL AN ADEQUATE STABILIZATION OCCURS.
5. ALL AREAS INDICATED AS PAVEMENT SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE TYPICAL PAVEMENT SECTIONS AS INDICATED ON THE DRAWINGS.
6. WHERE EXISTING PAVEMENT IS INDICATED TO BE REMOVED AND REPLACED, THE CONTRACTOR SHALL SAW CUT A MINIMUM 2" DEEP FOR A SMOOTH AND STRAIGHT JOINT AND REPLACE THE PAVEMENT WITH THE SAME TYPE AND DEPTH OF MATERIAL AS EXISTING OR AS INDICATED.
7. WHERE NEW PAVEMENT MEETS THE EXISTING PAVEMENT, THE CONTRACTOR SHALL SAW CUT THE EXISTING PAVEMENT A MINIMUM 2" DEEP FOR A SMOOTH AND STRAIGHT JOINT AND MATCH THE EXISTING PAVEMENT ELEVATION WITH THE PROPOSED PAVEMENT UNLESS OTHERWISE INDICATED.
8. IF DEWATERING IS REQUIRED, THE CONTRACTOR SHALL OBTAIN ANY APPLICABLE REQUIRED PERMITS. THE CONTRACTOR IS TO COORDINATE WITH THE OWNER AND THE DESIGN ENGINEER PRIOR TO ANY EXCAVATION.
9. STRIP TOPSOIL AND ORGANIC MATTER FROM ALL AREAS OF THE SITE AS REQUIRED. IN SOME CASES TOPSOIL MAY BE STOCKPILED ON SITE FOR PLACEMENT WITHIN LANDSCAPED AREAS BUT ONLY AS DIRECTED BY THE OWNER.
10. FIELD DENSITY TESTS SHALL BE TAKEN AT INTERVALS IN ACCORDANCE WITH THE LOCAL JURISDICTIONAL AGENCY.
11. ALL SLOPES AND AREAS DISTURBED BY CONSTRUCTION SHALL BE GRADED AS PER PLANS. THE AREAS SHALL THEN BE STABILIZED BY MEANS AND METHODS APPROVED BY THE LOCAL AGENCY. ANY AREAS DISTURBED FOR ANY REASON PRIOR TO FINAL ACCEPTANCE OF THE JOB SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER. ALL EARTHEN AREAS WILL BE COVERED WITH ROCK OR MULCHED AS SHOWN ON THE LANDSCAPING PLAN.
12. ALL CUT OR FILL SLOPES SHALL BE 4 (HORIZONTAL) :1 (VERTICAL) OR FLATTER UNLESS OTHERWISE SHOWN.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONTROL OF DUST AND DIRT RISING AND SCATTERING IN THE AIR DURING CONSTRUCTION AND SHALL PROVIDE WATER SPRINKLING OR OTHER SUITABLE METHODS OF CONTROL. THE CONTRACTOR SHALL COMPLY WITH ALL GOVERNING REGULATIONS PERTAINING TO ENVIRONMENTAL PROTECTION.
14. THE CONTRACTOR SHALL TAKE ALL REQUIRED MEASURES TO CONTROL TURBIDITY, INCLUDING BUT NOT LIMITED TO THE INSTALLATION OF TURBIDITY BARRIERS AT ALL LOCATIONS WHERE THE POSSIBILITY OF TRANSFERRING SUSPENDED SOLIDS INTO THE RECEIVING WATER BODY EXISTS DUE TO THE PROPOSED WORK. TURBIDITY BARRIERS MUST BE MAINTAINED IN EFFECTIVE CONDITION AT ALL LOCATIONS UNTIL CONSTRUCTION IS COMPLETED AND DISTURBED SOIL AREAS ARE STABILIZED. THEREAFTER, THE CONTRACTOR MUST REMOVE THE BARRIERS. AT NO TIME SHALL THERE BE ANY OFF-SITE DISCHARGE WHICH VIOLATES THE WATER QUALITY STANDARDS OF THE GOVERNING CODE.
15. EXPOSED SLOPES SHOULD BE STABILIZED WITHIN 48 HOURS OF COMPLETING FINAL GRADING, AND AT ANY OTHER TIME AS NECESSARY, TO PREVENT EROSION, SEDIMENTATION OR TURBID DISCHARGES.
16. THE CONTRACTOR MUST REVIEW AND MAINTAIN A COPY OF THE REQUIRED PERMITS COMPLETE WITH ALL CONDITIONS, ATTACHMENTS, EXHIBITS, AND PERMIT MODIFICATIONS IN GOOD CONDITION AT THE CONSTRUCTION SITE. THE COMPLETE PERMIT MUST BE AVAILABLE FOR REVIEW UPON REQUEST BY GOVERNING JURISDICTIONS.
17. THE CONTRACTOR SHALL ENSURE THAT ISLAND PLANTING AREAS AND OTHER PLANTING AREAS ARE NOT COMPACTED AND DO NOT CONTAIN ROAD BASE MATERIALS. THE CONTRACTOR SHALL ALSO EXCAVATE AND REMOVE ALL UNDESIRABLE MATERIAL FROM ALL AREAS ON THE SITE TO BE PLANTED AND PROPERLY DISPOSED OF IN A LEGAL MANNER.
18. CONTRACTOR TO VERIFY ALL EXISTING TOPOGRAPHY AND STRUCTURES ON THE SITE AND IMMEDIATELY NOTIFY THE ENGINEER OF ANY DISCREPANCIES PRIOR TO STARTING WORK.
19. ALL PAVEMENT SPOT GRADE ELEVATIONS WITHIN OR ALONG THE CURB REFER TO THE EDGE OF PAVEMENT ELEVATIONS UNLESS OTHERWISE NOTED.
20. ALL ELEVATIONS SHOWN DEPICT FINISHED GRADE UNLESS OTHERWISE NOTED. GENERAL CONTRACTOR TO COORDINATE WITH EXCAVATION, LANDSCAPING, AND PAVING SUBCONTRACTORS REGARDING TOPSOIL THICKNESS FOR LANDSCAPING AREAS AND PAVEMENT SECTION THICKNESS FOR PAVED AREAS TO PROPERLY ENSURE ADEQUATE CUT TO ESTABLISH SUBGRADE ELEVATIONS.
21. NO EARTHEN SLOPE SHALL BE GREATER THAN 4:1 UNLESS OTHERWISE NOTED.
22. MAXIMUM SLOPE IN ACCESSIBLE PARKING SPACES AND LOADING ZONES SHALL NOTE EXCEED 2.0% IN ALL DIRECTIONS.
23. MAXIMUM RUNNING SLOPE SHALL NOTE EXCEED 5% AND CROSS SLOPE SHALL NOTE EXCEED 2.0% ON ALL SIDEWALKS AND ACCESSIBLE ROUTES UNLESS OTHERWISE NOTED.
24. WHEN NATURAL FLOW OF DRAINAGE IS AWAY FROM CURB CONTRACTOR TO INSTALL REVERSE GUTTER PITCH.
25. REFERENCE ARCHITECTURAL PLANS FOR ROOF DRAIN AND LOCATIONS.
26. CONTRACTOR TO USE APPROPRIATE PAINT COLORS PER DETAILS SHEET. ADA BARRIER FREE AREAS TO COMPLY WITH ALL LOCAL AND FEDERAL ADA STANDARDS.
27. ACCESSIBLE ROUTE TO ACCESSIBLE SPACES, BUILDING ENTRANCES, AND PUBLIC STREETS SHALL NOT EXCEED 5% RUNNING SLOPE AND 2% CROSS SLOPE.
28. THE ACCESSIBLE ROUTE IN FRONT OF PARKING SHALL BE A MINIMUM OF 48" WIDE AND NOT REDUCED BY VEHICLE OVERHANGS, CURBING, SIGN POSTS, OR OTHER OBSTRUCTIONS.
29. ANY WALK THAT CROSSES OR ADJOINS A VEHICULAR WAY NOT SEPARATED BY CURBS, RAILINGS, OR OTHER ELEMENTS SHALL BE DEFINED BY A CONTINUOUS 36" WIDE DETECTABLE WARNING.
30. SPECIAL RAMP RULES APPLY FOR ANY RISE GREATER THAN 6" INCLUDING BUT NOT LIMITED TO RESTRICTION ON SLOPE, TOTAL RISE BETWEEN LANDINGS, AND USE OF HANDRAILS.
31. TRANSITION CHANGE IN ELEVATION IS NOT TO EXCEED 1/4" WITHIN AN ACCESSIBLE ROUTE.
32. JOINT WIDTHS ARE NOT TO EXCEED 1/2" OF WIDTH.
33. CURB RAMPS MUST HAVE A DIFFERENT FINISH FROM THE ADJACENT PAVEMENT.
34. 2% SLOPE IN ALL DIRECTIONS WITHIN ADA PARKING STALLS. AFTER PROPOSED GRADE BREAK, ALLOWABLE SLOPE TO MATCH EXISTING IS 5.0%.
35. ALL AREAS WHERE STRIPING IS TO BE ERADICATED. CONTRACTOR IS TO ERADICATE AND SEAL COAT AREA.

PRECISE GRADING NOTES (CITY OF PERRIS):

1. ALL GRADING SHALL CONFORM TO THE UNIFORM CODE, APPENDIX CHAPTER 33, AS AMENDED BY ORDINANCE NO. 457.
2. ALL PROPERTY CORNERS SHALL BE CLEARLY DELINEATED IN THE FIELD PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION/GRADING.
3. DURING ROUGH GRADING OPERATIONS AND PRIOR TO CONSTRUCTION OF PERMANENT DRAINAGE STRUCTURES, TEMPORARY DRAINAGE CONTROL SHOULD BE PROVIDED TO PREVENT PONDING WATER AND DAMAGE TO ADJACENT STRUCTURES.
4. DUST SHALL BE CONTROLLED BY WATERING OR OTHER APPROVED METHODS.
5. NO FILL SHALL BE PLACED ON EXISTING GROUND UNTIL THE GROUND HAS BEEN CLEARED OF WEEDS, DEBRIS, TOPSOIL, AND OTHER DELETERIOUS MATERIAL.
6. MAXIMUM CUT AND FILL SLOPE = 2:1, UNLESS OTHERWISE SHOWN ON PLANS.
7. STABILITY CALCULATIONS WITH A FACTOR OF SAFETY OF AT LEAST ONE AND FIVE TENTHS (1.5) SHALL BE SUBMITTED BY A SOILS ENGINEER TO THE BUILDING AND SAFETY DEPARTMENT FOR CUT AND FILL SLOPES OVER 30' IN VERTICAL HEIGHT.
8. PROVIDE 5' BY 1' HIGH BERM OR EQUIVALENT ALONG THE TOP OF ALL FILL SLOPES OVER 5' HIGH.
9. PROVIDE A BROW DITCH, DESIGNED TO HANDLE 100 YR. Q STORM FLOWS, ALONG THE TOP OF ALL FILL SLOPES OVER 5' HIGH.
10. MINIMUM BUILDING PAD AND DRAINAGE SWALE SLOPE SHALL BE 1% IF CUT OF FILL IS LESS THAN 10'. 2% IF CUT OR FILL IS GREATER THAN 10'. DRAINAGE SWALES SHALL BE A MINIMUM OF 0.2' DEEP AND BE CONSTRUCTED A MINIMUM OF 2' FROM THE TOP OF CUT OR FILL SLOPES.
11. NO OBSTRUCTION OF FLOOD PLAINS OR NATURAL WATER COURSES SHALL BE PERMITTED.
12. ALL EXISTING DRAINAGE COURSES ON THE PROJECT SITE MUST CONTINUE TO FUNCTION, ESPECIALLY DURING STORM CONDITIONS. PROTECTIVE MEASURES AND TEMPORARY DRAINAGE PROVISIONS MUST BE USED TO PROTECT ADJOINING PROPERTIES DURING GRADING OPERATIONS.
13. FINISHED GRADE SHALL BE SLOPED AWAY FROM ALL EXTERIOR WALLS AT NOT LESS THAN ½" PER FOOT FOR A MINIMUM OF 3'.
14. CUT AND FILL SLOPES EQUAL TO OR GREATER THAN 3' IN VERTICAL HEIGHT SHALL BE PLANTED WITH GRASS OR GROUND COVER TO PROTECT THE SLOPE FROM EROSION AND INSTABILITY IN ACCORDANCE WITH ORDINANCE NO. 457 PRIOR TO FINAL GRADING INSPECTION.
15. EROSION CONTROL: ALL SLOPES REQUIRED TO BE PLANTED SHALL BE PROVIDED WITH ROSEA ICE PLANT (OR EQUAL) GROUND COVER AT 12" ON CENTER. SLOPES EXCEEDING 15' IN VERTICAL HEIGHT SHALL BE PLANTED WITH APPROVED TREES SPACED NOT TO EXCEED 20' ON CENTER OR SHRUBS NOT TO EXCEED 10', OR A COMBINATION OF SHRUBS AND TREES NOT TO EXCEED 15' IN ADDITION TO A GRASS MIX OR GROUND COVER. SLOPES EXCEEDING 4' IN VERTICAL HEIGHT SHALL BE PROVIDED WITH AN IN-GROUND IRRIGATION SYSTEM. SLOPES EQUAL TO OR LESS THAN 4' MAY BE IRRIGATED BY HOSE BIB LOCATED AT THE TOP OR TOE OF THE SLOPE, SPACED TO MAKE USE OF A HOUSE NO LONGER THAN 50' IN HEIGHT. THE IRRIGATION SYSTEM SHALL BE PROVIDED WITH AN APPROPRIATE BACKFLOW DEVICE PER U.P.C., CHAPTER 10.
16. ALL GRADING SHALL BE DONE IN CONFORMANCE WITH RECOMMENDATIONS OF THE PRELIMINARY SOILS INVESTIGATION BY SALEM ENGINEERING GROUP, INC. TWO SETS OF THE FINAL COMPACTION REPORT SHALL BE SUBMITTED TO THE BUILDING AND SAFETY DEPARTMENT WHICH SHALL INCLUDE FOUNDATION DESIGN RECOMMENDATIONS AND CERTIFICATION THAT GRADING HAS BEEN DONE IN CONFORMANCE WITH THE RECOMMENDATIONS OF THE SITE INVESTIGATION REPORT.
17. IF STEEP SLOPING TERRAIN OCCURS UPON WHICH FILL IS TO BE PLACED, IT MUST BE CLEARED, KEYED AND BENCHED INTO FIRM NATURAL SOIL FOR FULL SUPPORT. PREPARATION SHALL BE APPROVED BY A SUITABLE QUALIFIED AND REGISTERED PROFESSIONAL PRIOR TO PLACEMENT OF FILL MATERIAL.
18. ALL GRADING SHALL BE DONE UNDER THE SUPERVISION OF A COMPETENT SOILS ENGINEER WHO SHALL CERTIFY THAT ALL FILL HAS BEEN PROPERLY PLACED AND WHO SHALL SUBMIT A FINAL COMPACTION REPORT FOR ALL FILLS OVER 1' DEEP.
19. FINAL COMPACTION REPORT WILL BE REQUIRED FOR ALL FILLS GREATER THAN 1'.
20. A SUITABLY QUALIFIED AND REGISTERED PROFESSIONAL SHALL SUBMIT TO THE BUILDING AND SAFETY DEPARTMENT WRITTEN CERTIFICATION OF COMPLETION OF ROUGH GRADING IN ACCORDANCE WITH THE APPROVED GRADING PLAN PRIOR TO REQUESTING INSPECTION AND ISSUANCE OF THE BUILDING PERMIT. CERTIFICATION SHALL INCLUDE LINE, GRADE, ELEVATION AND LOCATION OF CUT/FILL SLOPES.
21. A SUITABLE QUALIFIED AND REGISTERED PROFESSIONAL SHALL SUBMIT CERTIFICATION OF BUILDING PAD ELEVATION, WHERE SPECIFIC ELEVATIONS ARE REQUIRED. THE ELEVATION (WITH RESPECT TO MEAN SEA LEVEL) SHALL BE GIVEN. IF AN ELEVATION WITH RESPECT TO ADJACENT GROUND SURFACE IS REQUIRED, THE ACTUAL DISTANCE ABOVE THE ADJACENT SHALL BE GIVEN.
22. A SUITABLY QUALIFIED AND REGISTERED PROFESSIONAL SHALL SUBMIT TO THE BUILDING AND SAFETY DEPARTMENT WRITTEN CERTIFICATION OF COMPLETION OF FINAL GRADING IN ACCORDANCE WITH THE APPROVED PLANS FOR ALL GRADING AS "ENGINEERED GRADING".
23. THE CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALERT TWO DAYS BEFORE YOU DIG AT 1-800-227-2600. A GRADING PERMIT MUST BE OBTAINED FROM THE DEPARTMENT OF BUILDING AND SAFETY, CITY OF PERRIS, PRIOR TO GRADING.
24. THE CONTRACTOR SHALL NOTIFY THE BUILDING AND SAFETY DEPARTMENT, 101 NORTH "D" STREET, PERRIS, CA 92571, TELEPHONE (951) 943-5003, AT LEAST 24 HOURS IN ADVANCE REQUESTING LOT GRADE AND DRAINAGE INSPECTION. THE INSPECTION MUST BE APPROVED PRIOR TO BUILDING PERMIT FINAL INSPECTION.
25. THE EARTHWORK QUANTITIES SHOWN ARE SUBJECT TO FIELD CONDITIONS. THE GRADING CONTRACTOR SHALL SATISFY HIMSELF AS TO THE QUANTITIES AND ADDITIONAL WORK SHOWN ON THIS PLAN AS PART OF THIS BID.
26. CONSTRUCTION ACTIVITIES AND EQUIPMENT MAINTENANCE IS LIMITED TO THE HOURS BETWEEN 7:00 A.M. AND 7:00 P.M. PER ZONING ORDINANCE, NOISE CONTROL, SECTION 7.34.060, IT IS UNLAWFUL FOR ANY PERSONS BETWEEN THE HOURS OF 7:00 P.M. OF ANY DAY AND 7:00 A.M. OF THE FOLLOWING DAY, OR ON A LEGAL HOLIDAY, OR ON SUNDAYS TO ERECT, CONSTRUCT, DEMOLISH, EXCAVATE, ALTER OR REPAIR ANY BUILDING OR STRUCTURE IN A MANNER AS TO CREATE DISTURBING EXCESSIVE OR OFFENSIVE NOISE.
27. STATIONARY CONSTRUCTION EQUIPMENT THAT GENERATES NOISE IN EXCESS OF 65 DBA AT THE PROJECT BOUNDARIES MUST BE SHIELDED AND LOCATED AT LEAST 100 FEET FROM OCCUPIED RESIDENCES. THE EQUIPMENT AREA WITH APPROPRIATE ACOUSTIC SHIELDING SHALL BE DESIGNATED ON BUILDING AND GRADING PLANS. EQUIPMENT AND SHIELDING SHALL REMAIN IN THE DESIGNATED LOCATION THROUGHOUT CONSTRUCTION ACTIVITIES.
28. CONSTRUCTION ROUTES ARE LIMITED TO CITY OF PERRIS DESIGNATED TRUCK ROUTES.
29. WATER TRUCKS OR SPRINKLER SYSTEMS SHALL BE USED DURING CLEANING, GRADING, EARTH MOVING, EXCAVATION, TRANSPORTATION OF CUT OR FILL MATERIALS AND CONSTRUCTION PHASES TO PREVENT DUST FROM LEAVING THE SITE AND TO CREATE A CRUST AFTER EACH DAY'S ACTIVITIES CEASE. AT A MINIMUM, THIS WOULD INCLUDE WETTING DOWN SUCH AREAS IN THE LATER MORNING AND AFTER WORK IS COMPLETED FOR THE DAY AND WHENEVER WIND EXCEEDS 15 MILES PER HOUR.
30. A PERSON OR PERSONS SHALL BE DESIGNATED TO MONITOR THE DUST CONTROL PROGRAM AND TO ORDER INCREASED WATERING AS NECESSARY TO PREVENT TRANSPORT OF DUST OFF-SITE. THE NAME AND TELEPHONE NUMBER OF SUCH PERSON SHALL BE PROVIDED TO THE CITY.
31. PROJECT APPLICANTS SHALL PROVIDE CONSTRUCTION SITE ELECTRICAL HOOK-UPS FOR ELECTRIC HAND TOOLS SUCH AS SAWS, DRILLS, AND COMPRESSORS, TO ELIMINATE THE NEED FOR DIESEL-POWERED ELECTRIC GENERATORS OR PROVIDE EVIDENCE THAT ELECTRICAL HOOK-UPS AT CONSTRUCTION SITES ARE NOT PRACTICAL OR PROHIBITIVELY EXPENSIVE.

811
DIAL TOLL FREE
811
Know what's below.
Call before you dig.
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

BENCH MARK:
COUNTY OF RIVERSIDE BENCHMARK "M 21-1 RESET", 373 FEET EAST ALONG ETHANAC ROAD FROM THE INTERSECTION OF ETHANAC ROAD AND THE SOUTHBOUND LANES OF HIGHWAY 395. 150 FEET SOUTH OF ETHANAC ROAD. 50 FEET SOUTHEAST OF THE NORTHEAST CORNER OF A 6 FOOT CHAIN LINK RIGHT-OF-WAY FENCE. 1 FOOT NORTHEAST OF AN ANGLE-POINT IN THE RIGHT-OF-WAY FENCE. 2 FEET NORTH OF A MARKER POST. A BRASS DISK STAMPED "M-21-1 RESET" SET IN THE TOP OF A CONCRETE POST 3 INCHES ABOVE GROUND.
EL = 1421.891 NGVD 29 (5/85)

MARK	BY	DATE	REVISIONS	APPR	DATE
ENGINEER				CITY	

CITY OF PERRIS

APPROVED BY:

CONTRACT CITY ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER
SHEA-MICHAEL ANTI
RCE NO. 78274
CIVIL
STATE OF CALIFORNIA

Kimley»Horn
765 THE CITY DRIVE SUITE 200, ORANGE, CA 92868
PHONE: 714-939-1030

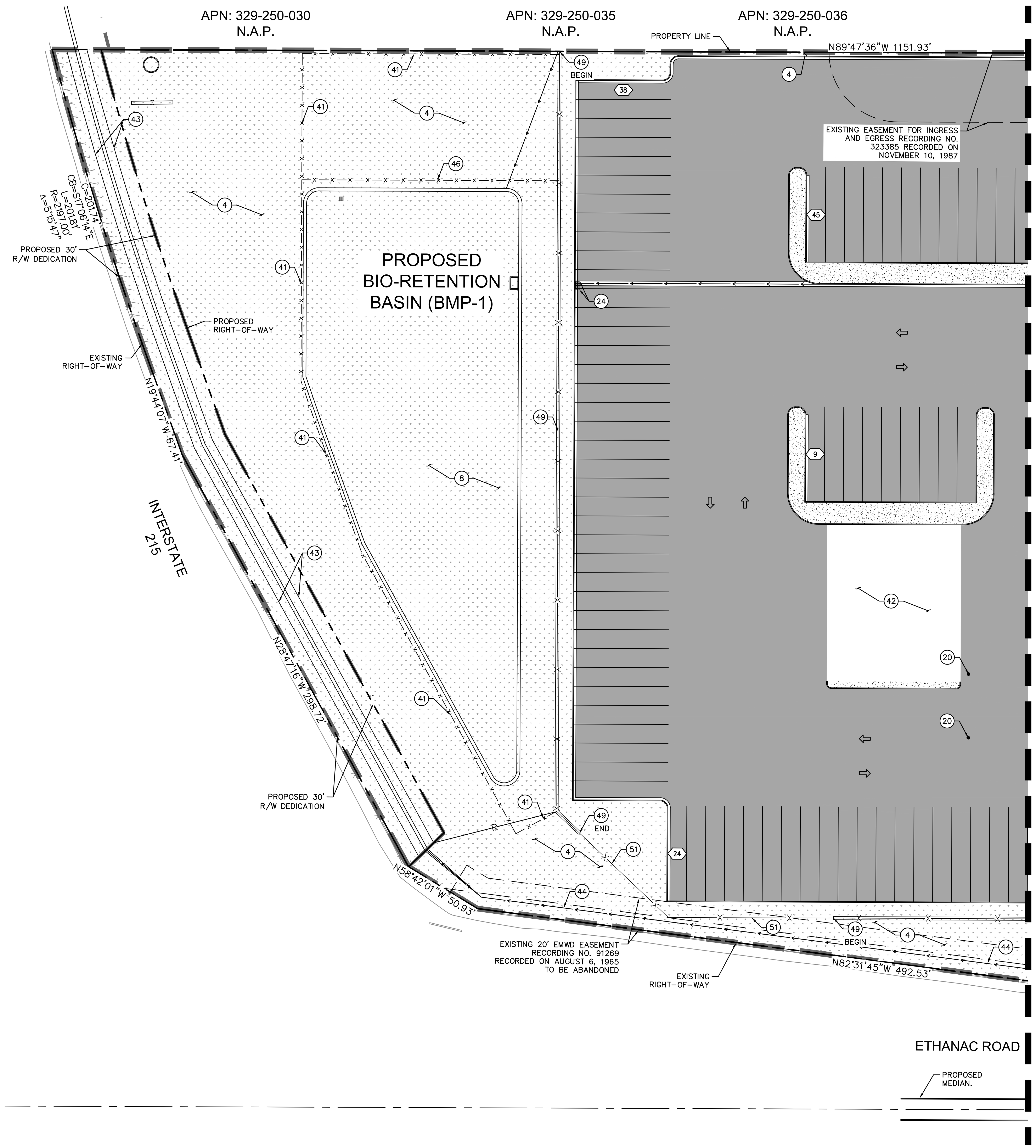
PREPARED BY:
SHEA-MICHAEL ANTI R.C.E. 78274
2/27/2022
DATE

GENERAL NOTES
PRELIMINARY PRECISE GRADING PLAN
PILOT PERRIS
ETHANAC ROAD AND TRUMBLE ROAD
APN: 329-250-011 & 329-250-012

PROJECT NUMBER: 095426010

FILE NO.:

SHEET NO.
2
OF 16 SHTS



LEGEND

PROPERTY LINE CIVIL	STANDARD DUTY CONCRETE PAVEMENT
LIMITS OF WORK	HEAVY DUTY CONCRETE PAVEMENT
CENTER LINE	HEAVY DUTY ASPHALT PAVEMENT
SETBACKS	STANDARD DUTY ASPHALT PAVEMENT
EASEMENT LINE	LANDSCAPE/ PLANTER AREA
ACCESSIBLE ROUTE	
FENCE	
GB GRADE BREAK	
R RIDGE LINE	
# PARKING COUNT	
DETECTABLE WARNINGS	
DECORATIVE PAVEMENT	

SITE INFORMATION

APN'S: 329-250-011 AND 329-250-012

GROSS PARCEL	±14.4	ACRES
DISTURBED	±14.4	ACRES
TOTAL PERVIOUS	±4.5	ACRES
TOTAL IMPERVIOUS (INCLUDING BUILDING)	±9.9	ACRES

TOTAL GROSS FLOOR AREA: 13,980 SF

EXISTING: COMMERCIAL COMMUNITY (CC)

PROPOSED: COMMERCIAL COMMUNITY (CC)

PARKING PROVIDED:

STANDARD	88	SPACES
ACCESSIBLE	5	SPACES
TRUCK	116	SPACES
BICYCLE SPACES	2	PROPOSED

CONSTRUCTION NOTES

1. PILOT TRAVEL CENTER BUILDING (SEE ARCHITECTURAL DRAWINGS), INSTALLED BY CONTRACTOR.
2. ABOVE GROUND STORAGE TANK FARM WITH CONTAINMENT. EACH AST FARM CONTAINS (4) 12,000 GALLON TACKS FOR DIESEL AND BIO. SEE PRODUCT PIPING DRAWINGS FOR MORE INFORMATION.
3. 25'-0" x 253'-7" AUTO CANOPY, FURNISHED AND INSTALLED BY CANOPY SUPPLIER. CANOPY FOUNDATIONS INSTALLED BY CONTRACTOR.
4. LANDSCAPE AREA INSTALLED BY CONTRACTOR. REFER TO LANDSCAPE AND IRRIGATION PLANS FOR MORE INFORMATION.
5. GREASE TRAP. FURNISHED AND INSTALLED BY CONTRACTOR.
6. CONCRETE ISLAND WITH A GAS/AUTO DIESEL (3+1) DISPENSER AND CONTAINMENT BOX TYPICAL AT (8) PLACES, INSTALLED BY CONTRACTOR.
7. 2'-0' HIGH GUARDRAIL AROUND CONTAINMENT AREA, 1'-0" OUTSIDE OF FENCE.
8. PROPOSED BIORETENTION BASIN. SEE UTILITY PLAN FOR MORE INFORMATION.
9. 25'-0" x 124'-9" TRUCK CANOPY, FURNISHED AND INSTALLED BY CANOPY SUPPLIER, CANOPY FOUNDATIONS INSTALLED BY CONTRACTOR.
10. TRUCK AIR STAND, TYPICAL AT EVERY OTHER TRUCK FUELING ISLAND, SUPPLIED BY OWNER AND INSTALLED BY CONTRACTOR.
11. CONCRETE ISLAND WITH A DIESEL DISPENSER AND CONTAINMENT BOX TYPICAL AT (8) PLACES, INSTALLED BY CONTRACTOR.
12. PREFABRICATED TRUCK ISLAND CATCH BASIN (TYP (7) PLACES). SUPPLIED BY OWNER INSTALLED BY CONTRACTOR
13. TRUCK FREEZE PROOF WATER STAND TYPICAL AT EVERY OTHER TRUCK FUELING ISLAND FURNISHED AND INSTALLED BY CONTRACTOR.
14. TANK #1, PRODUCT #1. 20,000 GALLON, 10'-0"ø X 37'-8 3/4" LONG, DOUBLE-WALL FIBERGLASS UNDERGROUND REGULAR UNLEADED GASOLINE TANK. FURNISHED BY OWNER, INSTALLED BY CONTRACTOR (TYP (1) PLACE). SEE PP DRAWINGS FOR MORE INFORMATION.
15. TANK #2 AND TANK #3. 20,000 GALLON, 10'-0"ø X 37'-10" LONG (2) CHAMBER UNDERGROUND DOUBLE WALL FIBERGLASS TANK, TANK #2, PRODUCT #2 - 12,000 GALLON SUPER UNLEADED GASOLINE, TANK #3, PRODUCT #3 - 8,000 AUTO DIESEL. FURNISHED BY OWNER, INSTALLED BY CONTRACTOR. (SEE PP DRAWINGS FOR MORE INFORMATION).
16. LOCAL UTILITY ELECTRICAL TRANSFORMER INSTALLED BY CONTRACTOR.
17. TRAVEL CENTER DISTRIBUTION ELECTRICAL TRANSFORMER INSTALLED BY CONTRACTOR.
18. PROPOSED WATER METER AND BACKFLOW. SEE UTILITY PLANS SHEET 11-12 FOR MORE INFORMATION.
19. PROPOSED IRRIGATION METER AND BACKFLOW PREVENTOR. SEE UTILITY PLANS SHEET 11-12 FOR MORE INFORMATION.
20. PROPOSED SEWER CLEANOUT. SEE UTILITY PLANS SHEET 11-12 FOR MORE INFORMATION.
21. PROPOSED U-SHAPED BIKE RACKS PER CITY STANDARDS AND SPECIFICATIONS.
22. INSTALL ACCESSIBLE RAMP. INSTALL CAST-IN-PLACE DETECTABLE WARNING SYSTEM (TRUNCATED DOMES) PER ARMOR TILE - 36" X 48" PANEL. PRODUCT NO. ADA-C-3648W PER DETAIL X, SHEET XX.
23. INSTALL DETECTABLE WARNINGS.
24. PROPOSED CATCH BASIN. SEE STORM DRAIN PLANS SHEET 13-14 FOR MORE INFORMATION.
25. AUTO AIR/VACUUM (PROVIDED BY OWNER, ELECTRICAL BY CONTRACTOR), YARD HYDRANT BY CONTRACTOR.
26. NEW TANK VENT RISER CLUSTER, INSTALLED BY CONTRACTOR.
27. 4,000 GALLON, 6'-0"ø x 21'-11" LONG, SINGLE-WALL FIBERGLASS UNDERGROUND OIL/ WATER SEPARATOR, FURNISHED BY OWNER, INSTALLED BY CONTRACTOR.
28. CLEAN OUT FOR OIL/WATER SEPARATOR FURNISHED AND INSTALLED BY CONTRACTOR.
29. B99 INJECTION SHED WITH SUMP. SUPPLIED BY OWNER. (SEE PRODUCT PIPING DRAWINGS FOR MORE INFORMATION).
30. 4" STEEL PIPE BOLLARD FURNISHED, INSTALLED BY CONTRACTOR (SEE CIVIL DWGS FOR SPECS.).
31. 6" STEEL PIPE BOLLARD FURNISHED, INSTALLED BY CONTRACTOR (SEE CIVIL DWGS FOR SPECS.).
32. 1'-0" CONCRETE BOLLARD FURNISHED, INSTALLED AND PAINTED BY CONTRACTOR (SEE CIVIL DWGS FOR SPECS.).
33. GREASE CONTAINER, PROVIDED BY OWNER.
34. SITE LIGHT, FURNISHED BY OWNER, INSTALLED BY CONTRACTOR. (LOCATION TO BE DETERMINED DURING FINAL ENGINEERING)
35. TRUCK SCALE, CONCRETE TRUCK SCALE PIT AND TRUCK SCALE FURNISHED AND INSTALLED BY TRUCK SCALE SUPPLIER. ELECTRICAL, COMMUNICATIONS AND DRAINAGE PROVIDED TO THE SCALE PIT BY CONTRACTOR, COORDINATION BY CONTRACTOR.
36. PARKING AREA DESIGNATED FOR GOLF CART.
37. TRASH ENCLOSURE 8' CHAIN LINK FENCE WITH VINYL INSERTS MOUNTED ON REINFORCED CONCRETE PAD WITH PROTECTIVE STEEL BOLLARDS, INSTALLED BY CONTRACTOR (SEE ARCH DWGS FOR DETAILS).
38. TRASH COMPACTOR, FURNISHED AND INSTALLED BY TRASH COMPACTOR SUPPLIER.
39. CARDBOARD BAILER OR RECYCLE DUMPSTER, FURNISHED AND INSTALLED BY DUMPSTER SUPPLIER.
40. STORAGE UNIT, FURNISHED BY OWNER. ELECTRICAL & A/C INSTALL BY CONTRACTOR.
41. PROPOSED "CERTAIN TEED BRAND; BUFFTECH VINYL FENCING; PRIVACY SERIES; STYLE "GALVESTON", 8' TALL; COLOR ALMOND." OR APPROVED EQUAL. FURNISHED AND INSTALLED BY CONTRACTOR.
42. PROPOSED SHOP BUILDING LOCATION.
43. PROPOSED CHANNEL (BOTTOM WIDTH 2', DEPTH 3.5', SIDE SLOPE 1.5:1) PER RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT PLAN FOR M.D.P. - ROMOLAND AREA LATERAL A-11A.
44. PROPOSED V-DITCH. REFER TO GRADING PLAN SHEET 9 AND 10 FOR MORE INFORMATION.
45. PROPOSED PORTE-COCHERE. REFER TO ARCHITECTURAL PLANS FOR MORE INFORMATION.
46. PROPOSED 4' CHAIN LINK FENCE.
47. INSTALL CHAIN LINK FENCE PER LANDSCAPE PLANS.
48. PROPOSED COMMERCIAL DRIVEWAY.
49. PROPOSED 8' AMETCO TITAN DESIGN ALUMINUM FENCE (COLOR TO MATCH BUILDING) ON TOP OF 3' BERM.
50. PROPOSED 10' CONCRETE MASONRY UNITS WALL.
51. PROPOSED 8' AMETCO TITAN DESIGN ALUMINUM FENCE (COLOR TO MATCH BUILDING) AT GRADE.

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80
1" = 40'
WHEN PRINTED AT FULL SIZE (24"X36")

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MARK	BY	DATE	REVISIONS	APPR	DATE
	ENGINEER			CITY	

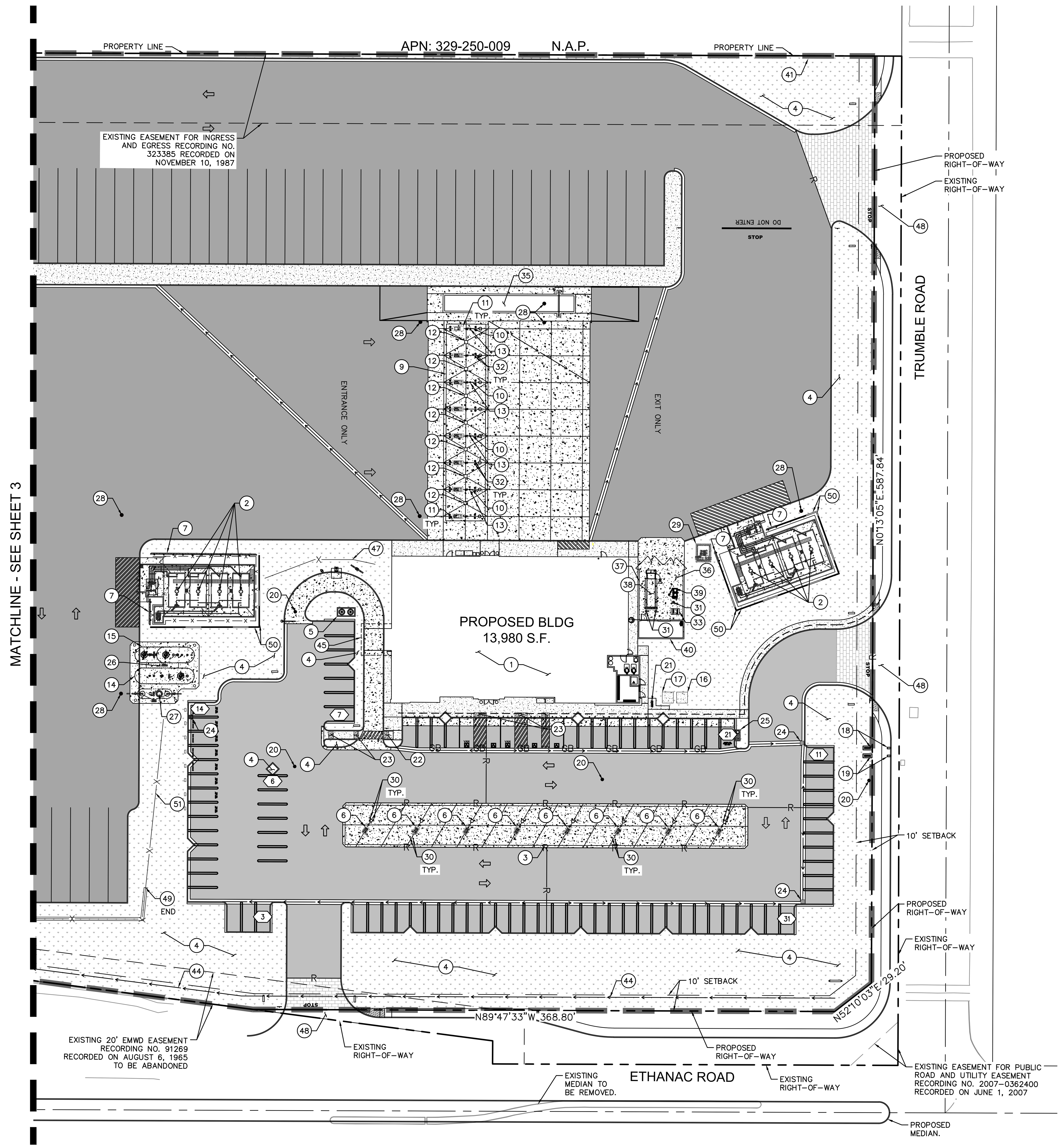
CITY OF PERRIS
APPROVED BY:
CONTRACT CITY ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER SHEA-MICHAEL ANTI RCE NO. 78274 CIVIL STATE OF CALIFORNIA

Kimley»Horn
765 THE CITY DRIVE SUITE 200, ORANGE, CA 92868
PHONE: 714-939-1030
PREPARED BY:
SHEA-MICHAEL ANTI R.C.E. 78274 2/27/2022 DATE

SITE PLAN
PRELIMINARY PRECISE GRADING PLAN
PILOT PERRIS
ETHANAC ROAD AND TRUMBLE ROAD
APN: 329-250-011 & 329-250-012
PROJECT NUMBER: 095426010

SHEET NO. 3
OF 16 SHTS
FILE NO.:



LEGEND

PROPERTY LINE CIVIL	STANDARD DUTY CONCRETE PAVEMENT
LIMITS OF WORK	HEAVY DUTY CONCRETE PAVEMENT
CENTER LINE	HEAVY DUTY ASPHALT PAVEMENT
SETBACKS	STANDARD DUTY ASPHALT PAVEMENT
EASEMENT LINE	LANDSCAPE/ PLANTER AREA
ACCESSIBLE ROUTE	
FENCE	
GRADE BREAK (GB)	
RIDGE LINE (R)	
PARKING COUNT (#)	
DETECTABLE WARNINGS	
DECORATIVE PAVEMENT	

SITE INFORMATION

APN'S: 329-250-011 AND 329-250-012

GROSS PARCEL	±14.4	ACRES
DISTURBED	±14.4	ACRES
TOTAL PERVIOUS	±4.5	ACRES
TOTAL IMPERVIOUS (INCLUDING BUILDING)	±9.9	ACRES

TOTAL GROSS FLOOR AREA: 13,980 SF

EXISTING: COMMERCIAL COMMUNITY (CC)

PROPOSED: COMMERCIAL COMMUNITY (CC)

PARKING PROVIDED:

STANDARD	88	SPACES
ACCESSIBLE	5	SPACES
TRUCK	116	SPACES
BICYCLE SPACES	2	PROPOSED

CONSTRUCTION NOTES

1. PILOT TRAVEL CENTER BUILDING (SEE ARCHITECTURAL DRAWINGS), INSTALLED BY CONTRACTOR.
2. ABOVE GROUND STORAGE TANK FARM WITH CONTAINMENT. EACH AST FARM CONTAINS (4) 12,000 GALLON TACKS FOR DIESEL AND BIO. SEE PRODUCT PIPING DRAWINGS FOR MORE INFORMATION.
3. 25'–0" x 253'–7" AUTO CANOPY, FURNISHED AND INSTALLED BY CANOPY SUPPLIER. CANOPY FOUNDATIONS INSTALLED BY CONTRACTOR.
4. LANDSCAPE AREA INSTALLED BY CONTRACTOR. REFER TO LANDSCAPE AND IRRIGATION PLANS FOR MORE INFORMATION.
5. GREASE TRAP. FURNISHED AND INSTALLED BY CONTRACTOR.
6. CONCRETE ISLAND WITH A GAS/AUTO DIESEL (3+1) DISPENSER AND CONTAINMENT BOX TYPICAL AT (8) PLACES, INSTALLED BY CONTRACTOR.
7. 2'–0' HIGH GUARDRAIL AROUND CONTAINMENT AREA, 1'–0" OUTSIDE OF FENCE.
8. PROPOSED BIORETENTION BASIN. SEE UTILITY PLAN FOR MORE INFORMATION.
9. 25'–0" x 124'–9" TRUCK CANOPY, FURNISHED AND INSTALLED BY CANOPY SUPPLIER, CANOPY FOUNDATIONS INSTALLED BY CONTRACTOR.
10. TRUCK AIR STAND, TYPICAL AT EVERY OTHER TRUCK FUELING ISLAND, SUPPLIED BY OWNER AND INSTALLED BY CONTRACTOR.
11. CONCRETE ISLAND WITH A DIESEL DISPENSER AND CONTAINMENT BOX TYPICAL AT (8) PLACES, INSTALLED BY CONTRACTOR.
12. PREFABRICATED TRUCK ISLAND CATCH BASIN (TYP (7) PLACES). SUPPLIED BY OWNER INSTALLED BY CONTRACTOR
13. TRUCK FREEZE PROOF WATER STAND TYPICAL AT EVERY OTHER TRUCK FUELING ISLAND FURNISHED AND INSTALLED BY CONTRACTOR.
14. TANK #1, PRODUCT #1. 20,000 GALLON, 10'–0"ø X 37'–8 3/4" LONG, DOUBLE–WALL FIBERGLASS UNDERGROUND REGULAR UNLEADED GASOLINE TANK. FURNISHED BY OWNER, INSTALLED BY CONTRACTOR (TYP (1) PLACE). SEE PP DRAWINGS FOR MORE INFORMATION.
15. TANK #2 AND TANK #3. 20,000 GALLON, 10'–0"ø X 37'–10" LONG (2) CHAMBER UNDERGROUND DOUBLE WALL FIBERGLASS TANK, TANK #2, PRODUCT #2 – 12,000 GALLON SUPER UNLEADED GASOLINE, TANK #3, PRODUCT #3 – 8,000 AUTO DIESEL. FURNISHED BY OWNER, INSTALLED BY CONTRACTOR. (SEE PP DRAWINGS FOR MORE INFORMATION).
16. LOCAL UTILITY ELECTRICAL TRANSFORMER INSTALLED BY CONTRACTOR.
17. TRAVEL CENTER DISTRIBUTION ELECTRICAL TRANSFORMER INSTALLED BY CONTRACTOR.
18. PROPOSED WATER METER AND BACKFLOW. SEE UTILITY PLANS SHEET 11–12 FOR MORE INFORMATION.
19. PROPOSED IRRIGATION METER AND BACKFLOW PREVENTOR. SEE UTILITY PLANS SHEET 11–12 FOR MORE INFORMATION.
20. PROPOSED SEWER CLEANOUT. SEE UTILITY PLANS SHEET 11–12 FOR MORE INFORMATION.
21. PROPOSED U–SHAPED BIKE RACKS PER CITY STANDARDS AND SPECIFICATIONS.
22. INSTALL ACCESSIBLE RAMP. INSTALL CAST–IN–PLACE DETECTABLE WARNING SYSTEM (TRUNCATED DOMES) PER ARMOR TILE – 36" X 48" PANEL. PRODUCT NO. ADA–C–3648W PER DETAIL X, SHEET XX.
23. INSTALL DETECTABLE WARNINGS.
24. PROPOSED CATCH BASIN. SEE STORM DRAIN PLANS SHEET 13–14 FOR MORE INFORMATION.
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CITY OF PERRIS
APPROVED BY:
CONTRACT CITY ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER SHEA-MICHAEL ANTI RCE NO. 78274 CIVIL STATE OF CALIFORNIA

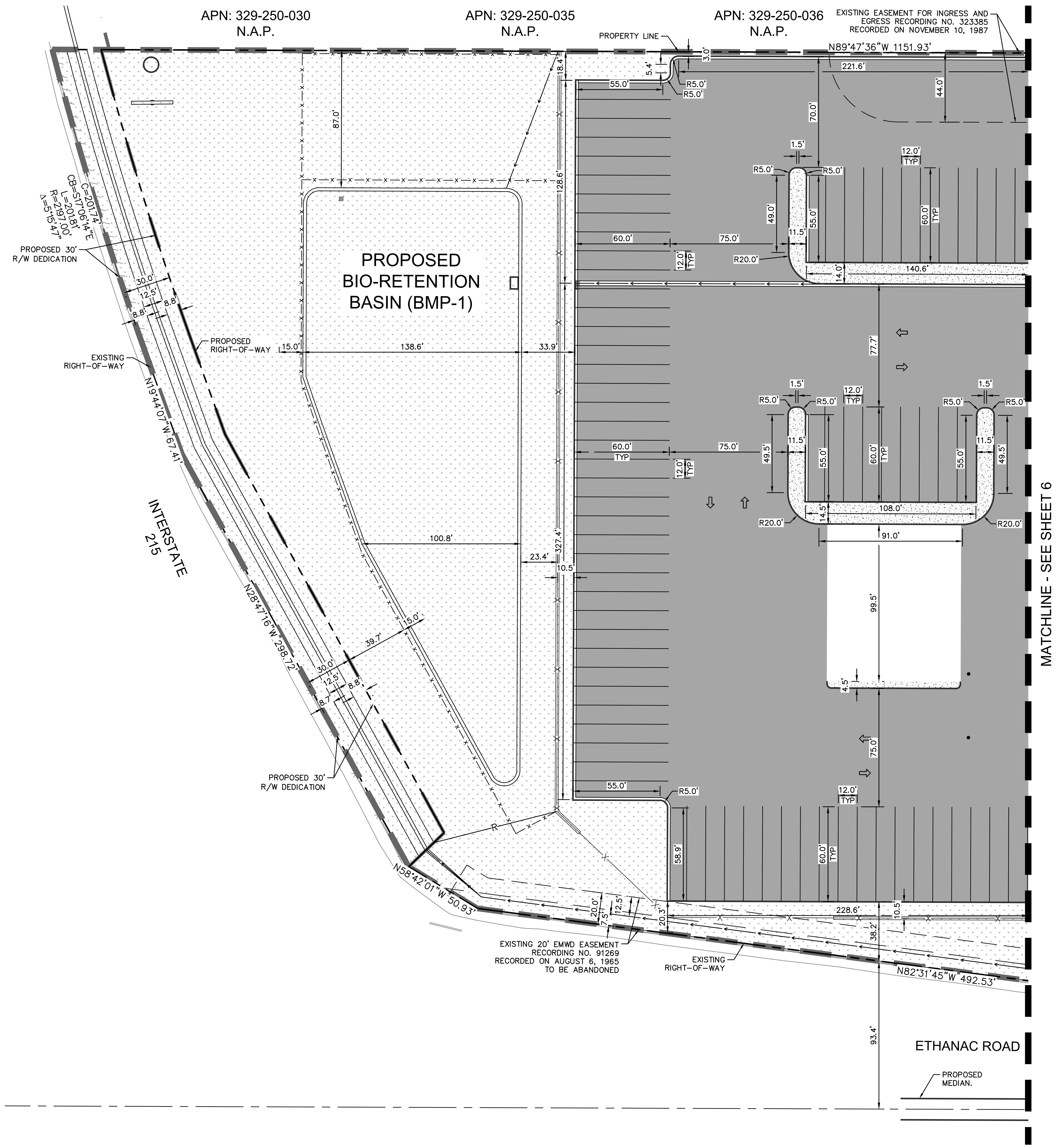
Kimley»Horn
765 THE CITY DRIVE SUITE 200, ORANGE, CA 92868
PHONE: 714–939–1030
PREPARED BY:
SHEA–MICHAEL ANTI R.C.E. 78274 2/27/2022 DATE

SITE PLAN
PRELIMINARY PRECISE GRADING PLAN
PILOT PERRIS
ETHANAC ROAD AND TRUMBLE ROAD
APN: 329-250-011 & 329-250-012

PROJECT NUMBER: 095426010

SHEET NO. 4 OF 16 SHTS

FILE NO.:



LEGEND

PROPERTY LINE CIVIL	STANDARD DUTY CONCRETE PAVEMENT
LIMITS OF WORK	HEAVY DUTY CONCRETE PAVEMENT
CENTER LINE	HEAVY DUTY ASPHALT PAVEMENT
SETBACKS	STANDARD DUTY ASPHALT PAVEMENT
EASEMENT LINE	LANDSCAPE/ PLANTER AREA
DETECTABLE WARNINGS	
DECORATIVE PAVEMENT	

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CITY OF PERRIS

APPROVED BY:

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REGISTERED PROFESSIONAL ENGINEER SHEA-MICHAEL ANTI RCE NO. 78274 CIVIL STATE OF CALIFORNIA

Kimley»Horn
765 THE CITY DRIVE SUITE 200, ORANGE, CA 92868
PHONE: 714-939-1030

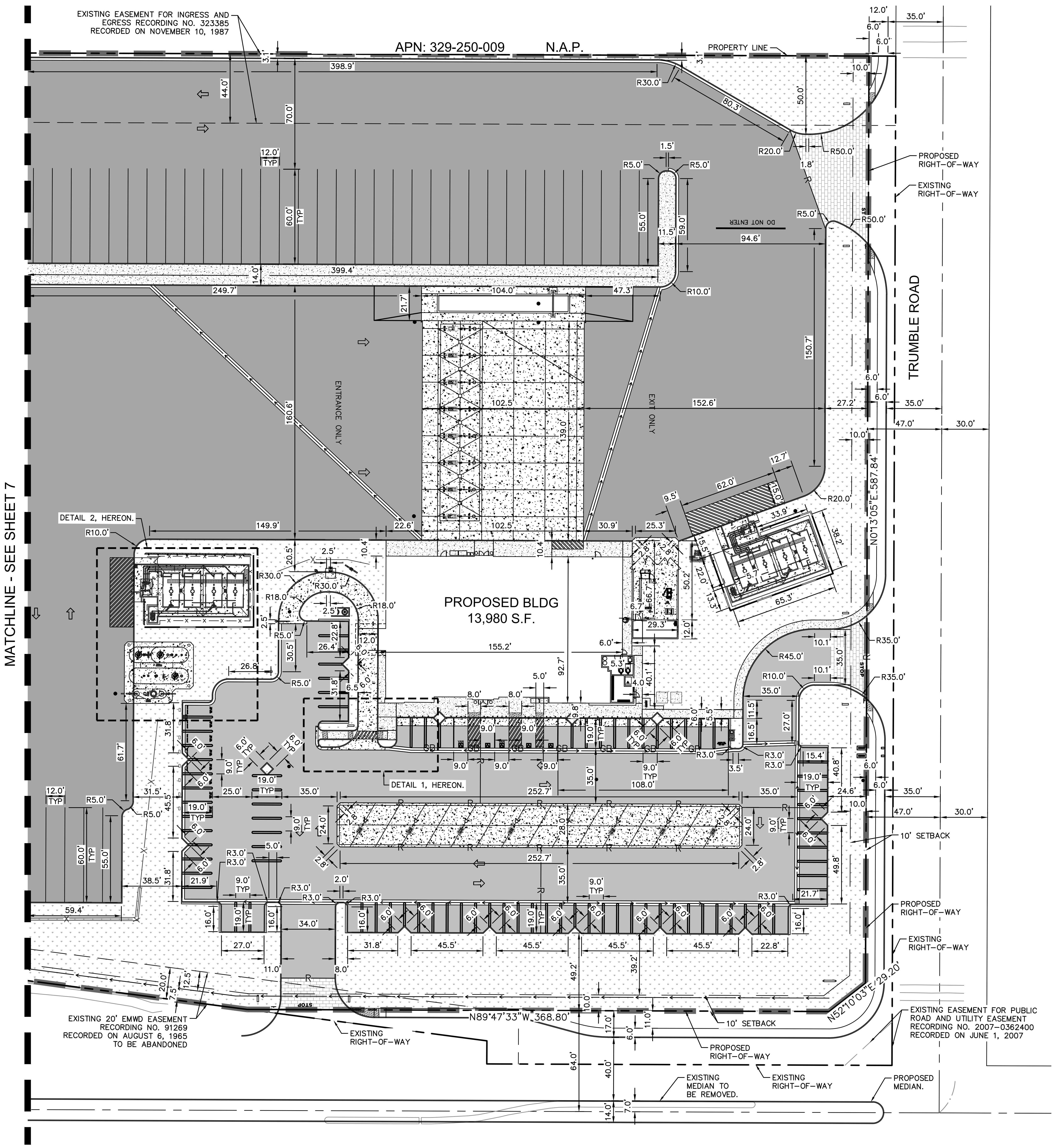
PREPARED BY:
SHEA-MICHAEL ANTI R.C.E. 78274 2/28/2022 DATE

HORIZONTAL CONTROL PLAN
PRELIMINARY PRECISE GRADING PLAN
PILOT PERRIS
ETHANAC ROAD AND TRUMBLE ROAD
APN: 329-250-011 & 329-250-012

PROJECT NUMBER: 095426010

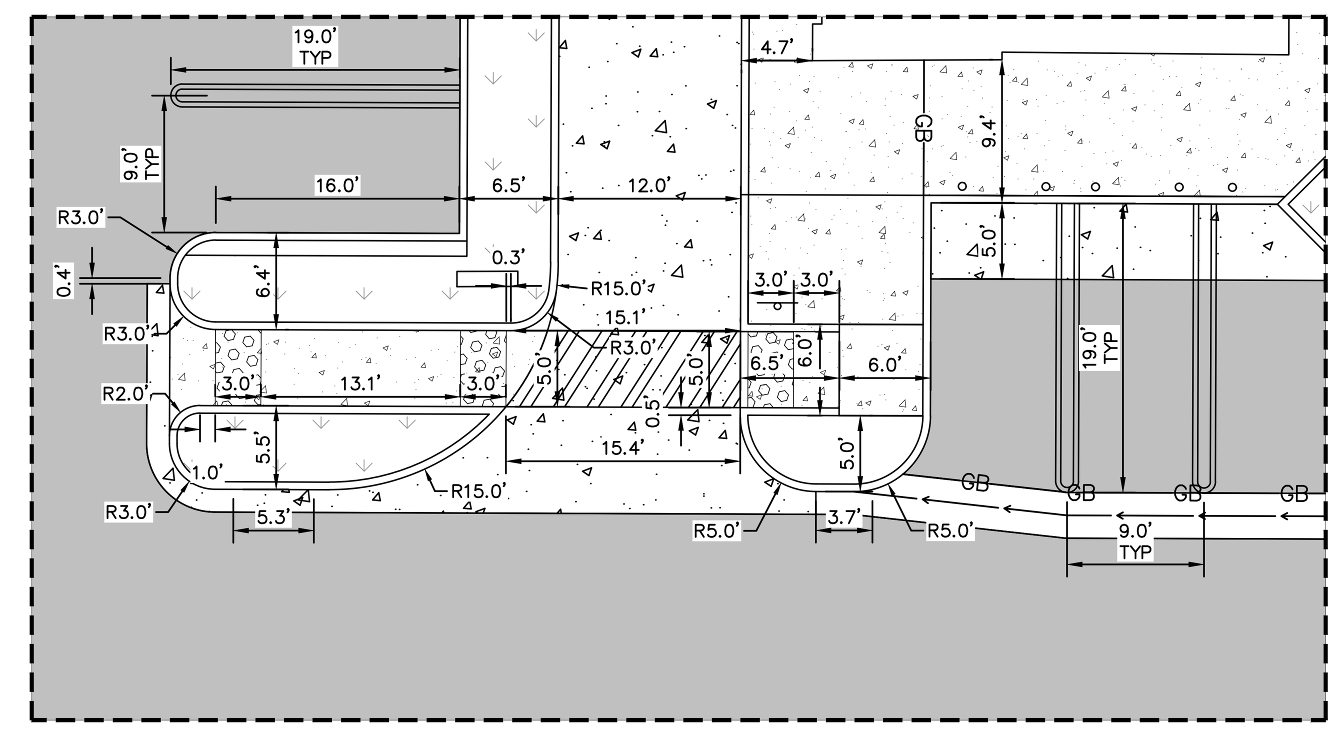
SHEET NO. 5 OF 16 SHTS

FILE NO.:



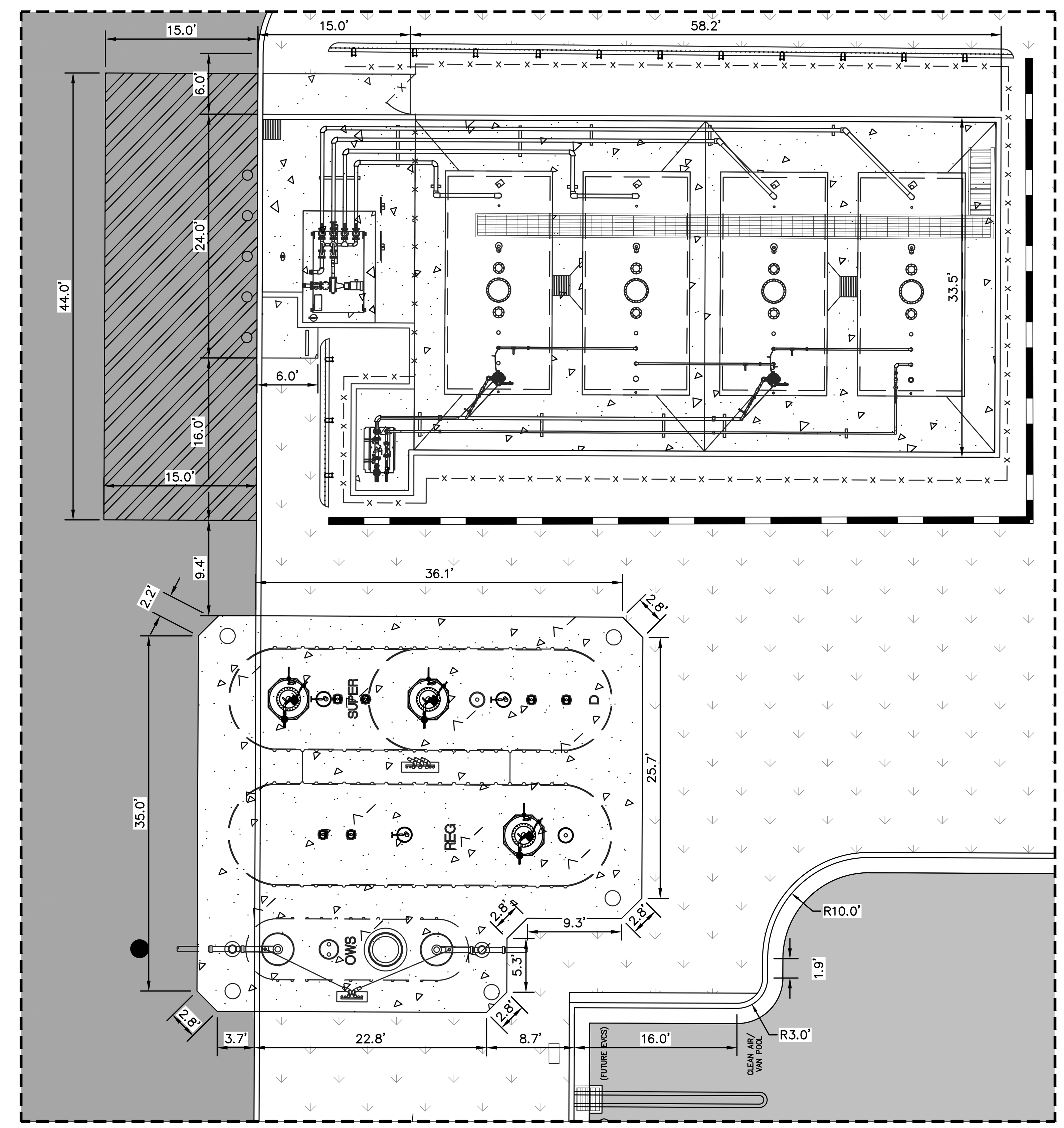
LEGEND

PROPERTY LINE CIVIL			STANDARD DUTY CONCRETE PAVEMENT
LIMITS OF WORK			HEAVY DUTY CONCRETE PAVEMENT
CENTER LINE			HEAVY DUTY ASPHALT PAVEMENT
SETBACKS			STANDARD DUTY ASPHALT PAVEMENT
EASEMENT LINE			LANDSCAPE/ PLANTER AREA
DETECTABLE WARNINGS			
DECORATIVE PAVEMENT			



DETAIL 1

1"=10'



DETAIL 2

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NORTH

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REGISTERED PROFESSIONAL ENGINEER
SHEA-MICHAEL ANTI
RCE NO. 78274
CIVIL
STATE OF CALIFORNIA

Kimley»Horn
765 THE CITY DRIVE SUITE 200, ORANGE, CA 92868
PHONE: 714-939-1030

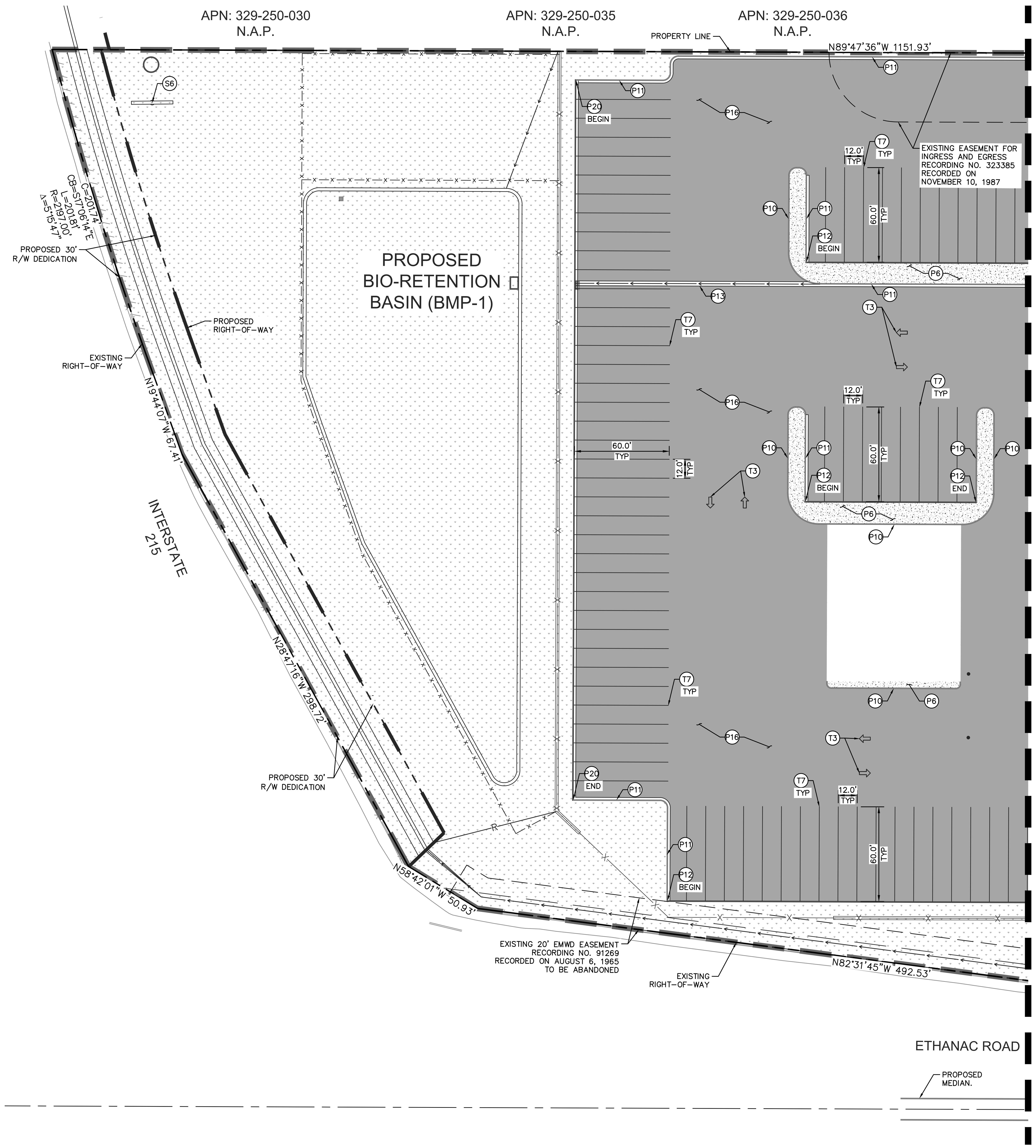
PREPARED BY:
SHEA-MICHAEL ANTI R.C.E. 78274
2/28/2022
DATE

HORIZONTAL CONTROL PLAN
PRELIMINARY PRECISE GRADING PLAN
PILOT PERRIS
ETHANAC ROAD AND TRUMBLE ROAD
APN: 329-250-011 & 329-250-012

PROJECT NUMBER: 095426010

SHEET NO. 6
OF 16 SHTS

FILE NO.:



LEGEND

- PROPERTY LINE CIVIL
- LIMITS OF WORK
- CENTER LINE
- SETBACKS
- EASEMENT LINE
- ACCESSIBLE ROUTE
- FENCE
- DETECTABLE WARNINGS
- DECORATIVE PAVEMENT
- STANDARD DUTY CONCRETE PAVEMENT
- HEAVY DUTY CONCRETE PAVEMENT
- HEAVY DUTY ASPHALT PAVEMENT
- STANDARD DUTY ASPHALT PAVEMENT
- LANDSCAPE/ PLANTER AREA

PAVEMENT NOTES

P1 6" REINFORCED CONCRETE PAD FOR AUTO CANOPY. WATER FROM SITE SHOULD NOT DRAIN ACROSS THE CONCRETE PAD FOR THE AUTO CANOPY. ASPHALT PAVING ON ALL (4) SIDES OF THE CONCRETE PAD SHOULD DRAIN AWAY FROM CONCRETE PAD. SEE DETAIL X SHEET X, INSTALLED BY CONTRACTOR.

P2 8" REINFORCED CONCRETE PAD FOR TRUCK CANOPY. WATER FROM SITE SHOULD NOT DRAIN ACROSS THE CONCRETE PAD FOR THE TRUCK CANOPY. ASPHALT PAVING ON BOTH SIDES OF THE CONCRETE PAD SHOULD DRAIN AWAY FROM CONCRETE PAD. CONCRETE PAD FOR THE TRUCK CANOPY MUST DRAIN TO CATCH BASIN. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P3 8" REINFORCED CONCRETE PAD AT TANK FARM. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P4 8" REINFORCED CONCRETE PAD TRASH ENCLOSURE. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P5 6" REINFORCED CONCRETE PARKING APRON AT PARKING SPACES IN FRONT OF BUILDING. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P6 4" REINFORCED CONCRETE SIDEWALK. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P7 7'-0" X 7'-0" X 6" REINFORCED CONCRETE PAD FOR ELECTRICAL TRANSFORMER. CONTRACTOR TO COORDINATE WITH UTILITY COMPANY FOR SIZE AND REINFORCING REQUIREMENTS. INSTALLED BY CONTRACTOR.

P8 8" REINFORCED CONCRETE PAD AT OIL/WATER SEPARATOR. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P9 SEE BUILDING PLANS FOR AST AND BIO SHED FOUNDATION DESIGN.

P10 STANDARD DUTY 6" CURB. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P11 STANDARD DUTY CURB AND GUTTER. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P12 HEAVY DUTY CURB. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P13 INSTALL RIBBON GUTTER PER DETAIL X, SHEET X.

P14 0" ELEVATION CURB. SEE GRADING PLANS FOR DETAILS AND SPECIFICATIONS.

P15 8" REINFORCED CONCRETE RAMP FOR CAT SCALE.

P16 CONSTRUCT HEAVY DUTY ASPHALT PAVEMENT PER DETAIL X SHEET X.

P17 CONSTRUCT STANDARD DUTY ASPHALT PAVEMENT DETAIL X SHEET X.

P18 CONSTRUCT THICKENED EDGE PER DETAIL X, SHEET X.

P19 CONSTRUCT CONCRETE WALK-OFF PER DETAIL X, SHEET X.

P20 HEAVY DUTY CURB AND GUTTER PER DETAIL X, SHEET X.

P21 DECORATIVE PAVEMENT

STRIPING NOTES

T1 INSTALL ACCESSIBLE PATH OF TRAVEL STRIPING.

T2 INSTALL ACCESSIBLE STRIPING PARKING STALL AND ACCESSIBLE PARKING SYMBOL.

T3 ALL DIRECTIONAL AND PARKING STRIPING TO BE SAFETY YELLOW-UNLESS NOTED OTHERWISE (TYP).

T4 STOP LINE INSTALLED BY CONTRACTOR.

T5 5'-0" X 20'-0" PASSENGER DROP-OFF/LOADING ZONE. TRAFFIC STRIPING 4" WIDE PAINTED (SAFETY YELLOW) PARALLEL STRIPES AT 16" O.C. FURNISHED AND INSTALLED BY CONTRACTOR.

T6 4" YELLOW DOUBLE HAIRPIN STRIPING, TYP. (COLOR PER CITY CODE).

T7 4" YELLOW PAINTED SOLID LINE, TYP. (COLOR PER CITY CODE).

T8 PROPOSED "PARKING FOR SERVICE ISLAND USE ONLY." PAVEMENT MARKING.

T9 PROPOSED "CLEAN AIR/ VAN POOL." PAVEMENT MARKING.

T10 PROPOSED FUTURE EVCS PARKING STALLS.

T11 PROPOSED "ENTRANCE ONLY" PAVEMENT MARKING.

T12 PROPOSED "EXIT ONLY" PAVEMENT MARKING.

SIGNING NOTES

S1 INSTALL ACCESSIBLE PARKING STALL SIGN PER DETAIL X SHEET X AND SINGLE BASE SIGN POST PER DETAIL X SHEET X.

S2 INSTALL VAN ACCESSIBLE PARKING STALL SIGN PER DETAIL X SHEET X AND SINGLE BASE SIGN POST PER DETAIL X SHEET X.

S3 "PASSENGER LOADING ZONE ONLY" SIGN FURNISHED AND INSTALLED BY CONTRACTOR SHALL BE WALL MOUNTED.

S4 "STOP SIGN" SIGN INSTALLED BY CONTRACTOR.

S5 "PED-XING" SIGN FURNISHED AND INSTALLED BY CONTRACTOR.

S6 SEE BUILDING PLANS DRAWINGS FOR ALL OTHER SIGNAGE.

S7 RESTAURANT "DRIVE-THRU" (INTERNALLY ILLUMINATED) DIRECTIONAL SIGN FURNISHED BY OWNER, INSTALLED BY SIGN SUPPLIER. CONCRETE FOUNDATION AND ELECTRICAL INSTALLED BY CONTRACTOR.

S8 "DRIVE-THRU CLEARANCE 9 FT. 6 IN." SIGN FURNISHED BY OWNER, INSTALLED BY SIGN SUPPLIER. CONCRETE FOUNDATION INSTALLED BY CONTRACTOR.

S9 RESTAURANT PREVIEW BOARD (INTERNALLY ILLUMINATED) FURNISHED BY OWNER, INSTALLED BY SIGN SUPPLIER. CONCRETE FOUNDATION AND ELECTRICAL INSTALLED BY CONTRACTOR.

S10 "RESTAURANT" MENU BOARD (INTERNALLY ILLUMINATED) AND INTERCOM SYSTEM FURNISHED BY OWNER, INSTALLED BY SIGN SUPPLIER. CONCRETE FOUNDATION AND ELECTRICAL INSTALLED BY CONTRACTOR.

S11 "THANK YOU / DO NOT ENTER" DIRECTIONAL SIGN (INTERNALLY ILLUMINATED) FURNISHED BY OWNER, INSTALLED BY SIGN SUPPLIER. CONCRETE FOUNDATION AND ELECTRICAL INSTALLED BY CONTRACTOR.

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1. ALL MANHOLES MUST BE SET 2" HIGHER THAN PAVING TO PROVIDE A CROWN IN A 24"Ø AREA AROUND EACH MANHOLE.
2. SUB-BASE MUST BE COMPACTED TO 95% STANDARD PROCTOR WITH A WATER CONTENT WITHIN 1.5% OF OPTIMUM.
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4. PRIOR TO INSTALLING BITUMINOUS PAVING CONTRACTOR IS TO PROOF-ROLL SUB-BASE USING HEAVY, PNEUMATIC-TIRED ROLLERS TO LOCATE AREAS THAT ARE UNSTABLE OR THAT REQUIRE FURTHER COMPACTION. NOTIFY CONSTRUCTION MANAGER IN WRITING OF ANY UNSATISFACTORY CONDITIONS. DO NOT BEGIN PAVING INSTALLATION UNTIL THESE CONDITIONS HAVE BEEN SATISFACTORILY CORRECTED.
5. ASPHALT PAVING @ EDGE OF CONCRETE PAD FOR THE TRUCK CANOPY SHOULD BE LAID @1/4" HIGHER THAN CONCRETE PAD ON EXIT SIDE CANOPY.
6. CONCRETE COLLAR IS REQUIRED FOR ALL STRUCTURES IN PAVEMENT.

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80
1" = 40'
WHEN PRINTED AT FULL SIZE (24"X36")

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BENCH MARK:
COUNTY OF RIVERSIDE BENCHMARK "M 21-1 RESET", 373 FEET EAST ALONG ETHANAC ROAD FROM THE INTERSECTION OF ETHANAC ROAD AND THE SOUTHBOUND LANES OF HIGHWAY 395. 150 FEET SOUTH OF ETHANAC ROAD. 50 FEET SOUTHEAST OF THE NORTHEAST CORNER OF A 6 FOOT CHAIN LINK RIGHT-OF-WAY FENCE. 1 FOOT NORTHEAST OF AN ANGLE-POINT IN THE RIGHT-OF-WAY FENCE. 2 FEET NORTH OF A MARKER POST. A BRASS DISK STAMPED "M-21-1 RESET" SET IN THE TOP OF A CONCRETE POST 3 INCHES ABOVE GROUND. EL = 1421.891 NGVD 29 (5/85)

MARK	BY	DATE	REVISIONS	APPR	DATE
ENGINEER				CITY	

CITY OF PERRIS
APPROVED BY:
CONTRACT CITY ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER SHEA-MICHAEL ANTI RCE NO. 78274 CIVIL STATE OF CALIFORNIA

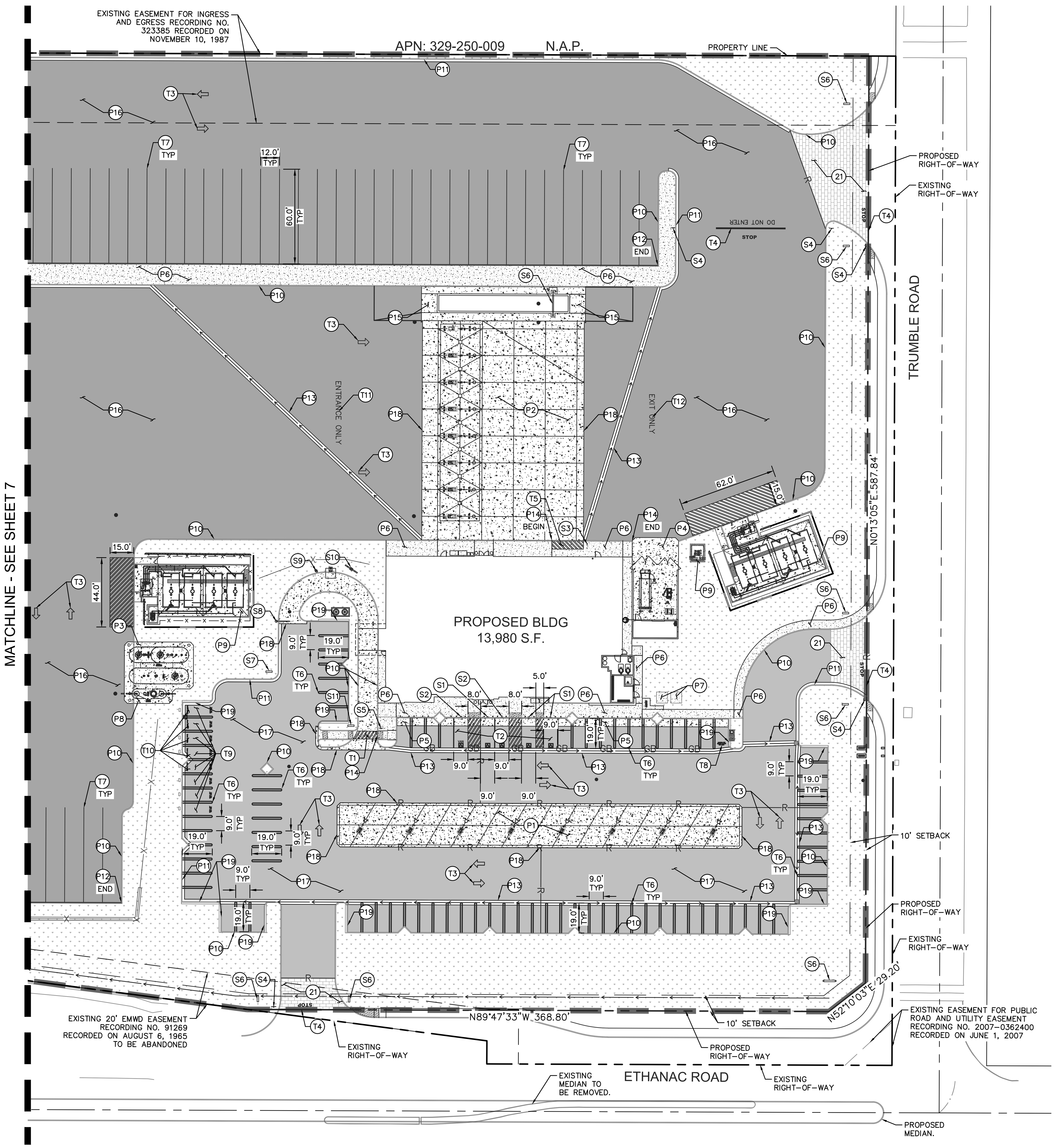
Kimley»Horn
765 THE CITY DRIVE SUITE 200, ORANGE, CA 92868
PHONE: 714-939-1030
PREPARED BY:
SHEA-MICHAEL ANTI R.C.E. 78274 2/28/2022 DATE

SIGNING, STRIPING, AND PAVEMENT PLAN
PRELIMINARY PRECISE GRADING PLAN
PILOT PERRIS
ETHANAC ROAD AND TRUMBLE ROAD
APN: 329-250-011 & 329-250-012

PROJECT NUMBER: 095426010

SHEET NO. 7 OF 16 SHTS

FILE NO.:



LEGEND

	PROPERTY LINE CIVIL		STANDARD DUTY CONCRETE PAVEMENT
	LIMITS OF WORK		HEAVY DUTY CONCRETE PAVEMENT
	CENTER LINE		HEAVY DUTY ASPHALT PAVEMENT
	SETBACKS		STANDARD DUTY ASPHALT PAVEMENT
	EASEMENT LINE		LANDSCAPE/ PLANTER AREA
	ACCESSIBLE ROUTE		
—x—x—x—	FENCE		
	DETECTABLE WARNINGS		
	DECORATIVE PAVEMENT		

PAVEMENT NOTES

P1 6" REINFORCED CONCRETE PAD FOR AUTO CANOPY. WATER FROM SITE SHOULD NOT DRAIN ACROSS THE CONCRETE PAD FOR THE AUTO CANOPY. ASPHALT PAVING ON ALL (4) SIDES OF THE CONCRETE PAD SHOULD DRAIN AWAY FROM CONCRETE PAD. SEE DETAIL X SHEET X, INSTALLED BY CONTRACTOR.

P2 8" REINFORCED CONCRETE PAD FOR TRUCK CANOPY. WATER FROM SITE SHOULD NOT DRAIN ACROSS THE CONCRETE PAD FOR THE TRUCK CANOPY. ASPHALT PAVING ON BOTH SIDES OF THE CONCRETE PAD SHOULD DRAIN AWAY FROM CONCRETE PAD. CONCRETE PAD FOR THE TRUCK CANOPY MUST DRAIN TO CATCH BASIN. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P3 8" REINFORCED CONCRETE PAD AT TANK FARM. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P4 8" REINFORCED CONCRETE PAD TRASH ENCLOSURE. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P5 6" REINFORCED CONCRETE PARKING APRON AT PARKING SPACES IN FRONT OF BUILDING. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P6 4" REINFORCED CONCRETE SIDEWALK. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P7 7'-0" X 7'-0" X 6" REINFORCED CONCRETE PAD FOR ELECTRICAL TRANSFORMER. CONTRACTOR TO COORDINATE WITH UTILITY COMPANY FOR SIZE AND REINFORCING REQUIREMENTS. INSTALLED BY CONTRACTOR.

P8 8" REINFORCED CONCRETE PAD AT OIL/WATER SEPARATOR. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P9 SEE BUILDING PLANS FOR AST AND BIO SHED FOUNDATION DESIGN.

P10 STANDARD DUTY 6" CURB. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P11 STANDARD DUTY CURB AND GUTTER. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P12 HEAVY DUTY CURB. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P13 INSTALL RIBBON GUTTER PER DETAIL X, SHEET X.

P14 0" ELEVATION CURB. SEE GRADING PLANS FOR DETAILS AND SPECIFICATIONS.

P15 8" REINFORCED CONCRETE RAMP FOR CAT SCALE.

P16 CONSTRUCT HEAVY DUTY ASPHALT PAVEMENT PER DETAIL X SHEET X.

P17 CONSTRUCT STANDARD DUTY ASPHALT PAVEMENT DETAIL X SHEET X.

P18 CONSTRUCT THICKENED EDGE PER DETAIL X, SHEET X.

P19 CONSTRUCT CONCRETE WALK-OFF PER DETAIL X, SHEET X.

P20 HEAVY DUTY CURB AND GUTTER PER DETAIL X, SHEET X.

P21 DECORATIVE PAVEMENT

STRIPING NOTES

T1 INSTALL ACCESSIBLE PATH OF TRAVEL STRIPING.

T2 INSTALL ACCESSIBLE STRIPING PARKING STALL AND ACCESSIBLE PARKING SYMBOL.

T3 ALL DIRECTIONAL AND PARKING STRIPING TO BE SAFETY YELLOW-UNLESS NOTED OTHERWISE (TYP).

T4 STOP LINE INSTALLED BY CONTRACTOR.

T5 5'-0" X 20'-0" PASSENGER DROP-OFF/LOADING ZONE. TRAFFIC STRIPING 4" WIDE PAINTED (SAFETY YELLOW) PARALLEL STRIPES AT 16" O.C. FURNISHED AND INSTALLED BY CONTRACTOR.

T6 4" YELLOW DOUBLE HAIRPIN STRIPING, TYP. (COLOR PER CITY CODE).

T7 4" YELLOW PAINTED SOLID LINE, TYP. (COLOR PER CITY CODE).

T8 PROPOSED "PARKING FOR SERVICE ISLAND USE ONLY." PAVEMENT MARKING.

T9 PROPOSED "CLEAN AIR/ VAN POOL." PAVEMENT MARKING.

T10 PROPOSED FUTURE EVCS PARKING STALLS.

T11 PROPOSED "ENTRANCE ONLY" PAVEMENT MARKING.

T12 PROPOSED "EXIT ONLY" PAVEMENT MARKING.

SIGNING NOTES

S1 INSTALL ACCESSIBLE PARKING STALL SIGN PER DETAIL X SHEET X AND SINGLE BASE SIGN POST PER DETAIL X SHEET X.

S2 INSTALL VAN ACCESSIBLE PARKING STALL SIGN PER DETAIL X SHEET X AND SINGLE BASE SIGN POST PER DETAIL X SHEET X.

S3 "PASSENGER LOADING ZONE ONLY" SIGN FURNISHED AND INSTALLED BY CONTRACTOR SHALL BE WALL MOUNTED.

S4 "STOP SIGN" SIGN INSTALLED BY CONTRACTOR.

S5 "PED-XING" SIGN FURNISHED AND INSTALLED BY CONTRACTOR.

S6 SEE BUILDING PLANS DRAWINGS FOR ALL OTHER SIGNAGE.

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PHONE: 714-939-1030

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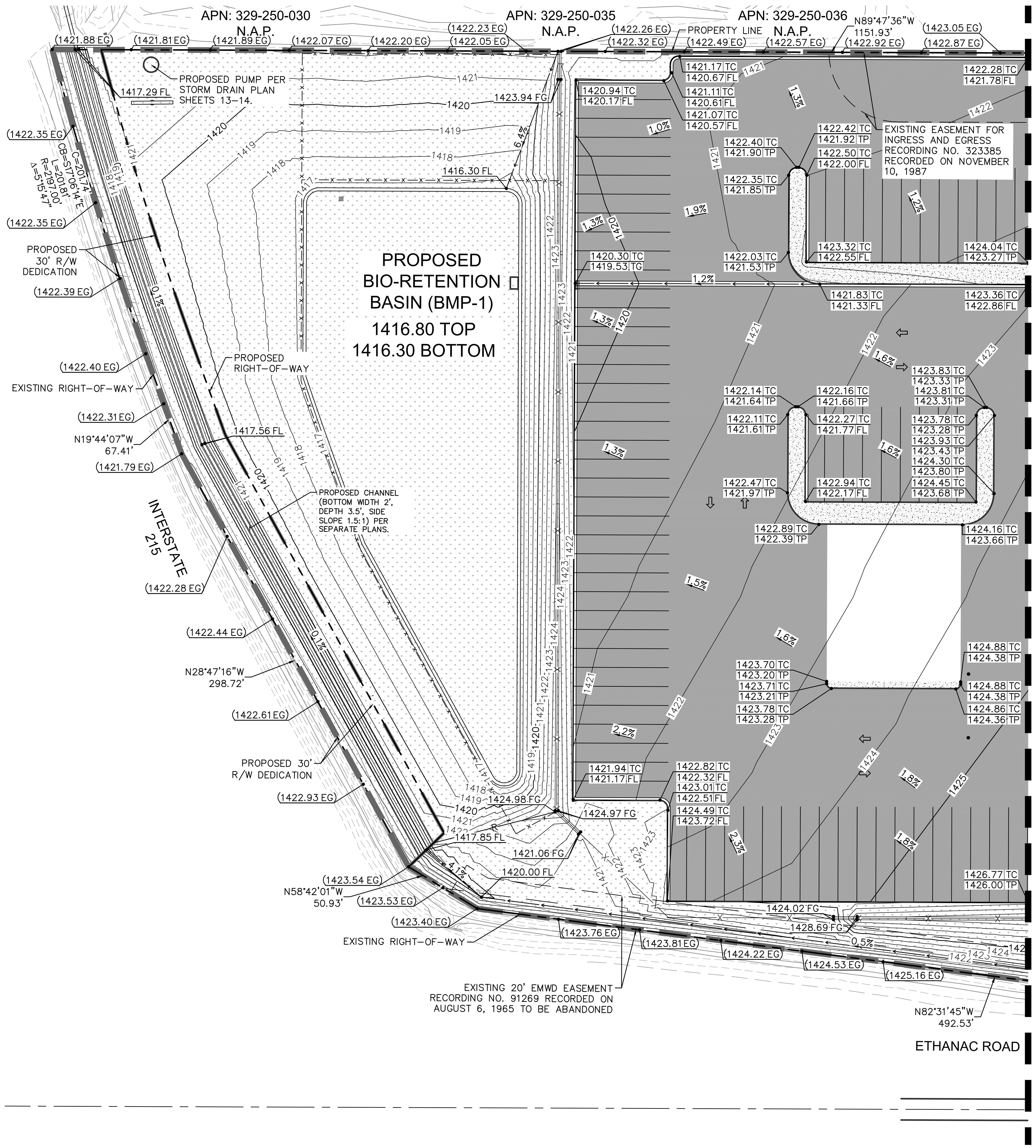
ETHANAC ROAD AND TRUMBLE ROAD
APN: 329-250-011 & 329-250-012

PROJECT NUMBER: 095426010

SHEET NO. 8
OF 16 SHTS

FILE NO.:



LEGEND

- PROPERTY LINE CIVIL
- LIMITS OF WORK
- CENTER LINE
- SETBACKS
- EASEMENT LINE
- GB — GRADE BREAK
- R — RIDGE LINE
- (1422.27 TC) / (1421.77 TP) — PROPOSED ELEVATION
- 1422.27 TC / 1421.77 TP — EXISTING ELEVATION
- 1.2% — SLOPE
- DETECTABLE WARNINGS
- STANDARD DUTY CONCRETE PAVEMENT
- HEAVY DUTY CONCRETE PAVEMENT
- HEAVY DUTY ASPHALT PAVEMENT
- STANDARD DUTY ASPHALT PAVEMENT
- LANDSCAPE/ PLANTER AREA
- DECORATIVE PAVEMENT

ABBREVIATIONS:

EG	EXISTING GROUND
FF	FINISHED FLOOR ELEVATION
FS	FINISH SURFACE
FG	FINISH GROUND
FL	FLOW LINE
GB	GRADE BREAK
HP	HIGH POINT
N.A.P	NOT A PART
TC	TOP OF CURB
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GRADING NOTES

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6. MAXIMUM RUNNING SLOPE SHALL NOT EXCEED 5% AND CROSS SLOPE SHALL NOT EXCEED 2% ON ALL SIDEWALKS AND ACCESSIBLE ROUTES.
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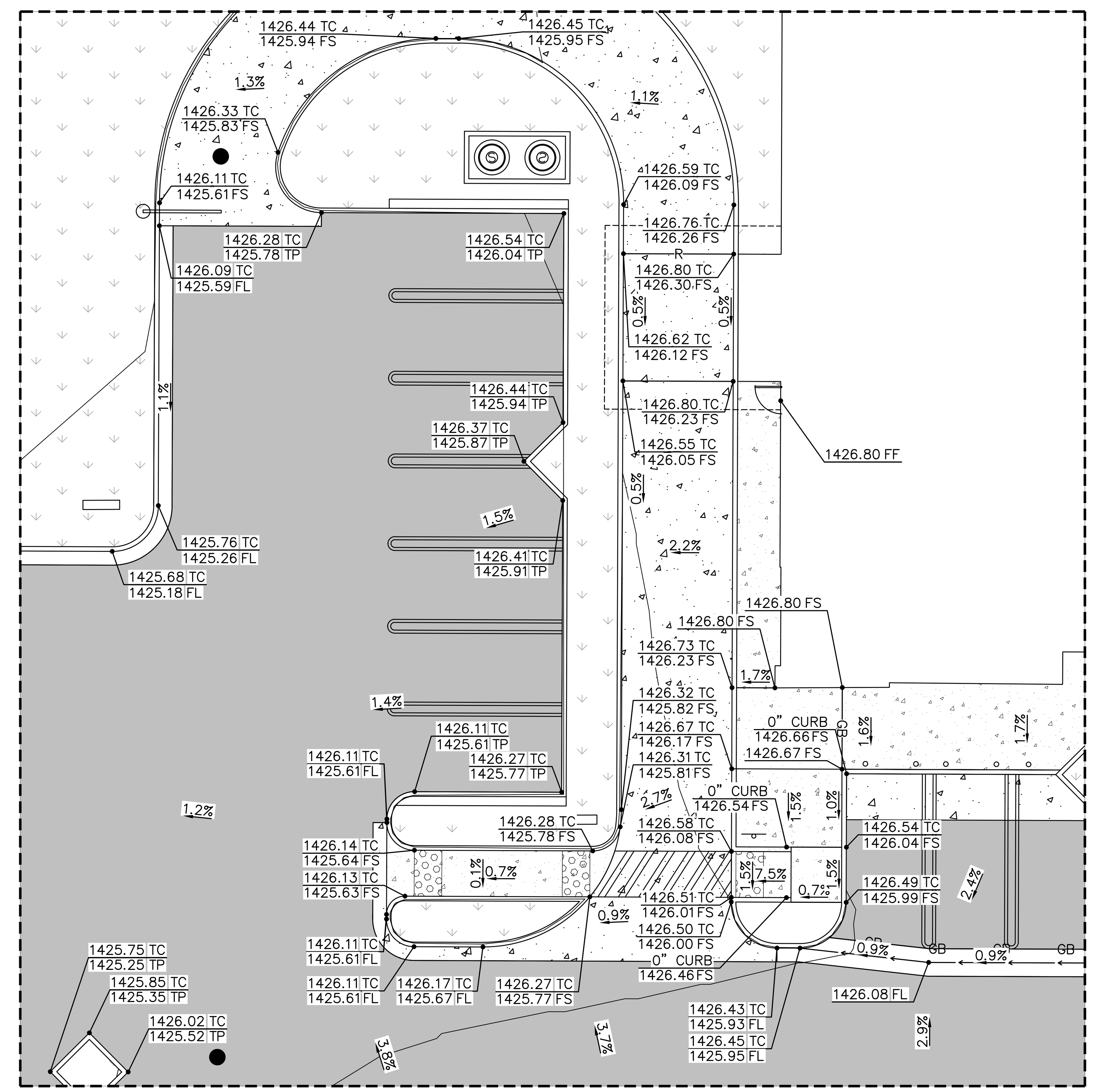

DETAIL 1
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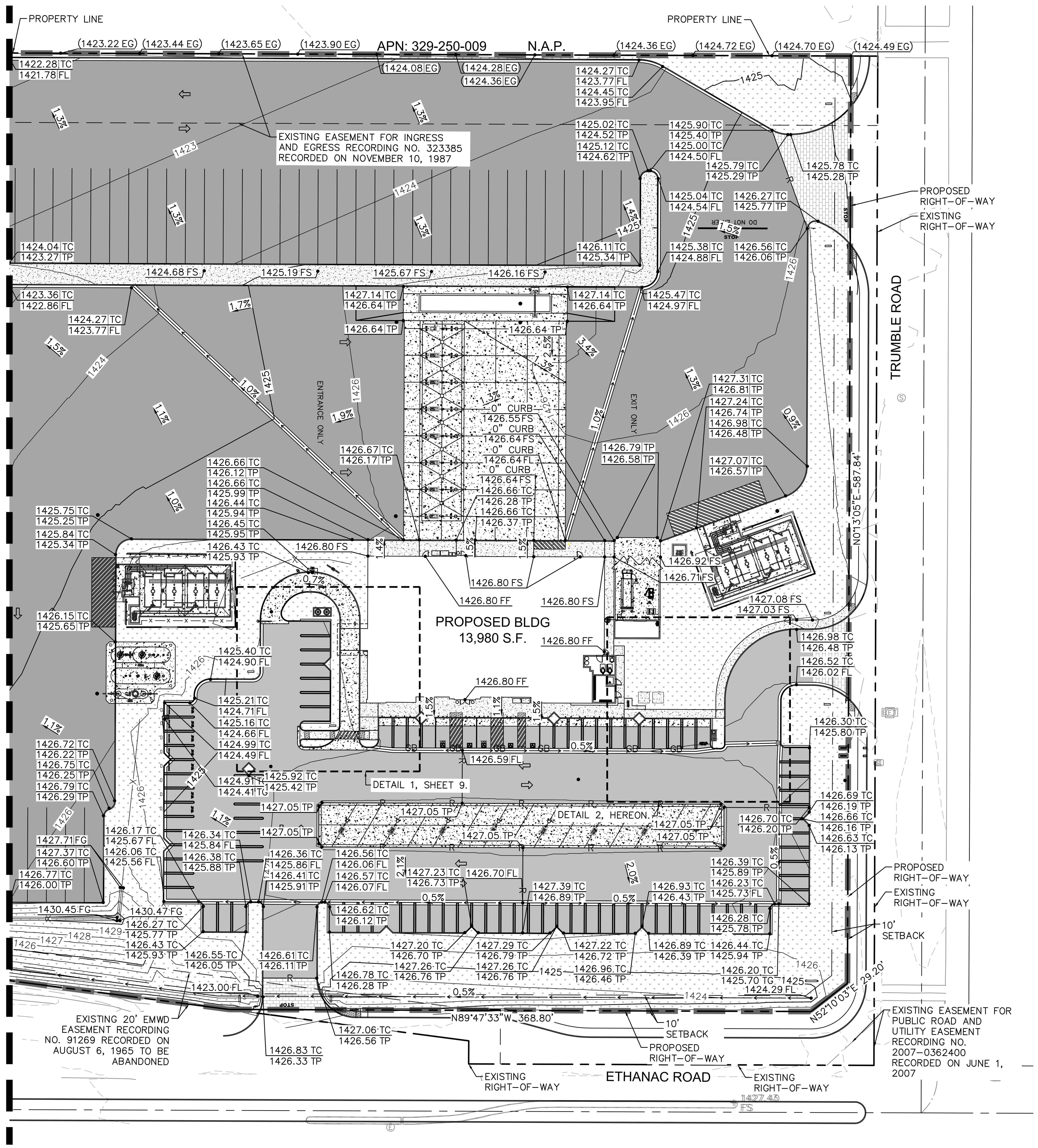

LEGEND

PROPERTY LINE CIVIL		STANDARD DUTY CONCRETE PAVEMENT	
LIMITS OF WORK		HEAVY DUTY CONCRETE PAVEMENT	
CENTER LINE		HEAVY DUTY ASPHALT PAVEMENT	
SETBACKS		STANDARD DUTY ASPHALT PAVEMENT	
EASEMENT LINE		LANDSCAPE/ PLANTER AREA	
GB — GRADE BREAK		DECORATIVE PAVEMENT	
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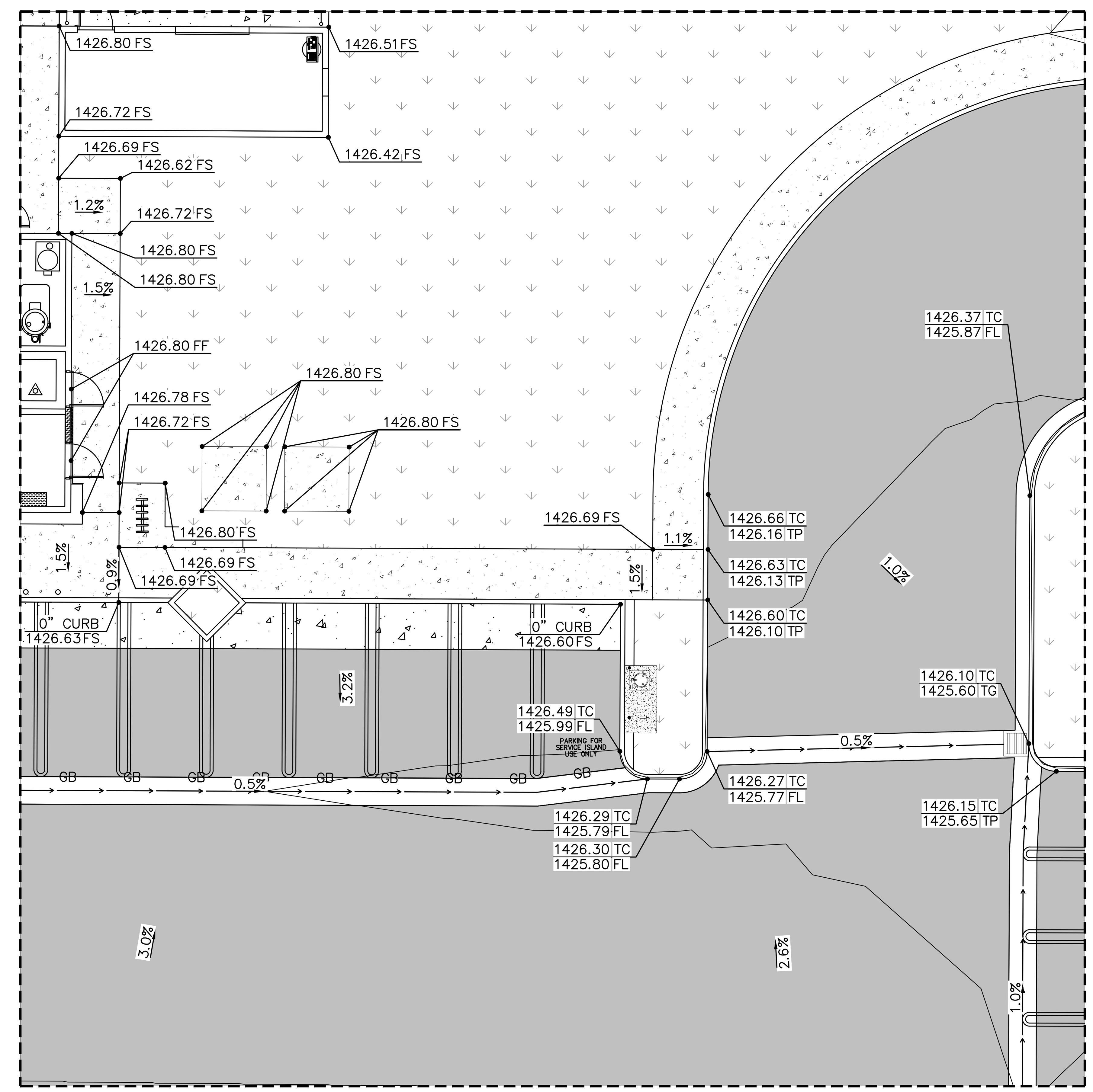

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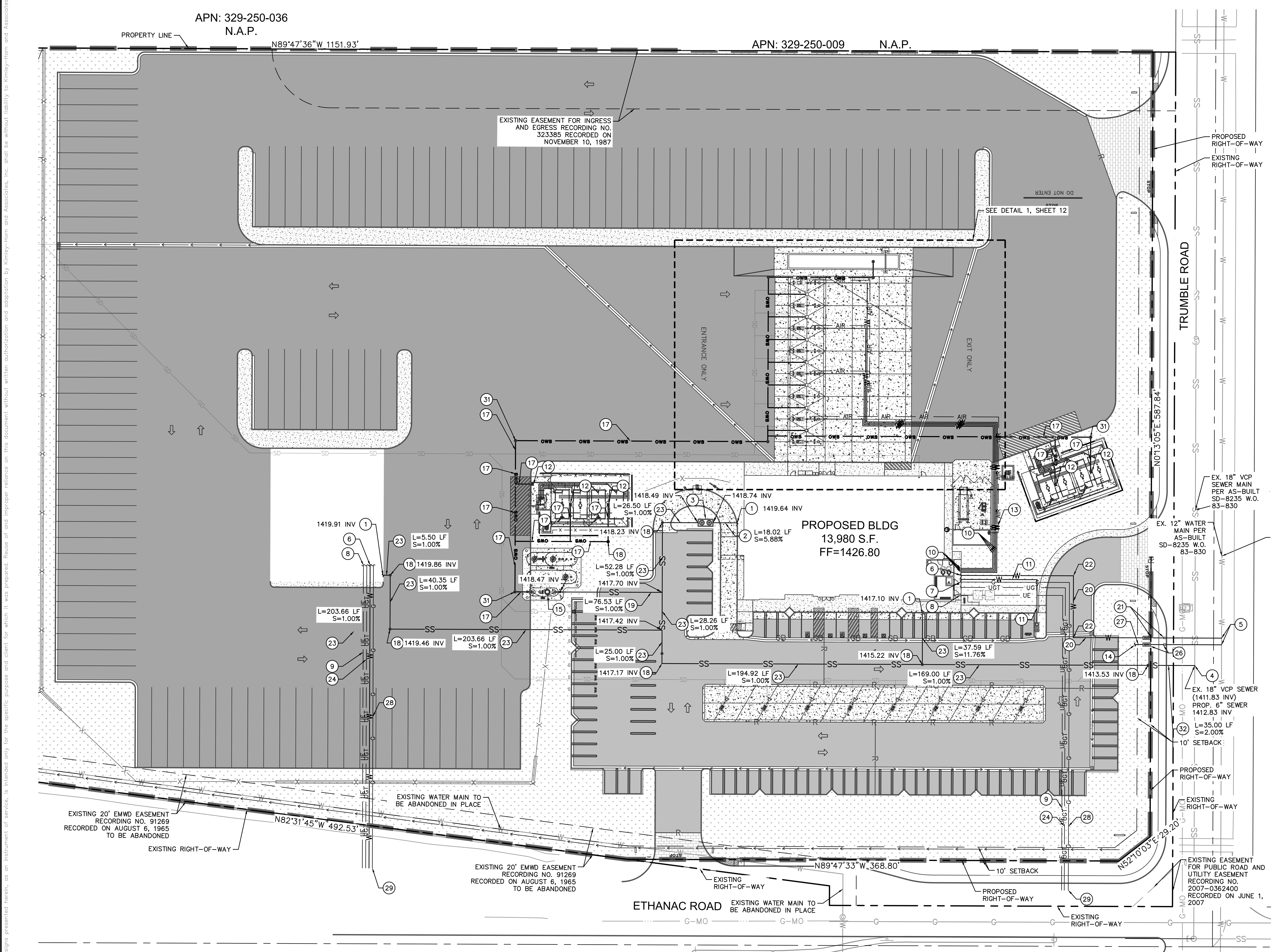

LEGEND

	PROPERTY LINE CIVIL
	LIMITS OF WORK
	CENTER LINE
	SETBACKS
	EASEMENT LINE
SS	PROPOSED SANITARY SEWER
SD	PROPOSED STORM DRAIN PIPE
AIR	PROPOSED AIR
W	PROPOSED WATER PIPE
OWS	PROPOSED OIL WATER SEPARATOR
UGT	PROPOSED TELEPHONE LINE
UE	PROPOSED UNDERGROUND ELECTRIC

UTILITY PLAN CONSTRUCTION NOTES

1. CONTRACTOR TO CONNECT TO 6" BUILDING SANITARY SEWER LINE. (4.00' MIN. BELOW FF)
2. CONTRACTOR TO CONNECT 6" BUILDING SANITARY SEWER LINE FROM BUILDING TO THE GREASE TRAP. INVERT ELEVATION AT THE GREASE TRAP OUTLET PER PLAN.
3. INSTALL GREASE TRAP. REFER TO MEP PLANS FOR MORE INFORMATION.
4. CONNECT INTO EXISTING 18" VCP SEWER MAIN PER EMWD STANDARDS AND SPECIFICATION. GENERAL CONTRACTOR SHALL VERIFY INVERT ELEVATION AT CONNECTION PRIOR TO COMMENCEMENT OF WORK. GENERAL CONTRACTOR TO NOTIFY ENGINEER OF ANY DISCREPANCIES.
5. HOT TAP INTO EXISTING 12" WATER MAIN. CONTRACTOR TO COORDINATE WITH UTILITY SERVICE PROVIDER.
6. CONTRACTOR TO CONNECT TO 2" WATER SERVICE LINE AT THE BUILDING. WATER SERVICE LINE SHALL BE COPPER.
7. CONTRACTOR TO CONNECT TO 3" GAS LINE AT THE BUILDING.
8. CONTRACTOR TO INSTALL ELECTRICAL SERVICE LINE FROM ELECTRICAL TRANSFORMER PAD TO BUILDING ELECTRICAL PANELS.
9. CONTRACTOR TO INSTALL AND/OR COORDINATE ELECTRICAL SERVICE LINE FROM ELECTRICAL TRANSFORMER TO THE LOCATION WHERE THE LOCAL UTILITY BRINGS SERVICE.
10. CONTRACTOR TO INSTALL 3/4" PEX WATER LINES INSIDE OF 2" PVC SLEEVES FROM BUILDING TO TRUCK FREEZE PROOF WATER STAND (FURNISHED AND INSTALLED BY CONTRACTOR) LOCATED AT EVERY OTHER TRUCK FUELING ISLAND. PEX AND PVC SLEEVE TO BE PROVIDED AND INSTALLED BY CONTRACTOR. SEE CIVIL SHEETS FOR DETAILS.
11. CONTRACTOR TO INSTALL 1/2" PEX WATER LINE INSIDE OF 2" PVC SLEEVE FROM BUILDING TO AUTO AIR/WATER STAND (TYP. (1) PLACE). PEX AND SLEEVE TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
12. INSTALL PREFABRICATED TRUCK ISLAND CATCH BASIN 2' BY 2' FOR OIL/WATER SEPARATION.
13. CONTRACTOR TO INSTALL 1/2" COPPER AIR LINE FROM AIR COMPRESSOR IN THE YARD MAINTENANCE BUILDING TO THE TRUCK AIR STAND LOCATED AT EVERY OTHER TRUCK FUELING ISLAND. SEE TC SHEETS FOR DETAILS.
14. REFER TO LANDSCAPE AND IRRIGATION PLANS FOR CONTINUATION.
15. PROPOSED OIL/WATER SEPARATOR.
16. CONTRACTOR TO INSTALL 4" SCHEDULE 40 PVC PIPE AND GLUED FITTINGS FROM THE TRUCK CANOPY PAD CATCH BASIN – TYPICAL AT EACH DRAIN. NO "FERNCO" TYPE FITTINGS ALLOWED AT ANY PART OF THE OWS PIPING SYSTEM.
17. CONTRACTOR TO INSTALL 6" SCHEDULE 40 PVC PIPE AND GLUED FITTINGS FROM 4" PVC CATCH BASIN LINES TO INLET OF OIL/WATER INTERCEPTOR. INVERT ELEVATION AT INTERCEPTOR INLET PER PLAN. NO "FERNCO" TYPE FITTINGS ALLOWED AT ANY PART OF THE OWS PIPING SYSTEM.
18. INSTALL SEWER CLEANOUT PER DETAIL 1, SHEET 12.
19. CONTRACTOR TO FURNISH AND INSTALL 6" SCHEDULE 40 PVC PIPE AND GLUED FITTINGS FROM OIL/WATER SEPARATOR TO THE SEWER PIPE. INVERT ELEVATION AT OIL/WATER SEPARATOR OUTLET PER PLAN. INVERT ELEVATION AT THE STORM POND INLET PER PLAN. NO "FERNCO" TYPE FITTINGS ALLOWED AT ANY PART OF THE OWS PIPING SYSTEM.
20. INSTALL 2–1/2" COPPER WATER SERVICE LINE. MAINTAIN 3' MINIMUM COVER.
21. INSTALL WATER METER AND BACKFLOW PREVENTOR. CONTRACTOR TO COORDINATE WITH UTILITY SERVICE PROVIDER.
22. INSTALL 90° DOMESTIC WATER PIPE BEND.
23. INSTALL 6" SDR–35 PVC AT MINIMUM 1% SLOPE.
24. CONTRACTOR TO INSTALL (2) 4" PVC SCH 40 CONDUIT BURIED TO MIN. DEPTH OF 24" W/200 LB. PULL STRING AND CAPPED ON BOTH ENDS FOR TELEPHONE SERVICE, TO LOCATION WHERE LOCAL UTILITY BRINGS SERVICE. MINIMUM 3 FT. SWEEPING RADIUS (NO RIGHT ANGLES), NO MORE THAN THREE 90 DEGREE TURNS WITHOUT A PULL BOX (12"x12"x18" MINIMUM), AND PATHS LONGER THAN 300 FT. WILL REQUIRE A PULL BOX.
25. CONTRACTOR TO INSTALL 3" PVC FROM TRUCK SCALE SUMP TO 6" TRUNK LINE TO GRIT CHAMBER.
26. INSTALL 1" IRRIGATION METER AND 1.5" BACKFLOW PREVENTOR. CONTRACTOR TO COORDINATE WITH UTILITY SERVICE PURVEYOR.
27. INSTALL 1" IRRIGATION WATER SERVICE LINE. CONTRACTOR TO COORDINATE WITH UTILITY SERVICE PURVEYOR.
28. PROPOSED GAS LINE. COORDINATE WITH GAS UTILITY COMPANY.
29. CONNECT TO EXISTING GAS MAIN BY OTHERS.
30. CONTRACTOR TO MAINTAIN A VERTICAL SEPARATION OF A MINIMUM OF 1–FOOT FOR ALL UTILITY CROSSINGS SHOWN ON THIS PLAN PER DETAIL 2, SHEET 12.
31. CLEANOUT FOR OIL/WATER SEPARATOR. REFER TO MEP PLANS FOR MORE INFORMATION.
32. INSTALL 6" VCP SEWER LATERAL AT MINIMUM 2% SLOPE.

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4. STUB POINT OF CONNECTION 5' FROM BUILDING. REFER TO MEP PLAN FOR CONTINUATION OF BUIDING.
5. CONTRACTOR TO MAINTAIN A VERTICAL SEPARATION OF A MINIMUM OF 1–FOOT FOR ALL UTILITY CROSSINGS SHOWN ON THIS PLAN PER DETAIL X, SHEET XX.

WATER AND SEWER UTILITY NOTES

SEE SHEET 2, FOR WATER AND SEWER UTILITY NOTES.

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80
1" = 40'
WHEN PRINTED AT FULL SIZE (24"X36")

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811
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UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

BENCH MARK:
COUNTY OF RIVERSIDE BENCHMARK "M 21–1 RESET", 373 FEET EAST ALONG ETHANAC ROAD FROM THE INTERSECTION OF ETHANAC ROAD AND THE SOUTHBOUND LANES OF HIGHWAY 395. 150 FEET SOUTH OF ETHANAC ROAD. 50 FEET SOUTHEAST OF THE NORTHEAST CORNER OF A 6 FOOT CHAIN LINK RIGHT–OF–WAY FENCE. 1 FOOT NORTHEAST OF AN ANGLE–POINT IN THE RIGHT–OF–WAY FENCE. 2 FEET NORTH OF A MARKER POST. A BRASS DISK STAMPED "M–21–1 RESET" SET IN THE TOP OF A CONCRETE POST 3 INCHES ABOVE GROUND. EL = 1421.891 NGVD 29 (5/85)

MARK	BY	DATE	REVISIONS	APPR	DATE
ENGINEER				CITY	

CITY OF PERRIS
APPROVED BY:
CONTRACT CITY ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER
SHEA-MICHAEL ANTI
RCE NO. 78274
CIVIL
STATE OF CALIFORNIA

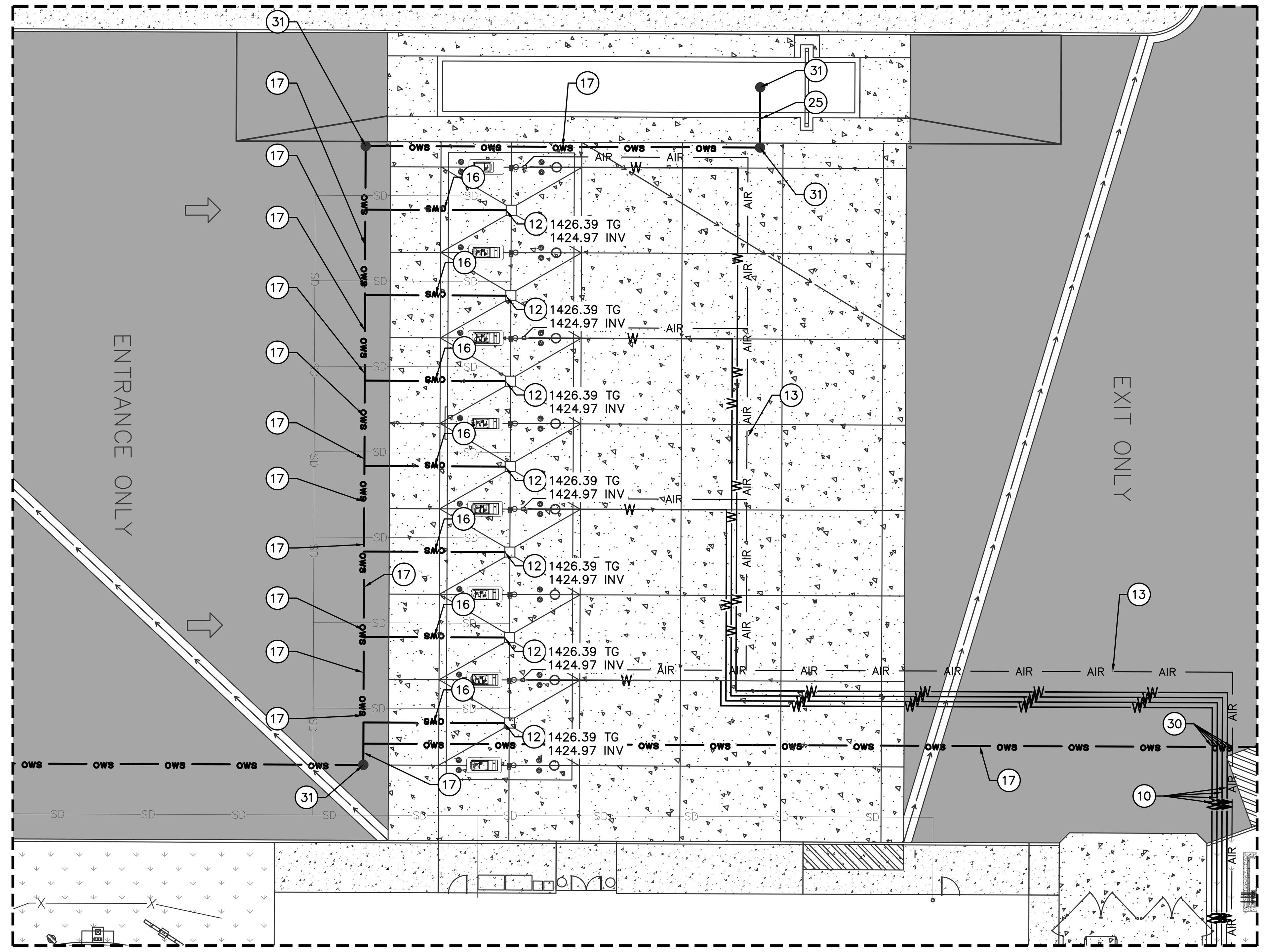
Kimley»Horn
765 THE CITY DRIVE SUITE 200, ORANGE, CA 92868
PHONE: 714–939–1030
PREPARED BY:
SHEA–MICHAEL ANTI R.C.E. 78274 2/28/2022 DATE

UTILITY PLAN
PRELIMINARY PRECISE GRADING PLAN
PILOT PERRIS
ETHANAC ROAD AND TRUMBLE ROAD
APN: 329-250-011 & 329-250-012
PROJECT NUMBER: 095426010

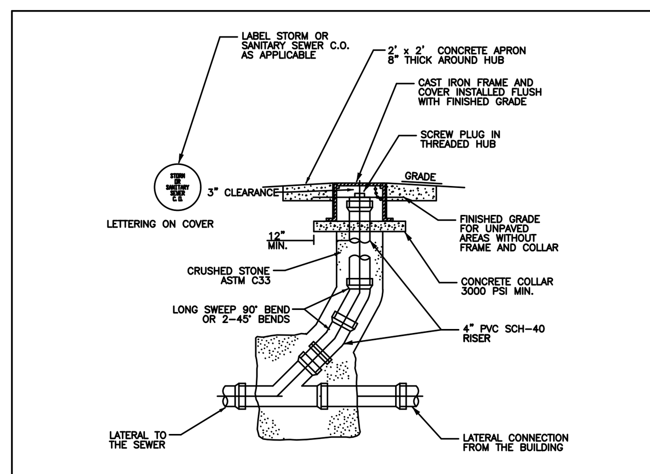
SHEET NO. 11 OF 16 SHTS
FILE NO.:

LEGEND

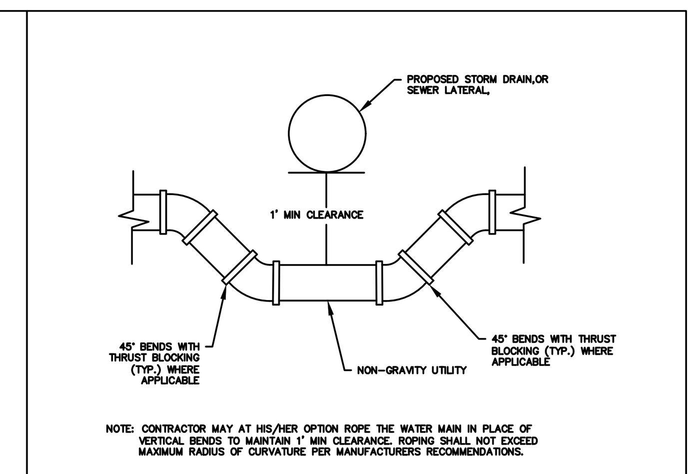
— — —	PROPERTY LINE CIVIL
▬ ▬	LIMITS OF WORK
— – —	CENTER LINE
———	SETBACKS
— — — —	EASEMENT LINE
——SS——	PROPOSED SANITARY SEWER
——SD——	PROPOSED STORM DRAIN PIPE
——AIR——	PROPOSED AIR
——W——	PROPOSED WATER PIPE
——OWS——	PROPOSED OIL WATER SEPARATOR
——UGT——	PROPOSED TELEPHONE LINE
——UE——	PROPOSED UNDERGROUND ELECTRIC



DETAIL 1
1"=20'



CLEAN OUT DETAIL
N.T.S. 1



NOTE: CONTRACTOR MAY AT HIS/HER OPTION ROPE THE WATER MAIN IN PLACE OF VERTICAL BENDS TO MAINTAIN 1' MIN CLEARANCE. ROPING SHALL NOT EXCEED MAXIMUM RADIUS OF CURVATURE PER MANUFACTURERS RECOMMENDATIONS.

WATER CROSSING DETAIL
N.T.S. 2

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CITY OF PERRIS

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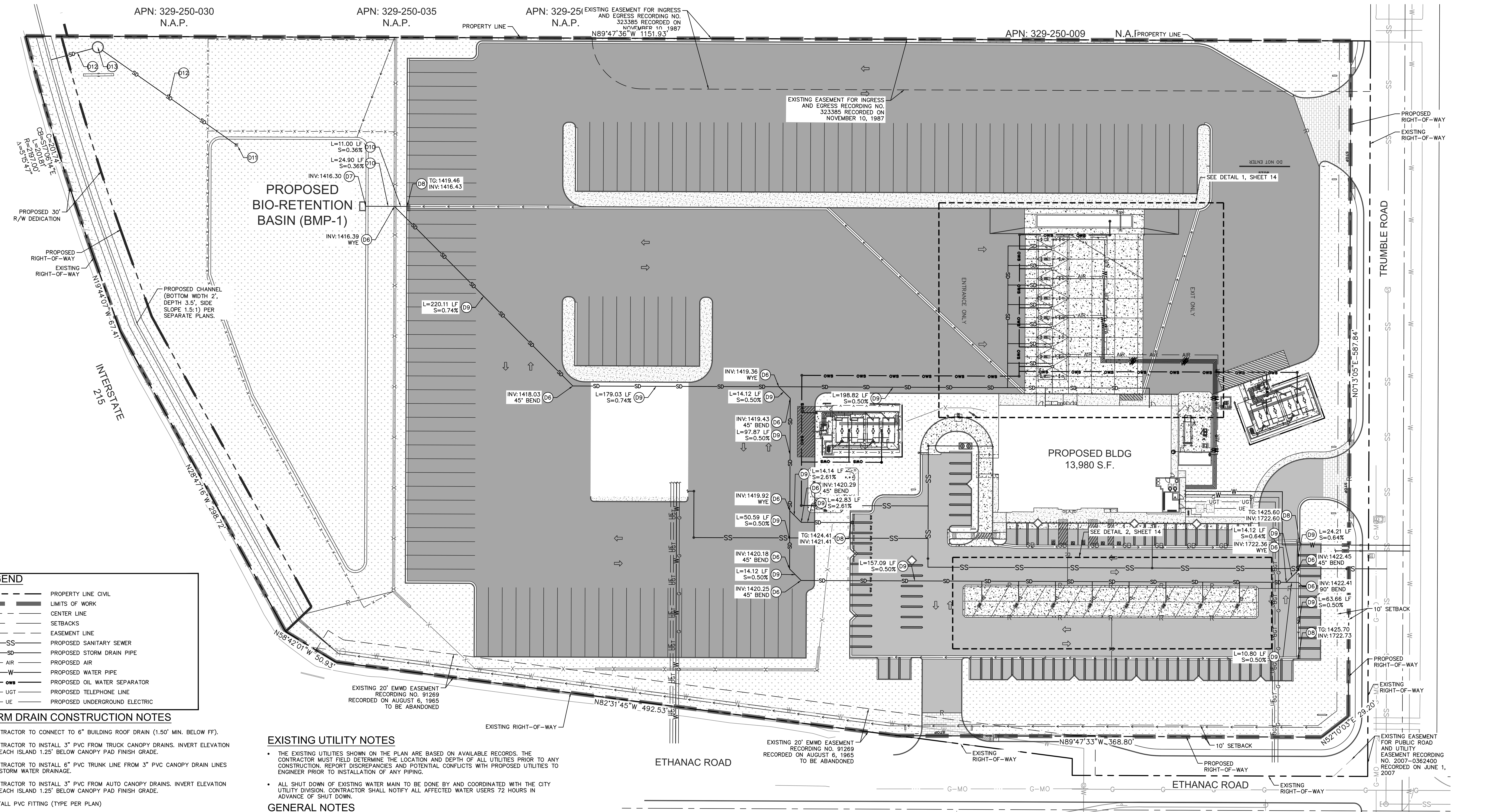
SHEET NO. 12
OF 16 SHTS

FILE NO.:



STORM DRAIN CONSTRUCTION NOTES

(D1) CONTRACTOR TO CONNECT TO 6" BUILDING ROOF DRAIN (1.50' MIN. BELOW FF).

(D2) CONTRACTOR TO INSTALL 3" PVC FROM TRUCK CANOPY DRAINS. INVERT ELEVATION AT EACH ISLAND 1.25' BELOW CANOPY PAD FINISH GRADE.

(D3) CONTRACTOR TO INSTALL 6" PVC TRUNK LINE FROM 3" PVC CANOPY DRAIN LINES TO STORM WATER DRAINAGE.

(D4) CONTRACTOR TO INSTALL 3" PVC FROM AUTO CANOPY DRAINS. INVERT ELEVATION AT EACH ISLAND 1.25' BELOW CANOPY PAD FINISH GRADE.

(D5) INSTALL PVC FITTING (TYPE PER PLAN)

(D6) INSTALL HDPE FITTING (TYPE PER PLAN)

(D7) CONSTRUCT SAND FOREBAY PER DETAIL X ON SHEET X

(D8) INSTALL NYLOPLAST 12" DRAIN BASIN WITH SUMP INSERT 2' BY 2' ROAD & HIGHWAY GRATE INLET WITH FLEXSTORM PERMANENT USE PURE INLET PER DETAIL X AND X ON SHEET X

(D9) INSTALL 12" HDPE STORM DRAIN PIPE

(D10) INSTALL 24" HDPE STORM DRAIN PIPE

(D11) PROPOSED OVERFLOW STRUCTURE.

(D12) PROPOSED OVERFLOW PIPE.

(D13) PROPOSED PUMP.

(D14) PROPOSED 6" ROOF DRAIN LINE.

EXISTING UTILITY NOTES

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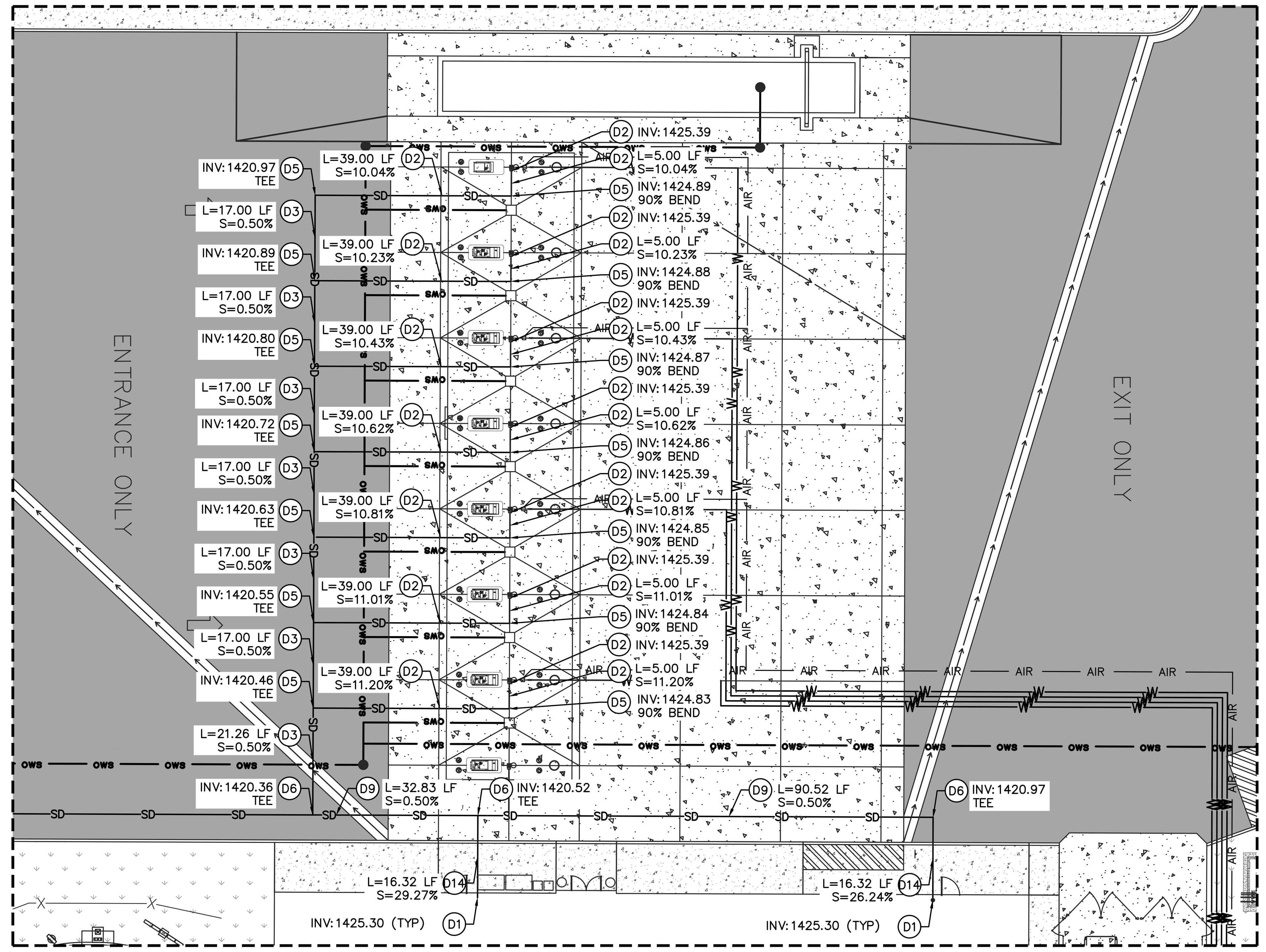
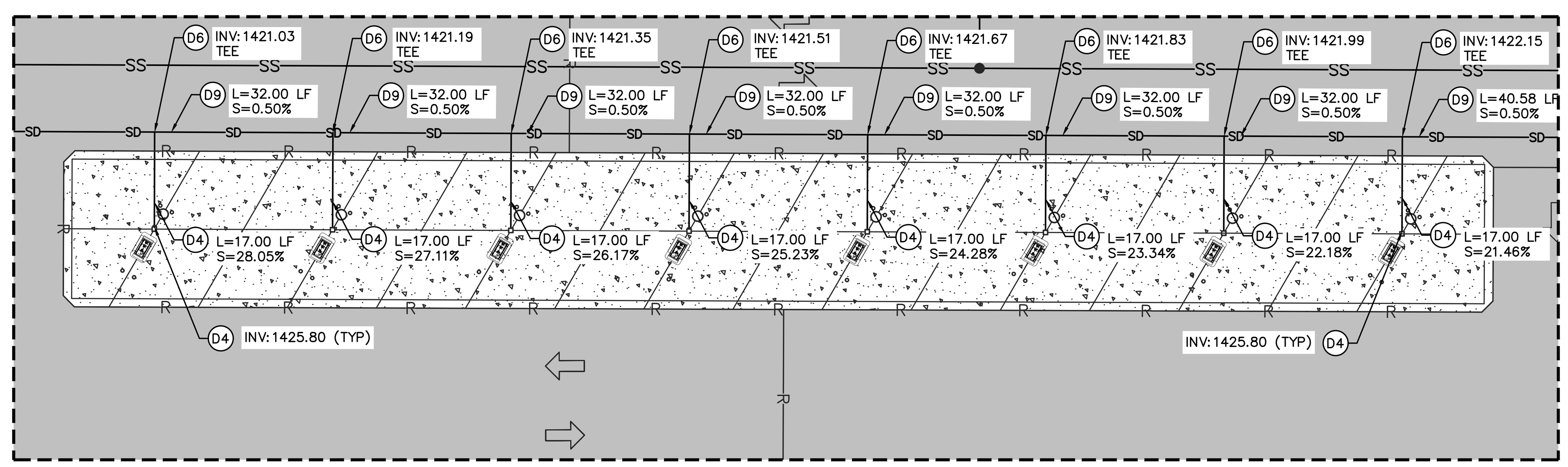
PREPARED BY:
SHEA-MICHAEL ANTI R.C.E. 78274 2/28/2022 DATE

STORM DRAIN PLAN
PRELIMINARY PRECISE GRADING PLAN
PILOT PERRIS
ETHANAC ROAD AND TRUMBLE ROAD
APN: 329-250-011 & 329-250-012
PROJECT NUMBER: 095426010

SHEET NO. 13 OF 16 SHTS
FILE NO.:



DETAIL 1
1"=20'



DETAIL 2
1"=20'

LEGEND

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ENGINEER				CITY	

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PREPARED BY:
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STORM DRAIN PLAN BLOW UPS
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PILOT PERRIS
ETHANAC ROAD AND TRUMBLE ROAD
APN: 329-250-011 & 329-250-012

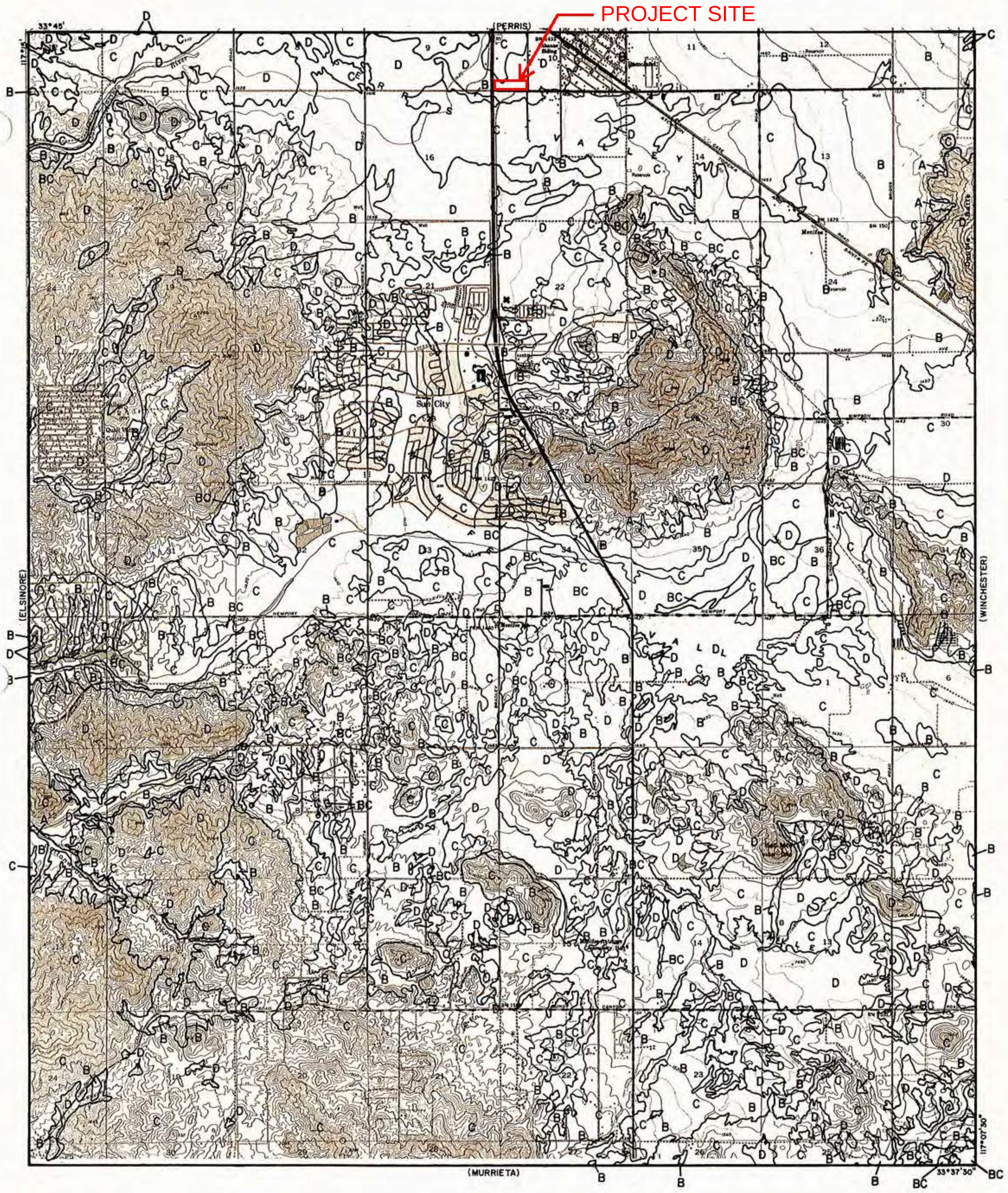
PROJECT NUMBER: 095426010

FILE NO.:

SHEET NO. 14 OF 16 SHTS

Appendix D

Hydrology Manual and Other Reference Material



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC & WCD

HYDROLOGY MANUAL

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP

FOR

ROMOLAND

PLATE C-1.42

RAINFALL INTENSITY–INCHES PER HOUR

SUNNYMEAD - MORENO			WOODCREST		
DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR
5	2.84	4.16	5	3.37	5.30
6	2.59	3.79	6	3.05	4.79
7	2.40	3.51	7	2.80	4.40
8	2.25	3.29	8	2.60	4.09
9	2.12	3.10	9	2.44	3.83
10	2.01	2.94	10	2.30	3.62
11	1.92	2.80	11	2.19	3.43
12	1.83	2.68	12	2.08	3.27
13	1.76	2.58	13	1.99	3.13
14	1.70	2.48	14	1.91	3.01
15	1.64	2.40	15	1.84	2.89
16	1.59	2.32	16	1.78	2.79
17	1.54	2.25	17	1.72	2.70
18	1.50	2.19	18	1.67	2.62
19	1.46	2.13	19	1.62	2.54
20	1.42	2.08	20	1.57	2.47
22	1.35	1.98	22	1.49	2.34
24	1.30	1.90	24	1.42	2.23
26	1.25	1.82	26	1.36	2.14
28	1.20	1.76	28	1.31	2.05
30	1.16	1.70	30	1.26	1.98
32	1.12	1.64	32	1.22	1.91
34	1.09	1.59	34	1.18	1.85
36	1.06	1.55	36	1.14	1.79
38	1.03	1.51	38	1.11	1.74
40	1.00	1.47	40	1.07	1.69
45	.95	1.39	45	1.01	1.58
50	.90	1.31	50	.95	1.49
55	.86	1.25	55	.90	1.42
60	.82	1.20	60	.86	1.35
65	.79	1.15	65	.82	1.29
70	.76	1.11	70	.79	1.24
75	.73	1.07	75	.76	1.19
80	.71	1.04	80	.73	1.15
85	.69	1.01	85	.71	1.11

SUNNYMEAD - MORENO: SLOPE = .500

WOODCREST: SLOPE = .550

STANDARD
INTENSITY - DURATION
CURVES DATA

ACTUAL IMPERVIOUS COVER

Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent (2)
Natural or Agriculture	0 - 10	0
Single Family Residential: (3)		
40,000 S. F. (1 Acre) Lots	10 - 25	20
20,000 S. F. (½ Acre) Lots	30 - 45	40
7,200 - 10,000 S. F. Lots	45 - 55	50
Multiple Family Residential:		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 -100	90

Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.

2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area should always be made, and a review of aerial photos, where available may assist in estimating the percentage of impervious cover in developed areas.

3. For typical horse ranch subdivisions increase impervious area 5 percent over the values recommended in the table above.

IMPERVIOUS COVER
FOR
DEVELOPED AREAS

RUNOFF COEFFICIENT CURVE DATA

The data in the following tables may be used to develop runoff coefficient (C) curves for any combination of runoff index (RI) number and antecedent mositure condition (AMC). For an RI number with an AMC of II (from Plate D-5.5) enter the tables on the following pages and plot the "C" curve data directly on Plate D-5.8. "C" curve data is given for even RI numbers only, but values may easily be interpolated for odd RI numbers.

For an AMC of I or III enter the tabulation on this page with the RI for AMC II, and read the appropriate RI for AMC I or III. Use this revised RI to enter the tables on the following pages to determine "C". For example if RI = 40 for AMC II, then RI = 22 for AMC I and RI = 60 for AMC III.

AMC ADJUSTMENT RELATIONSHIPS

RI FOR AMC II	RI FOR OTHER AMC CONDITIONS: AMC I	AMC III	RI FOR AMC II	RI FOR OTHER AMC CONDITIONS: AMC I	AMC III
10	--	22	55	35	74
11	--	24	56	36	75
12	--	25	57	37	75
13	--	27	58	38	76
14	--	28	59	39	77
15	--	30	60	40	78
16	--	31	61	41	78
17	--	33	62	42	79
18	--	34	63	43	80
19	--	36	64	44	81
20	--	37	65	45	82
21	10	38	66	46	82
22	10	39	67	47	83
23	11	41	68	48	84
24	11	42	69	50	84
25	12	43	70	51	85
26	12	44	71	52	86
27	13	46	72	53	86
28	14	47	73	54	87
29	14	49	74	55	88
30	15	50	75	57	88
31	16	51	76	58	89
32	16	52	77	59	89
33	17	53	78	60	90
34	18	54	79	62	91
35	18	55	80	63	91
36	19	56	81	64	92
37	20	57	82	66	92
38	21	58	83	67	93
39	21	59	84	68	93
40	22	60	85	70	94
41	23	61	86	72	94
42	24	62	87	73	95
43	25	63	88	75	95
44	25	64	89	76	96
45	26	65	90	78	96
46	27	66	91	80	97
47	28	67	92	81	97
48	29	68	93	83	98
49	30	69	94	85	98
50	31	70	95	87	98
51	31	70	96	89	99
52	32	71	97	91	99
53	33	72	98	94	99
54	34	73	99	97	--

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparrel, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparrel, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	72	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	28	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
URBAN COVERS -					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
AGRICULTURAL COVERS -					
Fallow (Land plowed but not tilled or seeded)		76	85	90	92

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	Soil Group B	Soil Group C	Soil Group D
AGRICULTURAL COVERS (cont.) -					
Legumes, Close Seeded (Alfalfa, sweetclover, timothy, etc.)	Poor	66	77	85	89
	Good	58	72	81	85
Orchards, Deciduous (Apples, apricots, pears, walnuts, etc.)		See Note 4			
Orchards, Evergreen (Citrus, avocados, etc.)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
Pasture, Dryland (Annual grasses)	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Pasture, Irrigated (Legumes and perennial grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
Row Crops (Field crops - tomatoes, sugar beets, etc.)	Poor	72	81	88	91
	Good	67	78	85	89
Small Grain (Wheat, oats, barley, etc.)	Poor	65	76	84	88
	Good	63	75	83	87
Vineyard		See Note 4			

Notes:

1. All runoff index (RI) numbers are for Antecedent Moisture Condition (AMC) II.

2. Quality of cover definitions:
   Poor-Heavily grazed or regularly burned areas. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.
   Fair-Moderate cover with 50 percent to 75 percent of the ground surface protected.
   Good-Heavy or dense cover with more than 75 percent of the ground surface protected.

3. See Plate C-2 for a detailed description of cover types.

4. Use runoff index numbers based on ground cover type. See discussion under "Cover Type Descriptions" on Plate C-2.

5. Reference Bibliography item 17.

Appendix E

NOAA Rainfall Data

NOAA Atlas 14, Volume 6, Version 2
Location name: Menifee, California, USA*
Latitude: 33.7438°, Longitude: -117.1867°
Elevation: 1427.48 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.086 (0.072-0.104)	0.124 (0.104-0.150)	0.176 (0.147-0.213)	0.220 (0.182-0.269)	0.283 (0.226-0.359)	0.334 (0.261-0.433)	0.389 (0.296-0.516)	0.447 (0.330-0.611)	0.530 (0.375-0.758)	0.599 (0.408-0.886)
10-min	0.123 (0.103-0.149)	0.178 (0.148-0.215)	0.252 (0.210-0.305)	0.315 (0.261-0.386)	0.406 (0.324-0.514)	0.479 (0.374-0.621)	0.557 (0.424-0.740)	0.641 (0.473-0.876)	0.760 (0.538-1.09)	0.858 (0.585-1.27)
15-min	0.149 (0.125-0.180)	0.215 (0.180-0.259)	0.305 (0.254-0.369)	0.381 (0.315-0.466)	0.491 (0.392-0.622)	0.580 (0.453-0.750)	0.674 (0.513-0.895)	0.775 (0.573-1.06)	0.920 (0.650-1.31)	1.04 (0.708-1.54)
30-min	0.243 (0.203-0.293)	0.349 (0.292-0.422)	0.496 (0.413-0.601)	0.621 (0.513-0.759)	0.799 (0.638-1.01)	0.944 (0.737-1.22)	1.10 (0.834-1.46)	1.26 (0.932-1.73)	1.50 (1.06-2.14)	1.69 (1.15-2.50)
60-min	0.352 (0.295-0.425)	0.506 (0.423-0.612)	0.718 (0.599-0.871)	0.899 (0.743-1.10)	1.16 (0.924-1.47)	1.37 (1.07-1.77)	1.59 (1.21-2.11)	1.83 (1.35-2.50)	2.17 (1.53-3.10)	2.45 (1.67-3.62)
2-hr	0.522 (0.437-0.630)	0.709 (0.593-0.856)	0.961 (0.801-1.17)	1.17 (0.969-1.43)	1.47 (1.17-1.86)	1.70 (1.33-2.20)	1.95 (1.48-2.59)	2.21 (1.63-3.02)	2.57 (1.81-3.66)	2.85 (1.95-4.23)
3-hr	0.640 (0.536-0.772)	0.852 (0.712-1.03)	1.14 (0.947-1.38)	1.37 (1.13-1.68)	1.70 (1.36-2.15)	1.96 (1.53-2.53)	2.23 (1.69-2.96)	2.51 (1.85-3.43)	2.90 (2.05-4.14)	3.20 (2.19-4.74)
6-hr	0.904 (0.756-1.09)	1.18 (0.988-1.43)	1.55 (1.29-1.88)	1.86 (1.54-2.27)	2.28 (1.82-2.88)	2.61 (2.03-3.37)	2.94 (2.24-3.91)	3.30 (2.43-4.51)	3.78 (2.67-5.40)	4.16 (2.84-6.16)
12-hr	1.19 (0.997-1.44)	1.56 (1.30-1.88)	2.05 (1.71-2.48)	2.45 (2.03-2.99)	3.01 (2.40-3.81)	3.45 (2.69-4.46)	3.90 (2.96-5.17)	4.37 (3.23-5.97)	5.02 (3.55-7.17)	5.53 (3.77-8.19)
24-hr	1.55 (1.37-1.78)	2.05 (1.81-2.36)	2.72 (2.40-3.15)	3.28 (2.87-3.83)	4.07 (3.44-4.90)	4.69 (3.89-5.77)	5.33 (4.32-6.71)	6.01 (4.74-7.78)	6.96 (5.27-9.37)	7.71 (5.65-10.7)
2-day	1.82 (1.61-2.10)	2.46 (2.17-2.84)	3.33 (2.93-3.85)	4.06 (3.55-4.74)	5.09 (4.30-6.13)	5.91 (4.90-7.27)	6.77 (5.48-8.52)	7.68 (6.06-9.94)	8.97 (6.80-12.1)	10.0 (7.33-13.9)
3-day	1.94 (1.72-2.24)	2.66 (2.35-3.07)	3.64 (3.21-4.21)	4.47 (3.91-5.22)	5.65 (4.78-6.81)	6.60 (5.48-8.12)	7.60 (6.16-9.57)	8.67 (6.84-11.2)	10.2 (7.72-13.7)	11.4 (8.37-15.9)
4-day	2.08 (1.84-2.40)	2.88 (2.55-3.33)	3.99 (3.51-4.62)	4.93 (4.30-5.75)	6.26 (5.30-7.55)	7.34 (6.09-9.03)	8.49 (6.88-10.7)	9.72 (7.66-12.6)	11.5 (8.69-15.4)	12.9 (9.45-18.0)
7-day	2.34 (2.07-2.70)	3.31 (2.93-3.83)	4.66 (4.11-5.40)	5.82 (5.09-6.79)	7.48 (6.34-9.02)	8.84 (7.33-10.9)	10.3 (8.34-13.0)	11.9 (9.35-15.3)	14.1 (10.7-19.0)	16.0 (11.7-22.2)
10-day	2.46 (2.18-2.84)	3.53 (3.12-4.08)	5.02 (4.42-5.81)	6.30 (5.51-7.36)	8.16 (6.91-9.84)	9.69 (8.04-11.9)	11.3 (9.18-14.3)	13.1 (10.3-17.0)	15.7 (11.9-21.1)	17.8 (13.1-24.8)
20-day	2.89 (2.56-3.33)	4.21 (3.72-4.86)	6.08 (5.36-7.04)	7.72 (6.75-9.02)	10.1 (8.58-12.2)	12.1 (10.1-14.9)	14.3 (11.6-18.0)	16.7 (13.2-21.6)	20.2 (15.3-27.2)	23.2 (17.0-32.3)
30-day	3.45 (3.05-3.98)	5.02 (4.43-5.80)	7.28 (6.41-8.43)	9.27 (8.10-10.8)	12.2 (10.4-14.7)	14.7 (12.2-18.1)	17.4 (14.1-22.0)	20.5 (16.1-26.5)	24.9 (18.9-33.6)	28.7 (21.1-40.0)
45-day	4.03 (3.57-4.65)	5.81 (5.13-6.71)	8.38 (7.38-9.71)	10.7 (9.33-12.5)	14.1 (12.0-17.0)	17.1 (14.1-21.0)	20.3 (16.4-25.6)	23.9 (18.9-31.0)	29.4 (22.2-39.5)	34.0 (24.9-47.4)
60-day	4.70 (4.16-5.42)	6.65 (5.88-7.69)	9.52 (8.38-11.0)	12.1 (10.6-14.1)	16.0 (13.5-19.3)	19.3 (16.0-23.8)	23.1 (18.7-29.0)	27.3 (21.5-35.3)	33.6 (25.5-45.3)	39.1 (28.6-54.4)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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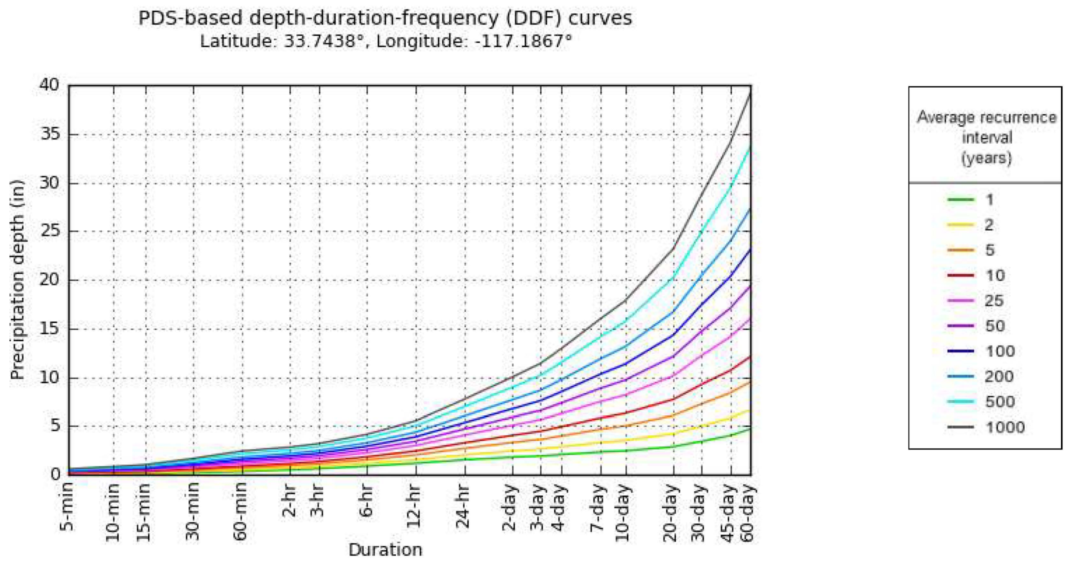
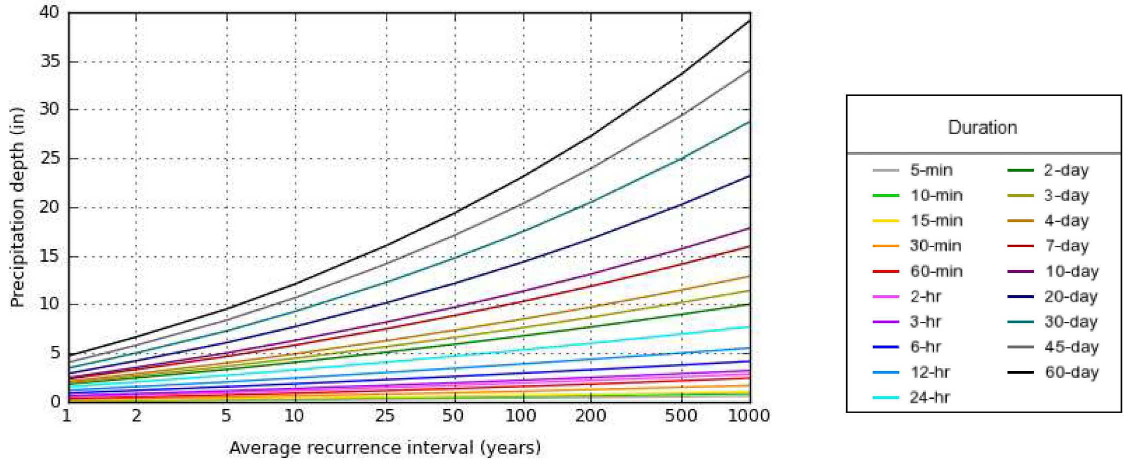
PF graphical





NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Mon Aug 16 22:51:56 2021

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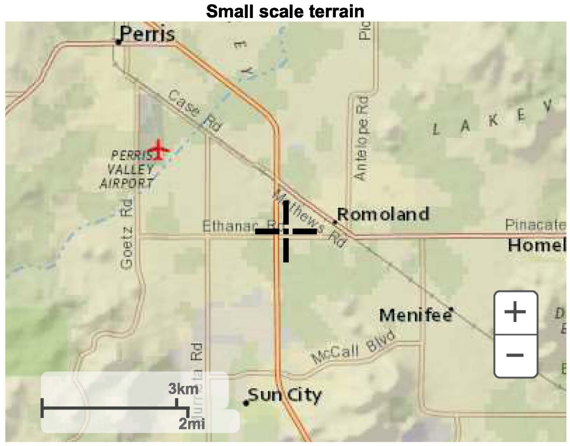
Maps & aerials

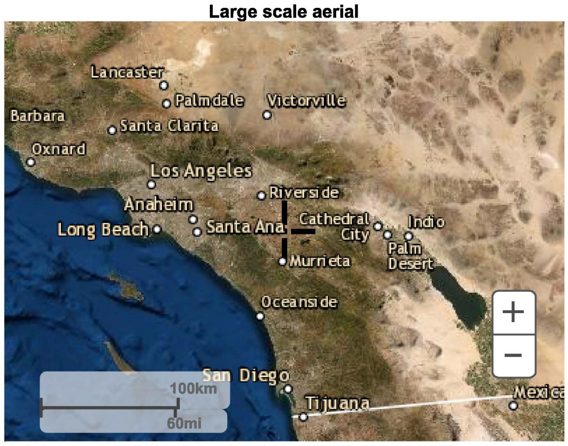
Small scale terrain



Large scale terrain

Large scale map

Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Appendix F

Soils Reports

WQMP Project Report

County of Riverside Stormwater Program

Santa Ana River Watershed Geodatabase

Monday, August 16, 2021

Note: The information provided in this report and on the Stormwater Geodatabase for the County of Riverside Stormwater Program is intended to provide basic guidance in the preparation of the applicantï¿½s Water Quality Management Plan (WQMP) and should not be relied upon without independent verification.

Project Site Parcel Number(s):	329250012, RW, 329250011, 329250009
Latitude/Longitude:	33.744, -117.1866
Thomas Brothers Page:	
Project Site Acreage:	14.52
Watershed(s):	SANTA ANA
This Project Site Resides in the following Hydrologic Unit(s) (HUC):	**HUC Name** - HUC Number **Perris Valley-San Jacinto River** - 180702020306
The HUCs Contribute stormwater to the following 303d listed water bodies and TMDLs which may include drainage from your proposed Project Site:	**WBID Name** - WBID Number **Canyon Lake (Railroad Canyon Reservoir)** - CAL8021100019990208151525 **Elsinore, Lake** - CAL8023100019990208151100
These 303d listed Water bodies and TMDLs have the following Pollutants of Concern (POC):	**Bacterial Indicators** - Pathogens **Nutrients** - Nutrients, Organic Enrichment/Low Dissolved Oxygen **Other Organics** - PCBs (Polychlorinated biphenyls) **Toxicity** - Sediment Toxicity, Unknown Toxicity
Is the Site subject to Hydromodification:	Yes
Limitations on Infiltration:	**Project Site Onsite Soils Group(s)** - C, D **Known Groundwater Contamination Plumes within 1000'** - No **Adjacent Water Supply Wells(s)** - No information available please contact your local water agency for more information. Your local contact agency is EASTERN MUNICIPAL W.D.. Your local wholesaler contact agency is METROPOLITAN WATER DISTRICT.
Environmentally Sensitive Areas within 200'(Fish and Wildlife Habitat/Species):	None
	None

Environmentally Sensitive Areas within 200'(CVMSHCP):	
Environmentally Sensitive Areas within 200'(WRMSHCP):	Burrowing Owl Survey Required Area
Groundwater elevation from Mean Sea Level:	1360
85th Percentile Design Storm Depth (in):	0.604
Groundwater Basin:	Perris-South
MSHCP/CVMSHCP Criteria Cell (s):	No Data
Retention Ordinance Information:	No Data
Studies and Reports Related to Project Site:	Comprehensive Nutrient Reduction Plan IBI Scores - Southern Cal bulletin118_4-sc water_fact_3_7.11 8039-SAR-Hydromodification Romoland MDP West San Jacinto GW Basin Management Plan Homeland/Romoland ADP Map

United States Department of Agriculture

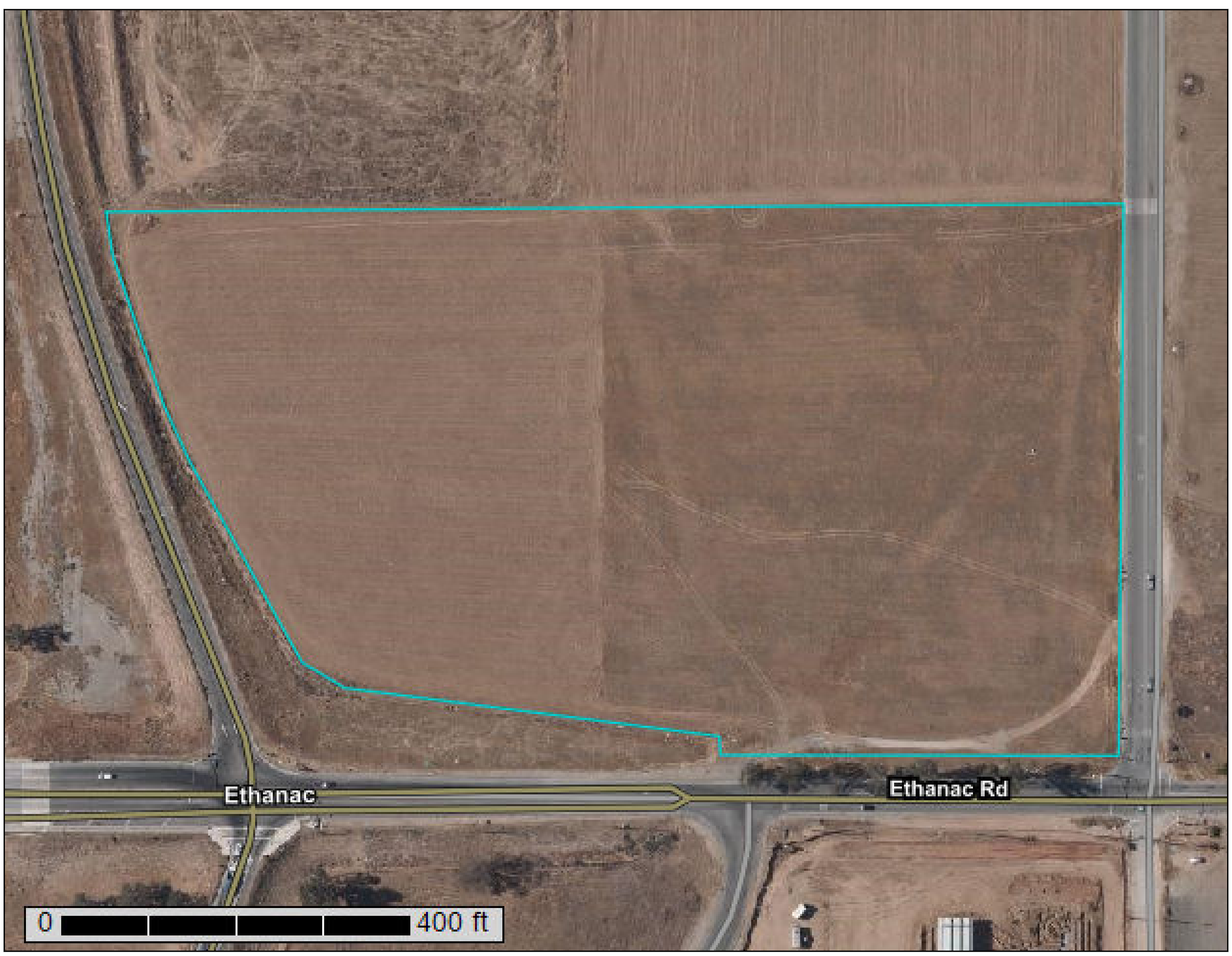
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Western Riverside Area, California



August 16, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:1,950 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 25, 50, 100, 150

Feet: 0, 50, 100, 200, 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 13, May 27, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 25, 2019—Jun 25, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
EnA	Exeter sandy loam, 0 to 2 percent slopes	0.5	3.3%
MaA	Madera fine sandy loam, 0 to 2 percent slopes	14.0	96.7%
Totals for Area of Interest		**14.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Western Riverside Area, California

EnA—Exeter sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hctg
Elevation: 20 to 700 feet
Mean annual precipitation: 7 to 20 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 250 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Exeter and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Exeter

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 16 inches: sandy loam
H2 - 16 to 37 inches: sandy clay loam
H3 - 37 to 50 inches: indurated
H4 - 50 to 60 inches: stratified sandy loam to silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 20 to 40 inches to duripan
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: C
Ecological site: R019XD029CA
Hydric soil rating: No

Minor Components

Greenfield

Percent of map unit: 4 percent
Hydric soil rating: No

Ramona

Percent of map unit: 4 percent
Hydric soil rating: No

Monserate

Percent of map unit: 4 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 3 percent
Hydric soil rating: No

MaA—Madera fine sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hcwt
Elevation: 20 to 250 feet
Mean annual precipitation: 14 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 250 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Madera and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Madera

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 19 inches: fine sandy loam
H2 - 19 to 26 inches: clay
H3 - 26 to 37 inches: indurated
H4 - 37 to 62 inches: stratified coarse sandy loam to clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches; 20 to 40 inches to duripan

Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: R019XD061CA
Hydric soil rating: No

Minor Components

Unnamed, ponded

Percent of map unit: 3 percent
Landform: Depressions
Hydric soil rating: Yes

Monserate

Percent of map unit: 3 percent
Hydric soil rating: No

Chino

Percent of map unit: 3 percent
Hydric soil rating: No

Exeter

Percent of map unit: 3 percent
Hydric soil rating: No

Willows

Percent of map unit: 3 percent
Hydric soil rating: No

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GEOTECHNICAL EVALUATION REPORT

TRAVEL PLAZA
PERRIS

AT

CORNER OF TRUMBLE ROAD &
ETHANAC ROAD
PERRIS, CALIFORNIA

PREPARED FOR:

BROADBENT, INC.
WEST PACIFIC AVENUE
HENDERSON, NEVADA, 89015

PROJECT NO: G-5908-01

JUNE 11, 2021

PREPARED BY:

GEOTECHNICAL SOLUTIONS, INC.
GEOTECHNICAL & ENVIRONMENTAL
ENGINEERING

June 11, 2021

Project No: G-5908-01

Broadbent, Inc.
8 West Pacific Avenue
Henderson, Nevada, 89015

Attention: Mr. Mark E. Kazelskis, PG, CHG, CEM
Principal Geologist

Via Email: mkazelskis@broadbentinc.com

Re: Geotechnical Engineering Evaluation Report
Travel Plaza Perris
Corner of Trumble Road &
Ethanac Road
Perris, California

Gentlemen:

Submitted herewith is the report of the Geotechnical Engineering evaluation study conducted by this office for Perris Travel Plaza at the referenced vacant site.

The project site is located just northwest corner of Trumble Road and Ethanac Road Intersection, and east of Freeway 215 in Perris, San Bernardino County, California as shown on Vicinity Map (Plate A) and Google Map (Plate D).

Based on our study findings, it is our opinion that the site is suitable for the proposed development from a geotechnical-engineering standpoint, provided that the recommendations of this report are successfully implemented.

The closest known active faults capable of producing major earthquakes are the Elsinore (GI) (6.89 Mw) and Elsinore (W + GI) (7.27 Mw) faults, which are located approximately 9.56 miles (15.3 km) away from the project site.

The site does not lie within Alquist-Priolo Earthquake Fault Zone as designated by the California Geological Survey (CGS). The potential for direct surface fault rupture at the site is considered unlikely.

The investigation was made in accordance with generally accepted geotechnical engineering principles and procedures and included such field and laboratory tests considered necessary under the circumstances.

In the opinion of the undersigned, the accompanying report has been substantiated by mathematical and other data and presents fairly the design information requested by your organization.

Respectfully Submitted,

Geotechnical Solutions, Inc.

REGISTERED PROFESSIONAL ENGINEER
DHARMA R. SHAKYA
No. GE 2773
GEOTECHNICAL
STATE OF CALIFORNIA

Dharma Shakya, PhD, PE, GE
Principal Geotechnical Engineer

Abraham S. Baha, PE, M. ASCE
Sr. Principal

REGISTERED PROFESSIONAL ENGINEER
ABRAHAM S. BAHA
No. C053067
CIVIL
STATE OF CALIFORNIA

Distribution: (3+pdf) Addressee

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 Purpose and Scope

The primary objectives of this study were to explore subsurface conditions beneath the project site and evaluate the existing earth materials relative to foundation support and lateral pressure design factors, seismic conditions and earthquake-induced liquefaction potential.

In general, the study objectives were met by a visual reconnaissance of the site and vicinity, review of available tentative development plans, exploratory drilling and sampling of earth materials, laboratory testing, seismic evaluations, geologic hazards study, and engineering analysis. The general scope and objectives of the study were established in collaboration with the client/project team. Items considered in our study relevant to this site included the following:

- Near surface and subsurface soil types,
- Expansion potential,
- Settlement and hydro-collapse potential,
- Bearing capacity and Foundation Design Parameters,
- Slabs-on-grade,
- Lateral earth pressures,
- Drainage considerations,
- Temporary excavation support,
- Corrosion potential,
- Groundwater conditions,
- Likely excavation conditions,
- Seismic Conditions,
- Earthquake induced liquefaction potential,

- Pavements,
- Grading considerations, and
- Construction observation and testing considerations.

To address these, the following scope of work was executed:

1. Review of preliminary project plans, available documents, and coordination with the owner's representatives and project design professionals.
2. Site reconnaissance.
3. Evaluation of seismic conditions for the subject location.
4. Excavator and Backhoe drilling, sampling and logging twelve (11) test holes to investigate subsurface conditions.
5. Laboratory testing of soil samples obtained from subsurface explorations, to determine their physical and engineering properties.
6. Geotechnical analysis of the data obtained.
7. Developing conclusions and recommendations for foundation design.
8. Preparation of this report.

1.2 Project Description

Based on the information provided, the proposed Travel Plaza Perris will have total site area of 14.67 acres including 0.9 acre for the pond area and will consist mainly of constructing the Auto Fueling Island / Canopy, Truck Fueling Island / Canopy, Cat Scale, Aboveground (AST's) and underground (UST's) storage tanks, store building, shop building, pond area, and truck approaches at the location shown on Plot Plan and Boring Location Map (Plate B in Appendix A).

Also, the project consists of heavy-duty asphalt pavement for parking and driveways with some rigid concrete pavement sections to accommodate 98 auto parking and 135 truck parking.

1.3 Site Description and Topography

The project site is located just northwest of Trumble Road and Ethanac Road Intersection and just east of freeway 215 as shown on Vicinity Map (Plate A) and Google Map (Plate D) in Appendix A. At the time of our field exploration, the site was vacant and covered mostly with grass and weeds all around.

The site is relatively flat at an elevation of 1,426 feet above the sea level. No hilly terrain or drainage problems exist at the subject property.

1.4 Site Geologic Setting

The Peninsular Ranges province is one of the largest geomorphic units in western North America. Basically, it extends from the Tranverse Ranges geomorphic province and the Los Angeles Basin, roughly 900 miles south to the tip of Baja California. This province varies in width from about 30 to 100 miles. It is bounded on the west by the Pacific Ocean, on the south by the Gulf of California and on the east by the Colorado Desert Province. The Peninsular Ranges are essentially a series of northwest-southeast oriented fault blocks. Three major fault zones are found in this province. The Elsinore Fault zone and the San Jacinto Fault zones trend northwest-southeast and are found in the near the middle of the province. The San Andreas Fault zone borders the northeasterly margin of the province.

The Perris Block is a large mass of granitic rock generally bounded by the San Jacinto Fault, the Elsinore Fault, the Santa Ana River and a non-defined southeast boundary. The Perris Block has had a history of vertical land movements of several thousand feet due to shifts in the Elsinore and San Jacinto Faults. The primary source of strong seismic ground shaking in the project area is the Elsinore Fault Zone and San Jacinto Fault Zone. Other regional fault zone of significance that could affect the project area is the San Andreas. The Site Regional Geology Map is shown on the enclosed Plate D.

The site is underlain by alluvial soils over Cretaceous aged igneous rocks (Val Verde Tonalite). The materials encountered onsite generally consist of alluvial soils consist of dense to very dense silty sand to sand. The tonalite bedrock is grey in color and moderately weathered and becomes harder with depth. It should be noted that Special handling and coring could be required during the caisson excavation.

The most significant geologic hazard to the project is the potential for moderate to severe ground shaking resulting from earthquakes generated on the faults close to the site. The site is not located in an Alquist-Priolo Special Studies zone for earthquake rupture hazard. The potential for direct surface fault rupture in the project area is considered very low.

1.5 Other Geologic Hazards

Since the site is located in a relatively flat area, we do not consider landslides or other forms of natural slope instability to represent a hazard to the project. The site is not located near any impounded bodies of water therefore tsunamis and seiches are not considered a potential hazard to the project. The proposed project is an area of stable soil conditions with low shrink-swell potential; hence, no impact is anticipated.

In addition to possible strong earthquake ground motion at the site, the secondary effects of earthquake-induced liquefaction, and earthquake-induced landsliding, were considered. Guidelines for evaluating and mitigation seismic hazards in California (CGS, 2008, SP-117A) summarize procedures for evaluating the earthquake-induced landslide and liquefaction potential.

1.5.1 Earthquake-Induced Liquefaction

The site has not been evaluated for earthquake-induced liquefaction potential as per

California Geologic Survey (Plate F, Appendix A). Liquefaction is discussed in more detail in the proceeding sections.

1.5.2 Induced Flooding

The site lies far and/or high enough from the coast or large inland body of water to preclude the hazards of tsunami or seiche waves or inundation from the rupture of an up-gradient reservoir.

1.5.3 Eathquake-Induced Landsliding

The site has not been evaluated by California Geologic Survey (CGS) for earthquake-induced landsliding potential. Since the site is far enough from steep slopes, landsliding will be unlikely.

2.0 FIELD EXPLORATION

2.1 Scope

Hollow Stem auger was used to drill. Eleven (11) borings were drilled to get soil samples from the depths varying from 10- to 51.5-feet below the existing ground level in the proposed development areas. The Boring Logs, B-1 through B-11 are shown on the Plot Plan and Boring Location Map (Plate B) in Appendix A.

2.2 Drilling and Sampling Procedures

A continuous record of the materials encountered during the drilling was made by our field engineer and Log of all the borings are presented on Appendix A The lines designating the interface between soil strata on the log of Test Holes represent approximate boundaries. The transition between strata may be gradual. Undisturbed samples were secured at frequent intervals from various locations for laboratory testing.

Core samples and bulk samples were secured at frequent depth intervals for laboratory examination and testing. Both California standard ring samples (CA) and split spoon samples with Penetration test (SPT) blow counts were obtained for further evaluation. Disturbed bulk samples, representative of the surficial subgrade materials were also obtained.

The relative sampler penetration resistance (SPT) exhibited by the deposits sample is tabulated in the Blow per Foot column of the pertinent test hole log. Recorded blow counts for 12 inches of sampler penetration were generally indicative of medium to high shear resistance (140 pounds hammer at a 30-inch drop).

2.3 Field Tests and Measurements

The drilled holes were examined and logged in the field. Representative samples were obtained to classify the soils. The Unified Soil Classification System (USCS) was used to classify the soils. The soil classification symbols appear on the boring logs and are briefly described in Appendix A. Local and regional geologic characteristics were used to estimate the seismic design criteria.

In addition, relatively undisturbed California ring samples were obtained for laboratory testing. The attached logs tabulate data based on laboratory classification tests and visual observation by the field geologist at the site.

2.4 Standard Penetration Resistance

A sediment is considered to be susceptible to transformation to a fluid mass during a strong seismic event only if the packing of the grains (relative density) is relatively low. Sediments with high relative densities cannot reduce their total volume through the compactive effort induced by the ground shaking.

The number of blows necessary to drive a standard sampler (1½" I.D.)-12 inches into the individual stratum is a measurement of a specific property that has been correlated to relative density. The sampling (penetration) resistance offered by sediment from successive blows delivered by a 140-pound hammer falling 30 inches is counted. The number of blows to drive the standard sampler full 12 inches is recorded as the N-Value.

The on-site material yielded penetration resistance which indicates dense to very dense alluvial soils, fine to coarse grained, dry to slightly moist with trace of silt were encountered within the boring depth. The standard penetration resistances of the on-site materials at 5-feet intervals are presented on the boring logs (Appendix A).

3.0 LABORATORY TESTING AND SUMMARY METHODS

Laboratory testing was programmed following a review of field investigation data and after considering the various foundations, floor slabs, and grading elements to be evaluated. In general, this includes physical testing to establish foundation-bearing characteristics, and classification tests.

A. In-Place Moisture & Density (ASTM D2216 & D2937)

In-situ moisture content and density were determined for all the undisturbed core samples obtained during test boring drilling operations. Test results are tabulated on Plates I-1 through I-11, Log of Test Holes.

B. Mechanical Analysis (ASTM D-422)

The texture composition of a selected typical sample determined by the hydrometer test method was as follows:

Boring No.	Depth (Feet)	Percent Sand	Percent Silt	Percent Clay
B-2	0-3	72	10	18
B-7	0-3	61	17	22
B-8	0-3	56	22	22

B-9		0-3		68		12		20

C. Direct Shear (ASTM D-3080)

Direct shear test was performed on the representative sample of native soil and was considered most pertinent in the design of mat/ spread footings, and moderately deep pier. Tests were performed in the saturated condition at the field density. Individual test results are shown on Plate J.

D. Expansion (ASTM D-4829)

Expansion characteristics were determined by the Expansion Index test on a typical bulk sample considered to be generally representative of the near subgrade soils. Test results were as follows:

Test Boring No.	Moisture Content (%)	Dry Density (pcf)	Expansion Index	Remarks
B-8	8.6	115.2	18	Very Low Expansive

According to the test results, the underlying soils generally exhibit very low expansive potential.

E. Consolidation (ASTM D-2435)

Consolidation (load deformation) tests were performed on undisturbed samples at selected depths. Plotted test results are presented on Plates K, L, and M.

F. Chemical Sulfate Analysis (CAL 417-A Method)

Chemical sulfate analysis was performed on a representative sample by the CAL 417-A method. A soluble sulfate of 390 parts per million was indicated, which is negligible exposure to concrete, however we recommend using Type II Portland cement for the foundation elements in contact with the underlying soil.

G. R-Value Test (ASTM D-2844)

Representative samples of the subgrade soils were obtained and tested to determine the R-value. The material is thought to be typical and presumed to be representative of the subgrade soils. Testing was performed in general accordance with the latest revisions to the Department of Transportation, State of California, Material & Research Test Method No. 301. Pavement design recommendations are based on the latest Traffic Indices (TI's) and recently tested R-value.

An R-Value test was conducted on a representative sample of the near surface soil consisting of clayey sand with trace of silt. The specimens were tested in a state as near to full saturation as possible to simulate the condition the soil might attain at typical field density and under adverse moisture conditions. The R-Value for a representative soil was determined to be 30. Test results are as follows:

The R-Value for a representative soil was determined to be 40. Test results are as follows:

Test Number	Moisture @ Compaction (%)	Density (pcf)	Exudation Pressure (psi)	Stabilometer "R"-Value
a	7.4	120.5	200	37
b	7.1	122.0	350	42
c	6.7	123.8	450	47

* Interpolated 300 psi by Exudation , Rv = 40

4.0 SUBSURFACE DISCUSSION

4.1 General

The recommendations presented are based on entirely upon data derived from a limited number of samples obtained from widely spaced borings. The attached logs, B-1 through

B-11 presented in Appendix A are indicators of subsurface conditions only at the specific locations and times noted. This report assumes the uniformity of the geology and soil structure between the borings, however variations can and often do exist. Whenever there is any deviation, difference or change is encountered or becomes known, we should be contacted.

4.2 Material and Soil Conditions Summary

No appreciable artificial fill was encountered at the boring locations during the exploratory drilling. The upper and underlying natural soils are older alluvium, light brown to dark brown, dry to slightly moist, generally fine to coarse grained, medium dense to very dense, sand with gravel, and some rock fragments as well. A more detailed soil profiles are shown on Plates I-1 through I-11, Log of Test Hole (Appendix A).

4.3 Groundwater

Surface water on this site is the likely result of precipitation or surface run-off from surrounding sites. Overall site drainage is in a north and northwesterly direction. Provisions for surface drainage will need to be accounted for by the project civil engineer.

We recommend that all surface runoff should not be allowed to pond above or flow freely over adjacent slope surfaces. Collected water should be conveyed via a non-erosive device to a suitable storm drain system.

Groundwater was not encountered at a drilled hole depth of 51.5-feet during the field study. No springs or perennial stream flow in local drainages exist based on older topographic maps.

The nearest well, 05S03W10N0015 as shown on Closest Well Groundwater Data (Plate H-1) and groundwater well data (Plate H-2) indicated the highest groundwater elevation to be 1331.86 above mean sea level. The elevation of our project area is about 1,426 feet.

Thus we believe the historic groundwater depth was around 95-feet below the existing ground surface.

Groundwater is not anticipated to affect the site adversely. However, these observations reflect site conditions at the time of the investigation and do not preclude changes in local groundwater conditions, localized seepage due to variations in rainfall, heavy irrigation, damaged structure (pipes, etc.), or altered site drainage pattern(s).

Proper surface drainage is imperative to collect and convey any surface water off site to a suitable storm drain system.

4.4 Faulting and Seismicity

The project site is located in the highly seismic Southern California region within the influence of several fault systems that are considered to be active or potentially active. An active fault is defined by the State of California as a "sufficiently active and well-defined fault" that has exhibited surface displacement within the Holocene time (about the last 11,000 years).

A potentially active fault is defined by the State as a fault with a history of movement within Pleistocene time (between 11,000 and 1.6 million years ago).

No faults have been mapped trending towards or through the site area. The site area does not lie within an Alquist-Priolo Earthquake Fault Zone as designated by the California Geological Survey (CGS) (Hart, 1997). For this reason, the potential for direct surface rupture is considered unlikely.

4.4.1 Faults Close to the Site

USGS National Seismic Hazard Maps for Source parameters interactive query has been used to determine the closest fault to the site within 50 miles and has been tabulated on Table – 1 in Appendix B.

The closest known active faults capable of producing major earthquakes are the Elsinore (GI) and Elsinore (W + GI) Faults, which are both located approximately 9.56 miles (15.3 km) away from the project site. The Elsinore (GI) Fault has been assigned to 6.89 Mw magnitude and slip rate of 5 mm/year and Elsinore (W + GI) Fault has been assigned to 7.27 Mw magnitude and slip rate of N/A.

4.4.2 U.S.G.S. Earthquake Hazard Program

Latest Interactive U.S.G.S. Earthquake Hazard Program using Unified Hazard Tool has been utilized for Conterminous U.S. 2008 (v3.2.x) and peak ground acceleration.

Peak Horizontal Ground Acceleration for 10% probability of exceedance in 50 years i.e. return period of 475 years	0.4423g
Peak Horizontal Ground Acceleration for 5% probability of exceedance in 50 years i.e. return period of 975 years	0.5487g
Peak Horizontal Ground Acceleration for 2% probability of exceedance in 50 years i.e. return period of 2,475 years	0.6906g

Interactive **Hazard Curve** and **Uniform Hazard Response Spectrum** have been plotted and presented in Appendix B.

4.4.3 Seismic Factors

The following are the geotechnical parameters for earthquake design data in accordance with ASCE 7-16 and the latest CBC 2019. The details are presented in Appendix B:

Latitude: **33.7441^0** and Longitude: **-117.1658^0**

NO.	PARAMETERS	VALUES	REFERENCE
1	0.2-Second Mapped Spectral Response Accelerations, S_s **(MCE$_R$ Ground Motion)**	**1.428g**	ASCE 7-16
2	1-Second Mapped Spectral Response Accelerations, S_1 **(MCE$_R$ Ground Motion)**	**0.532g**	ASCE 7-16
3	Site Class	**D**	ASCE 7-16
4	Site Amplification Factor at 0.2 sec, F_a According to Section 11.4.4, F_a should not be less than 1.2	**1.0** **1.2**	ASCE 7-16 Use
5	Site Amplification Factor at 1.0 sec, F_v, however, according to Table 11.4.2, **F_v should be 1.77**	**Null** **1.77**	ASCE 7-16 Use
6	Site Modified Spectral Acceleration Value, S_{MS} $S_{MS} = F_a\ S_s = 1.2 \times 1.428 = 1.714$	**1.714g** **1.714g**	ASCE 7-16 Use
7	Site Modified Spectral Acceleration Value, S_{M1} $\mathbf{SM_1 = F_v\ S_1 = 1.77 \times 0.532 = 0.942}$	**Null** **0.942g**	ASCE 7-16 Use
8	Numeric Seismic Design value at 0.2 sec SA, $\mathbf{S_{DS} = 2/3 \text{ of } S_{MS} = 2/3 \times 1.714 = 1.143}$	**1.143g** **1.143g**	ASCE 7-16 Use
9	Numeric Seismic Design value at 1.0 sec SA, $\mathbf{S_{D1} = 2/3 \text{ of } SM_1 = 2/3 \times 0.942 = 0.628}$	**Null** **0.628g**	ASCE 7-16 Use

Other seismic parameters are as follows:

Closest Fault Distance	9.56 miles (15.3 km)
Fault Name	Elsinore (GI) & Elsinore (W + GI) Faults
Earthquake Magnitude	6.89 M_w & 7.27 Mw
Slip Rate (mm/year)	5.0 & N/A
PGA_M Site Modified Peak Ground Acceleration	**0.600g**
5% Damped Design Spectral Acceleration at short period, S_{DS}	**1.143g**
5% Damped Design Spectral Acceleration at 1-sec period, S_{D1}	**0.628g**
Seismic Design Category	D
Risk Category	II
Soil Site Class	D

4.5 Design Values

Representative values were selected from the test data and other sources for design and is tabulated below:

Field Density	120 pcf
Expansion Index	0 & 18
Angle of Internal Friction (Ult/Peak)	32/33 & 34/35 deg.
Cohesion (Ult/Peak) Remolded	200/250 & 200/250 psf
Subgrade K-Value	100 pci

5.0 SITE CONSIDERATIONS

5.1 Site Preparation

5.1.1 General

It is our professional opinion that the proposed construction will not be subject to geologic hazard from settlement, slippage, or landslide, provided the recommendations of this report are incorporated into the proposed construction. It is also our opinion that the proposed construction will not adversely affect the geologic stability of the site or adjacent properties provided the recommendations contained in this report are incorporated into the proposed construction.

The validity of the conclusions contained in this report is based on compliance with the recommendations presented in this section. Any excavating, trenching, or disturbances that occur after completion of the earthwork must be backfilled, compacted and tested in accordance with the recommendations contained herein. If any unobserved and untested earthwork, trenching, or backfilling occurs, then the conclusions and recommendations in this report may not be relied on.

5.1.2 Site Clearing

Prior to grading, all grasses, bushes, shrubs and debris including construction materials should entirely be removed from the site and disposed of off-site. Existing any undesirable materials should also be removed and hauled off-site. Existing utilities (if Any) should be removed and relocated as required. Any construction debris or ant buried or other contaminated exposed during site clearance should be removed and hauled away from the site. The resulting excavation from any removal should be cleared of loose material then backfilled with compacted soil. Oversized rocks greater than 6 inches should be removed.

5.1.3 Excavation

Excavations into the on-site soils may encounter a variety of challenges for example, firm alluvium, gravels, some fragments of rocks etc. Caving on clean sands may be encountered. The contractor should be made responsible for designing and constructing stable, temporary excavations as required to maintain stability of the excavation sides. All excavations should be sloped or shored in the interest of safety following local and federal regulations including current OSHA excavation and trench safety standards.

Heavy equipment for breaking the very dense and firm alluvium may be required for the excavations for shallow foundations, drilled shafts, and utility trenches for the proposed construction. The speed and ease of excavation are dependent on the nature of the deposit, the type of equipment used, and the skill and experience of the equipment operator.

5.1.4 ASTs Pad Preparation

At the locations where Above Ground Storage tanks (ASTs) are located, proof-roll the exposed subgrade to observe for any loose or disturbed soils that may remain. Remove and replace any loose or disturbed soils prior to placing any additional fill materials required to reach the finished subgrade elevation.

5.1.5 Compliance

Recommendations for foundations and slabs-on-grade supported on compacted fills or prepared subgrade depend upon compliance with the **Site Preparation recommendations** and Recommended Earthwork Specifications in Appendix C.

To assess compliance, observation and testing should be performed under the direction of a geotechnical engineer. Please contact us to provide observation and testing services.

5.2 Lateral Earth Pressures

5.2.1 Lateral Passive Resistance

Horizontal forces may be resisted by passive pressure acting on the side and sliding resistance. The passive pressure may be 300 psf per foot of embedment from the lowest adjacent grade up to a maximum of 4,500 psf.

Friction between base of footings and/or floor slabs, and the underlying soils may be assumed to be 40 percent of the dead loads.

The allowable bearing capacity and the allowable resistance of horizontal forces may be increased one-third for transient forces.

Friction and lateral pressure may be combined, but not to exceed two-thirds of the allowable lateral pressure.

5.2.2 Retaining Wall Recommendations (If Any)

The retaining wall structures may be supported by shallow footings bearing on compacted fill or competent subgrade soil. Following bearing values may be used for foundation design.

Shallow footings for the wall and/or secondary structure may be designed for an allowable bearing value of 1,500 pounds per square foot (psf) embedded at least 18 inches, a minimum width of 12 inches, placed over a minimum of 12-inches thick engineered fill compacted to 90% relative density or over a competent subgrade soil. This basic bearing value may be increased by 200 psf for each one-foot increase in depth, and by 100 psf for each additional 12 inches in width to a maximum value of 2,500 psf.

Recommended bearing values are for dead plus live loads and may be increased by one-third for combined dead, live, and transient forces such as wind load and seismic forces.

It is recommended that all foundations be reinforced per structural design, but no less than a minimum reinforcement of 2#5 bars top and 2#5 bars at the bottom.

It is estimated that total settlement will be less than 0.50" and differential settlement will be less than 0.25" over a horizontal distance of 30 feet.

5.2.3 Active Pressure

Recommended active lateral soil pressure values for design of drained retaining wall are as follows:

Surface Slope of Retained Material (Horizontal:Vertical)	Equivalent Fluid Weight (pcf) (Native Backfill)	Allowable Bearing Capacity
Level	35	1,500 psf

A Pipe and gravel drain (4" perforated PVC embedded in at least three cubic feet of gravel per lineal foot of pipe wrapped with Mirafi geofabric 10N or equivalent) should be provided on the retained earth side and near the base of all the retaining walls. Backfill should consist of sand and/or gravel. While all backfills should be compacted to the required degree, care should be taken when working close to the walls to prevent excessive pressure.

5.2.4 At-Rest Earth Pressure (If Any)

Retaining walls (basement walls, underground vault, if applicable) should be designed for at-rest conditions. The recommended earth pressure for at-rest conditions is an equivalent fluid density of 60 pounds per cubic foot without surcharge loading.

Note:

The equivalent fluid pressures presented herein do not include the lateral pressures arising from the presence of the following:

- Hydrostatic conditions, submergence or partial submergence
- Sloping backfill, positively or negatively
- Surcharge loading, permanent or temporary
- Seismic or dynamic conditions

5.2.5 Seismic Force on Wall

Lateral forces on retaining walls (exceeding 6 feet in height) due to earthquake movements in accordance with Section 1803A.5.12 of the 2019 CBC for active and at-rest conditions may be calculated as follows:

Seismic active Force = 13 H^2 pounds/ft of wall (Inverted triangular distribution, acting at 0.6H from bottom).

Seismic at-rest Force = 24 H^2 pounds/ft of wall (Rectangular Distribution, acting at 0.6H from bottom).

Where, H = Height of the retaining wall in feet

5.3 On-Site Fill Soils

5.3.1 Materials

On-site clean sand (after removing rocks, sizes greater than 6 inches), low-expansive potential soils, or imported materials may be used as fill material for the following:

- Foundation Areas
- Interior Slab Areas
- Pavement Areas
- Backfill

Any earth materials imported or excavated on the property may be utilized in the fill provided that each material has been determined to be suitable by the soil engineer. These materials should be free of roots, tree branches, other organic matter or other deleterious materials. Soils of poor gradation, undesirable expansion potential, or substandard strength characteristics may be designated by the consultant as unsuitable and may require blending with other soils to serve as a satisfactory fill material.

Gradation (as per ASTM C136) should be as follows:

Size	% by Weight
6"	100
4"	85-100
¾"	70-100
No 4 Sieve	50-100
No. 200 Sieve	15 (max)

Any import material should have an expansion Index, EI less than 20.

5.3.2 Placement and Compaction

a. Place and compact approved fill material in nearly horizontal layers that when compacted should not exceed 6 inches in thickness.

b. Use appropriate equipment and procedures that will produce recommended densities and water contents throughout the lift. Moisture condition, blending, and mixing of the fill layer should continue until the fill materials have a uniform moisture content at or above optimum moisture.

c. Uncompacted fill lifts should not exceed 8 inches.

d. Materials should be compacted to the following:

- On-site or imported soil, reworked and fill:

	Minimum % (ASTM D-1557 Laboratory Standard)
Subgrade Below Footings	90
Subgrade Below Slab-on Grade	90
Subgrade Below Pavement	90
Crush Rock Below Slab-on-Grade	95
Aggregate Base below pavement	95

5.4 Soil Corrosivity

5.4.1 Corrosion and Sulfate Attack Protection

A major factor in determining soil corrosivity is electrical Resistivity. The electrical Resistivity of a soil is a measure of its resistance to the flow of electrical current. Corrosion of buried metal is an electrochemical process in which the amount of metal loss due to corrosion is directly proportional to the flow of electrical current (DC) from the metal into the soil. Corrosion currents, following Ohm's Law, are inversely proportional to soil Resistivity. Lower electrical resistivities result from higher moisture and chemical contents and indicate corrosive soil. Other soil characteristics that can influence corrosivity toward metals are pH, chemical content, soil types and site drainage.

Based on test results and our past experience at this site, soils are classified as slightly corrosive to ferrous metals and negligible sulfate exposure to concrete. The type of alluvial deposits encountered at this site and in this area in general is known to cause corrosion problems. Ferrous metals and pipes should be properly coated and wrapped. Please be advised that this firm does not practice corrosion engineering; therefore, we recommend that upon completion of precise grading, onsite soils be analyzed by a qualified corrosion engineer to evaluate the impact of chemical activity of these soils on buried metallic pipes and other underground structures. If necessary, more elaborate corrosion protection systems may be considered as may be recommended by a corrosion expert.

5.4.2 Concrete

Concrete for foundation where in contact with the underlying soils should be designed in accordance with the 2019 CBC, ACI 318 Section 4.3, Table 4.3.1 (2005). As the potential for sulfate attack on concrete appears negligible, however, we recommend that the use of type II Portland cement, with a maximum water-cement ratio of 0.50, and a minimum compressive strength of 3,000 psi should be taken into consideration for the foundation elements in contact with the soil.

For all concrete in contact with soil, concrete cover over rebar should be maintained per California Building Code (CBC 2019).

5.5 Building Foundation Recommendations

Based upon results of the field explorations, laboratory testing and engineering analysis, it is concluded that the site is suitable for the proposed development at the subject site. The site is subject to ground shaking typical of the Southern California area, any construction should conform to the current seismic design provision of the California Building Code (2019), and/or other regulatory codes.

Following are more specific recommendations:

5.5.1 Conventional/Spread Foundations

The planned ASTs and the proposed building may be supported by conventional continuous and/or isolated shallow spread pad footings, bearing on certified compacted fill. The foundations should bear on engineered fills achieved by removal and re-compaction of the soils below foundation and slab elements.

Footings placed at least 18 inches below finish subgrade and 3 feet x 3 feet spread footings, 24 inches deep may be designed for an allowable bearing value of 1,500 pounds per square foot (psf). The footing width should be a minimum of 18 inches. An increase of 100 psf and 200 psf are allowed for each additional foot of increase in width and depth, respectively to a maximum value of 2,000 psf.

This allowable bearing value is for dead plus live load and may be increased by one-third for combined dead, live, and transient loads such are wind or seismic forces.

All footings at minimum shall be incorporated with 2#5 bars at top and 2#5 bars at the bottom.

Isolated column footings should be connected to other foundation elements with reinforced grade beams.

Total settlement is estimated to be less than ½ inch for loading of 2 kips per square foot. Differential settlement will be 1/3 of an inch maximum for a horizontal distance of 30 feet. Additional foundation movements could occur if water from any source infiltrates the foundation soils. Therefore, proper drainage should be provided in the final design and during construction.

All footings, stem walls, and masonry walls should be steel-reinforced to reduce the potential for distress caused by differential foundation movements. The use of joints at openings or other discontinuities in masonry walls is recommended.

We recommend that geotechnical engineer, or his representative thereof, observe the footing excavations before reinforcing steel and concrete are placed. This observation is to assess whether the soils exposed are similar to those anticipated based on our exploration. Any soft, loose, or otherwise unacceptable soils should be undercut to suitable materials and backfilled with approved fill materials, or controlled density fill (i.e., lean concrete). Soil backfill should be properly placed and compacted.

5.5.2 Mat Foundation (Alternate Foundation for ASTs)

Alternatively, above ground storage tanks (ASTs) and proposed building may be supported on the mat foundation. The semi-rigid mat foundation should be at least 4-feet or more below the finish grade and may be designed for an allowable bearing capacity of 2,000 pounds per square foot. This basic allowable bearing value is for dead load plus live load and may be increased by one-third for short duration loading, such as wind or seismic forces. Modulus of subgrade reaction, k value may be taken as 150 pci for subgrade soil at 4 feet depth.

For lateral support, an average passive capacity of 300 pounds per square foot per foot to a maximum of 4,500 psf may be used for mat footing.

Minimum thickness of mat footing should be 24 inches. The bottom of excavation at 4 feet below the finish grade should be compacted to 90 % of the maximum density as per ASTM D-1557 Laboratory Standard, certified by the Geotechnical Engineer of record prior to pouring concrete. Other aspects of the design including reinforcement and the thickness of the mat should be determined by the project structural engineer. The mat may be buried and should be backfilled with on-site material compacted to 90 percent.

5.5.3 Drilled Shafts for Canopy Foundation

Proposed truck diesel and gas canopies may be supported by moderately deep cast-in-place concrete caisson bearing into natural subgrade materials. Very hard drilling may be encountered because of the presence of dense to very dense alluvial soils. Heavy-duty equipment may be required.

The lateral forces will be the controlling element in this case depending on the height of the canopies, wind load, and/or seismic loads. Therefore, it is recommended that the minimum pier diameter should be 36 inches and should be extended to a minimum depth of 10 feet into the native material.

The pier may be designed for an allowable end bearing of 3,000 pounds per square foot or for an average frictional resistance of 300 pounds per square foot. Either skin resistance or end bearing or combined will provide adequate foundation support for the proposed canopies. The uppermost length of the drilled shaft foundation equal to the diameter of the shaft should be ignored when evaluating allowable capacities.

For lateral support, a passive capacity of 350 pounds per square foot per foot to a maximum of 5,000 psf may be used.

It is recommended that concrete be placed immediately after drilling. The concrete for the pier should be placed through tremmie or other directional devices. Pier drilling operations should be subject to observation by this office to confirm the conditions encountered are consistent with the conclusions and recommendations of this report and/or to make any appropriate modifications, if necessary. Please note that caving is very likely to be encountered during caisson drilling. The contractor should be ready to provide either casing or other methods to prevent caving. The contractor should bring the heavy duty equipment because very difficult drilling are anticipated due to presence of boulders and rocks.

We anticipate that total settlement of the proposed structures, supported by drilled shaft foundations as recommended, should be less than ½-inch. Additional foundation could occur if water from any source infiltrates the foundation soils. Therefore, proper drainage should be provided in the final design and during construction.

In case, caisson drilling is not feasible for the canopies, mat foundation as explained on 5.5.2 for the support of the canopies may be anticipated.

5.6 Slab Design Recommendation

Based on test results, the underlying surface soils are very low expansive, therefore it is recommended to maintain subgrade soil at near optimum moisture content during precise grading and / or by periodic watering following grading and incorporated slab reinforcement of No. 3 bars 16 inches center to center cross pattern. The slab thickness should be 5 inches minimum. However, the thickness and reinforcement requirements of the slab should be evaluated by the project structural engineer.

It is further recommended that moisture retarder (Stego 15 mil or approved equivalent) be provided over a minimum of 6 inches of ¾" aggregate rock rolled and compacted to 95% relative compaction, with the gradation (90-100% passing on sieve ¾" size, 1-10% passing on No. 4 sieve, and 0-3% passing on No. 100 sieve) over the compacted fill subgrade compacted to 90% relative compaction.

The modulus of subgrade reaction (k) is estimated to be 125 pounds per cubic inch (pci). All concrete placement and curing operations should follow the American Concrete Institute (ACI 318-19) manual recommendations. Improper curing techniques, high slump (high water-cement ratio), or both, could cause excessive shrinkage, cracking, or curling. Concrete slabs should be allowed to cure properly before placing vinyl or other moisture-sensitive floor coverings.

5.7 General Drainage and Moisture Protection

It is recommended to provide positive surface drainage systems consisting of a combination of sloped concrete flatwork, sheet flow gradients, swales, surface area drains (where needed) around the structures. Ground surface should have a minimum gradient of 2 percent away from any building foundations and similar structures. Surface waters should not be allowed to collect or pond against building foundations and within the level areas of the site. Buildings should be provided with gutters and downspouts. Downspouts shall be connected to area drains by pipes.

Planters near the building should be avoided if possible and if used, they should be water proofed. Irrigation should be controlled and an area drain system should be provided to avoid water intrusion beneath the structure.

5.8 Volume Changes

Based on our experience, there is typically a reduction in soil volume when the native soils are excavated and then compacted. Typical shrinkage percentages are usually in the range of 5 to 10 percent when the soils are compacted depending on the native in-place density.

5.9 Underground Utilities

Utility backfill should be placed and compacted by mechanical means as recommended in this report. Testing of the backfill should be conducted to verify conformance to the required specifications. Ponding or water jetting of the backfill should not be conducted.

Exterior trenches adjacent to, and within areas extending below a 1:1 plane projected from the outside bottom edge of the footing, and all trenches beneath hardscape features should be compacted to at least 90% of the laboratory standard. Sand backfill, unless excavated from the trench, should not be used in these backfill areas. Compaction testing and observations, along with probing, should be accomplished to verify the desired results.

All trench excavations should conform to CAL_OSHA and local safety codes.

5.10 Pavement Design

5.10.1 Pavement Section

The pavement sections presented on the following page are based on the R-value data tested, the assumed TI values, and the guidelines presented in the latest revision to the California Department of Transportation "Highway Design Manual," latest edition.

Typical categories of paved areas with corresponding traffic indices are listed as follows:

T.I. 5.0 Parking Stalls

T.I. 6.0 Driveways

T.I. 8.0 Trucks Route, Fire Lane, Truck Parking

The recommended pavement sections provided below are intended as a minimum guideline. If thinner or highly variable pavement sections are constructed, increased maintenance and repair could be expected.

If the ADT (average daily traffic) or ADTT (average daily truck traffic) increases beyond that intended, as reflected by the TI used for design, increased maintenance and repair could be required for the pavement sections.

Consideration should be given to the increased potential for distress from overuse of paved areas by heavy equipment and/or construction related traffic (e.g., concrete trucks, loaded supply trucks, etc.), particularly when the final section is not in place (i.e., topcoat). Best management construction practices should be followed at all times, especially during inclement weather.

Based on an "R" Value of 40, the following thickness of aggregate base was determined for vehicular and non-vehicular areas.

Asphalt Concrete Pavement Section Design Table

Pavement Areas	Traffic Index, TI	Asphalt Concrete AC (inch)	Aggregate Base AB (inch)
Truck Route, Fire lane Truck Parking	8	4"	12"
Driveway/Under Canopy	6	4"	8"
Parking Stall	5	4"	6"

Rigid Concrete Pavement Section Design Table

Pavement Areas	Traffic Index, TI	Concrete (inch)	Aggregate Base AB (inch)
Heavy Truck Vehicular Areas	6	6"	10"
Walkways	-	4"	4"

For concrete section, #4 reinforcement 12-inch center to center each way cross pattern are recommended. However structural design by structural engineer will suffix.

5.10.2 Pavement Grading Recommendations

5.10.3 General

A representative of Geotechnical Solutions, Inc. (GSI) should be present for the preparation of subgrade, aggregate base, and asphalt concrete for flexible pavement and concrete for rigid pavement.

5.10.4 Subgrade Preparation

After removing the existing deleterious materials on the pavement areas and hauled offsite, all surficial deposits of loose soil material should be removed and excavate 12 inches below the base and recompacted as recommended. The bottom is further scarified to a depth of at least 6 inches; moisture conditioned as necessary and compacted to 90 percent of the maximum laboratory density as determined by ASTM Test Method D-1557.

Deleterious material, grass/weeds, excessively wet or dry pockets, concentrated zones of oversized rock fragments, and any other unsuitable materials encountered during excavation or grading should be removed. The compacted fill material should then be brought to the elevation of the proposed subgrade for the pavement.

The subgrade should be proof-rolled in order to ensure a uniform, firm and unyielding surface. All grading and fill placement should be observed by the project soils engineer and/or his representative.

5.10.5 Aggregate Base

Compaction and rolling are required for the recommended base section. Minimum relative compaction required will be 95 percent of the laboratory maximum density as determined by ASTM Test Designation D-1557. Aggregate base should be in accordance with Crush Rock Class II aggregate base (minimum R-value=78) and sample should be brought for testing and approval prior to delivery to the site. Please note that crush miscellaneous base is not allowed.

5.10.6 Asphalt Concrete Pavement

Asphalt concrete pavement should be Performance Grade PG 64-10 1/2" maximum aggregate size and should be placed and compacted in two layers. Asphalt concrete shall be compacted to 95 percent of the Hveem Laboratory Standard.

5.10.7 Concrete Pavement Areas:

Concrete flatwork including sidewalks, patio-type slabs and concrete sub-slabs to be covered with decorative pavers should be at least 4 inches thick and provided with construction joints or expansion joints every 6 feet or less.

Concrete driveway slabs should be at least 6 inches thick over 6 inches of aggregate base or native base (for vehicular areas) and 4” of concrete over 4” of aggregate base or native base (Non-vehicular areas) over approved subgrade, providing #4 reinforcement 12” center to center each way cross pattern and provided with construction joints or expansion joints every 10 feet or less.

At the driveway areas, the top 12 inches of subgrade should be excavated; moisture conditioned and recompacted with minimum 90% compaction immediately prior to placing the rock base and asphalt concrete. Rock-base material shall be class II aggregate base and to be compacted to 95 percent minimum.

Design section must be verified during site grading, based on R value test and appropriate modifications shall be made, if required.

5.11 Exterior Concrete Flatwork

In order to reduce the potential for unsightly cracking, concrete sidewalks, deck and patio slabs and concrete sub-slabs to be covered with decorative pavers should be at least 4 inches thick and provided with construction joints or expansion joints every 6 feet or less. Concrete driveway slabs should be at least 5 inches thick and provided with construction joints or expansion joints every 10 feet or less.

5.12 Temporary Excavations

Temporary excavations may not be required but in case it is needed then the Contractor should be made fully responsible for adequate support of the excavation at all times. Temporary support of excavation structures plans should be designed by a Professional Engineer licensed in the State of California and experienced in such work and these plans should be reviewed by us and approved by the City of Perris, if necessary.

Since the site has adequate room to lay back with temporary excavation slopes, shoring may not be needed, but this should be evaluated based on field conditions.

The stability of temporary excavations depends on many factors, including the slope angle, the shearing strength of the existing material, orientation and inclination of geologic structure, the height of the slope and the length of time the excavation remains unsupported and exposed to equipment vibrations and rainfall. All excavations should be observed by the engineering geologist during excavation.

The possibility of temporary excavations failing may be minimized by: 1) keeping the time between cutting and filling operations to a minimum; 2) limiting excavation length exposed at any one time; and, 3) cutting no steeper than a 1:1 (horizontal to vertical [h:v]) inclination and no steeper for false cuts along the toe for key excavations, cleanouts, etc.

Following is the temporary excavation recommendation, subject to field verification by the geotechnical consultant.

Excavation up to 4 feet	Vertical
Excavation over 4’ but not to exceed 10’	1:1 (H: V)
Excavation from 10’ to 20’	1½:1 (H: V)

6.0 GENERAL COMMENTS AND LIMITATIONS

6.1 Plan Review

Final project plans should be reviewed by this office prior to construction, so that construction is in accordance with the conclusions and recommendations of this report. Based on our review, supplemental recommendations and/or further geotechnical studies may be warranted.

6.2 Geotechnical Observation and Testing

All footing trenches for the proposed structure should be observed by a representative of this firm to verify that they were excavated into competent bearing soils per the recommendations of this report as well as to the minimum depths recommended above. These observations should be performed prior to the placement of forms or reinforcement. The excavations should be trimmed neat, level and square. All loose, sloughed or moisture softened soil should be removed prior to placing concrete.

6.3 Construction Verification Procedure

Construction of foundations and placement of engineered fill should be done under the observation and documentation of a representative of the project Geotechnical Engineer. The following are noted as items requiring verification during construction.

Pre-Grading Meeting:

A pre-grading meeting should be held prior to the start of any grading activities. Attendees of this meeting should include the Owner, the Architect, the Geotechnical Engineer, and the Contractor, to review procedures and scheduling.

Footing Observations:

Construction of foundation and slab should be performed under inspection of the Geotechnical Engineer. Footings should be observed and certified by Geotechnical Engineer of Record after excavation and prior to placement of reinforcing bars.

Earthwork Observations:

Relative compaction of all fill materials placed on site should be tested in accordance with ASTM D6938. All new fill shall be brought to near optimum moisture, placed in layers not exceeding six inches in thickness, and compacted to at least 90 percent relative compaction for subgrade and 95 percent relative compaction for aggregate base. No jetting or water tamping of fill soils shall be permitted. All imported soil for engineered fill should be pre-approved by the Geotechnical Engineer and consist of clean, granular, non-expansive soil, free of vegetation and other debris with an Expansion Index of 20 or less.

At all times, the contractor should have a responsible field superintendent on the project in full charge of the work, with authority to make decisions. He should cooperate fully with the Geotechnical Engineer in carrying out the work.

All footing trenches for continuous and spread footings and subgrade for the slab areas should be observed by the project Geotechnical Engineer to verify that over-excavation and re-compaction operations of adequate depth, thickness, and compaction have been performed as specified. All footing excavations should be trimmed neat, level and square. All loose, sloughed or moisture softened soil should be removed and replaced with properly compacted soil.

6.4 Recommendations for Construction

Surveying: The contractor shall set necessary stakes to verify lines and grades as shown on the plan.

Changed Conditions: Any changed conditions not found during exploration should be brought to the attention of the soil engineer. As a result of the changed conditions, the soil engineer will provide further recommendations.

Site Drainage: The site should be sloped to direct water away from all structures and divert to a positive drainage device at the street. Roof gutters and down spouts shall be provided for roof drainage. Down spouts shall be connected to the positive area drains.

Footing and Utilities Trenches. All the Footing excavations as well as utility trenches should be observed by a representative of Geotechnical Solutions, prior to placement of steel.

6.5 Limitations

This report is issued with the understanding that it is the responsibility of the owner or his representative to see that the information and recommendations contained herein are called to the attention of the other members of the design team for the project and that the applicable information is incorporated into the plans, and that the necessary steps are taken to see that the contractors and the subcontractors carry out such recommendations. The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether due to natural processes or to the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated, wholly or in part, by changes outside of our control. The validity of the recommendations of this report assumes that Geotechnical Solutions, Inc. will be retained to provide construction monitoring services. The scope of our services did not include any investigation for the presence or absence of hazardous or toxic materials.

6.6 Closure

The Conclusions and recommendations contained herein are based on the findings and observations made at the test boring locations. It is not unusual to find conditions between and beyond such locations, which differ from the conditions encountered. If conditions are encountered during construction, which appear to differ from those previously disclosed, this office should be notified so as to consider the need for modifications. On-site construction observations and wherever appropriate, tests should be performed during the course of construction by a representative of this office to evaluate compliance with the design concepts, specifications, and recommendations contained herein.

This report has been compiled for the exclusive use of our client, it shall not be transferred to, or used by, other parties, or applied to any project on this site other than described herein without consent and /or thorough review by this office.

Geotechnical Solutions, Inc.

References

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Jennings, C.W., 1994, Preliminary Fault Activity Map of California, Scale 1:750,000, DMG Open File Report 92-03.

Morton, D.M. and F.K. Miller, 2006, "Geologic Map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California: U.S. Geological Survey, Open-File Report OF-2006-1217, Scale 1:100,000.

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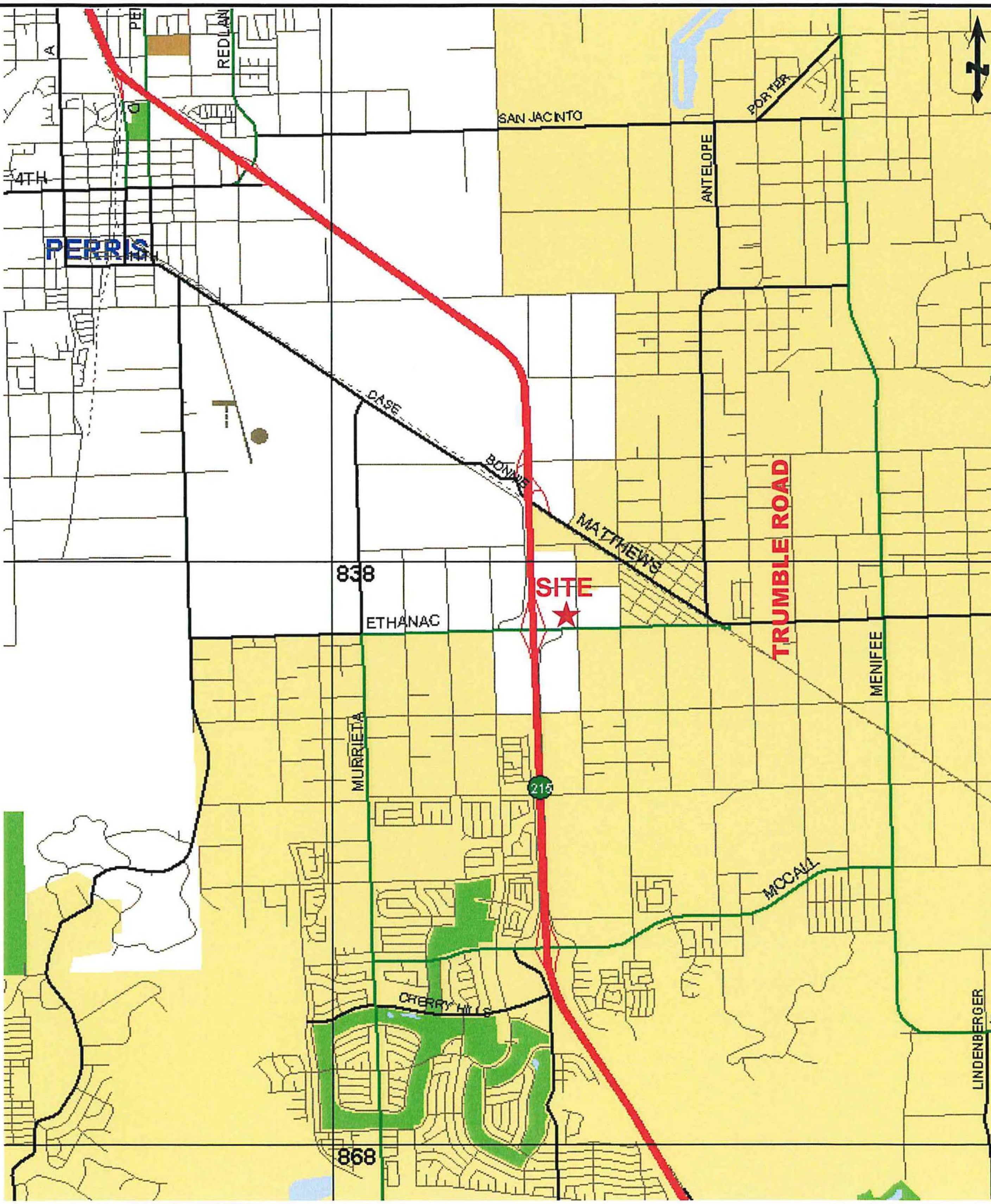
U.S.G.S., Earthquake Hazards Program, Unified Hazard Tool – Interactive Hazard Curve and Interactive Deaggregation web Site. **https://earthquake.usgs.gov/hazards/interactive/**

Appendix A

Plates:

- Vicinity Map
- Plot Plan and Boring Location Map
- Topographic Map
- Google Map
- Site Regional Geology Map
- Seismic Hazard Map – CGS
- Fault, Liquefaction and Flood Zones
- Groundwater Closest Well Data
- Groundwater Map – Well Data
- Log of Test Borings
- Direct Shear Tests
- Consolidation Tests

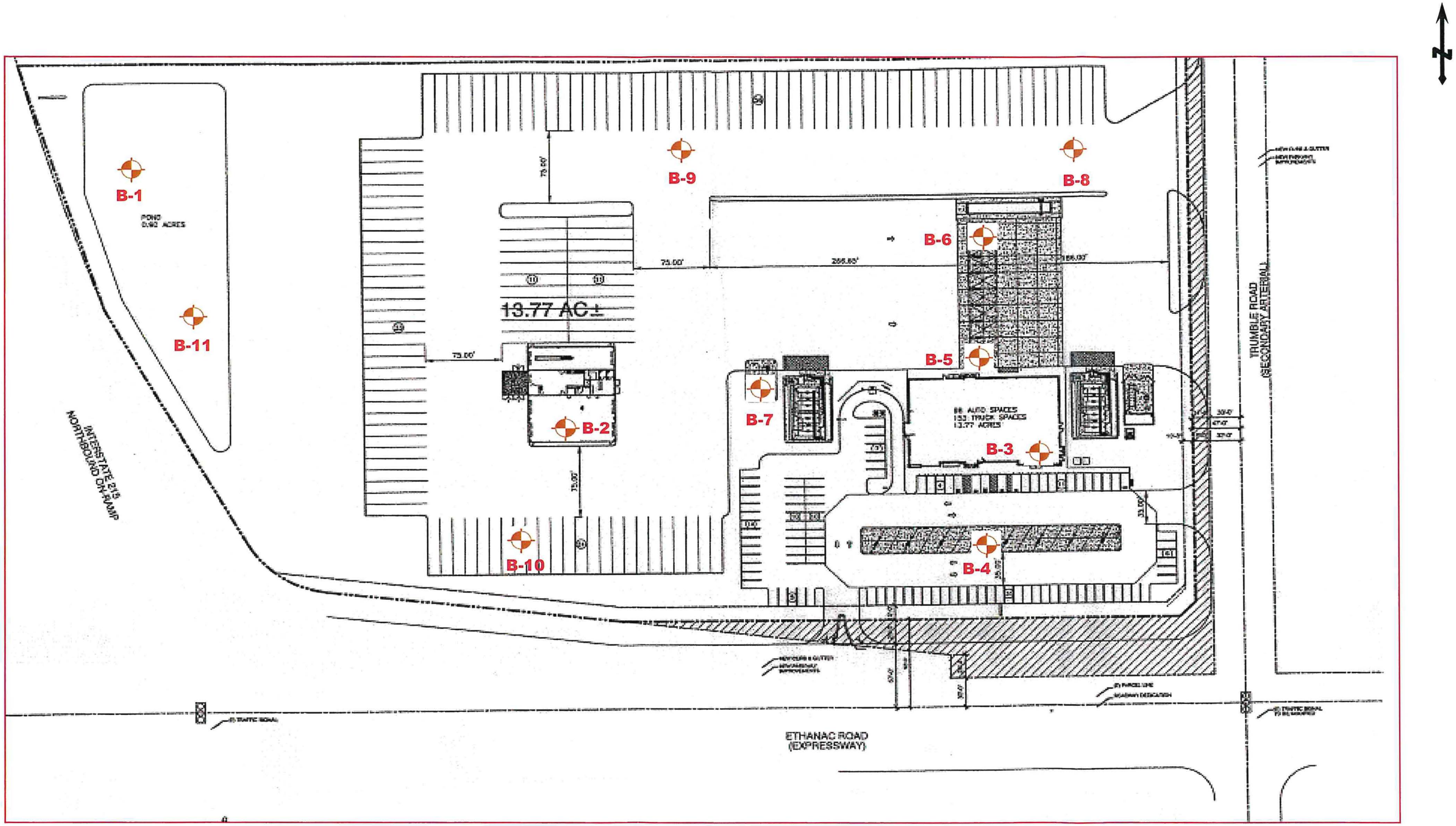
VICINITY MAP



Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	A

Geotechnical Solutions, Inc.

PLOT PLAN & BORING LOCATION MAP

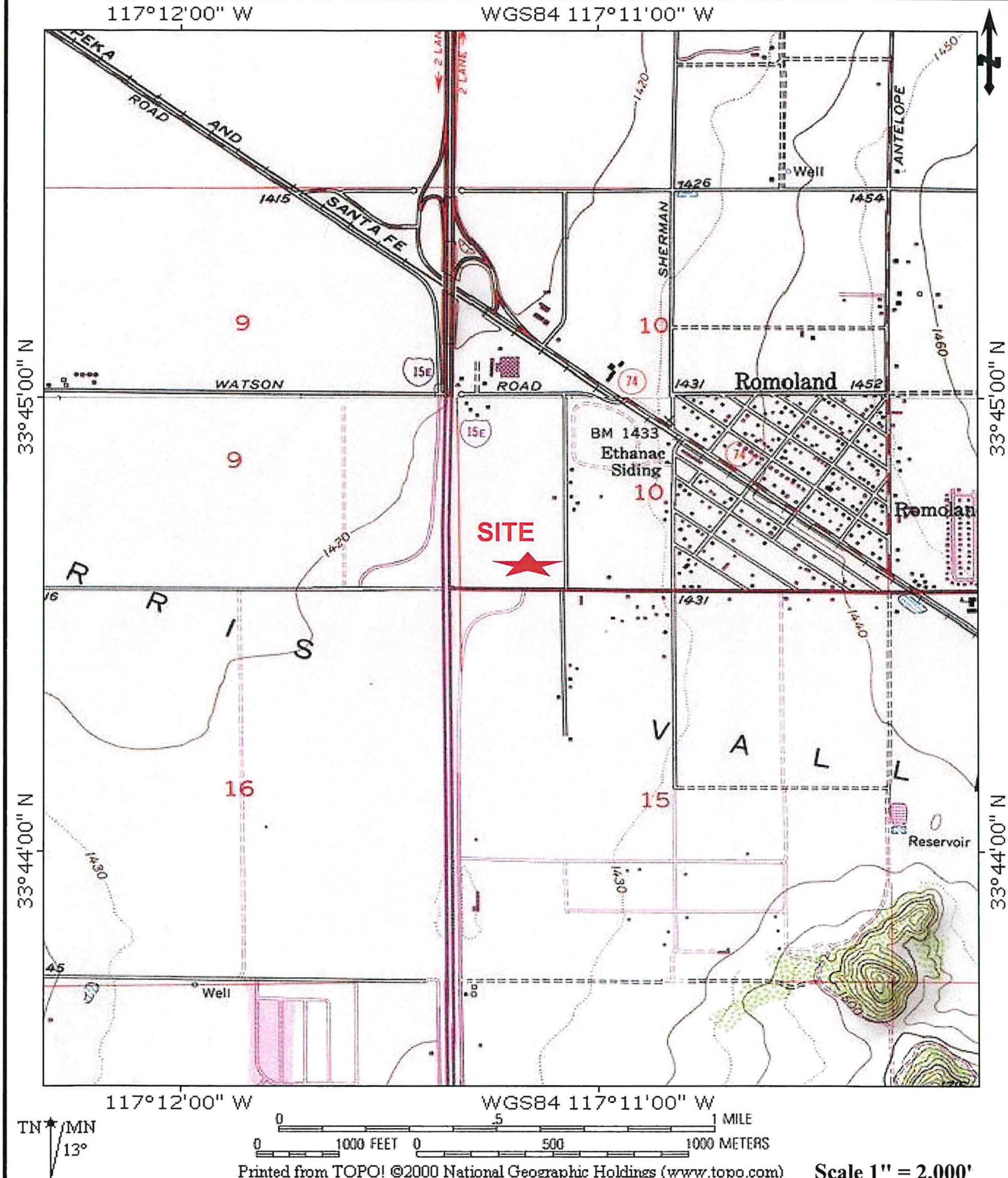


APPROX. SCALE: 1" = 100'

Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	B

Geotechnical Solutions, Inc.

TOPOGRAPHIC MAP



Scale 1" = 2,000'

Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	C

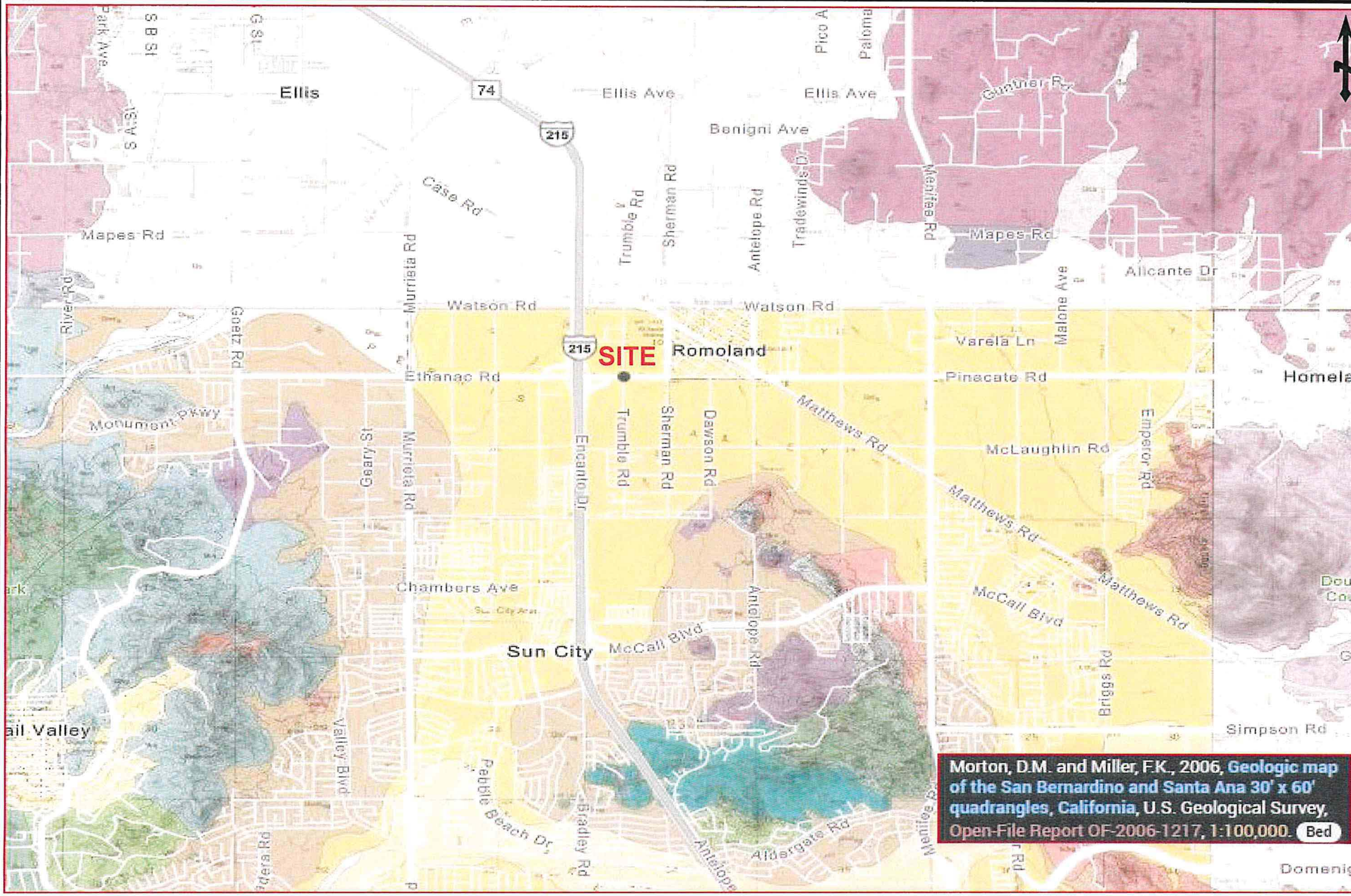
Geotechnical Solutions, Inc.

GOOGLE MAP

Travel Plaza - Perris		Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California		Plate:	D

Geotechnical Solutions, Inc.

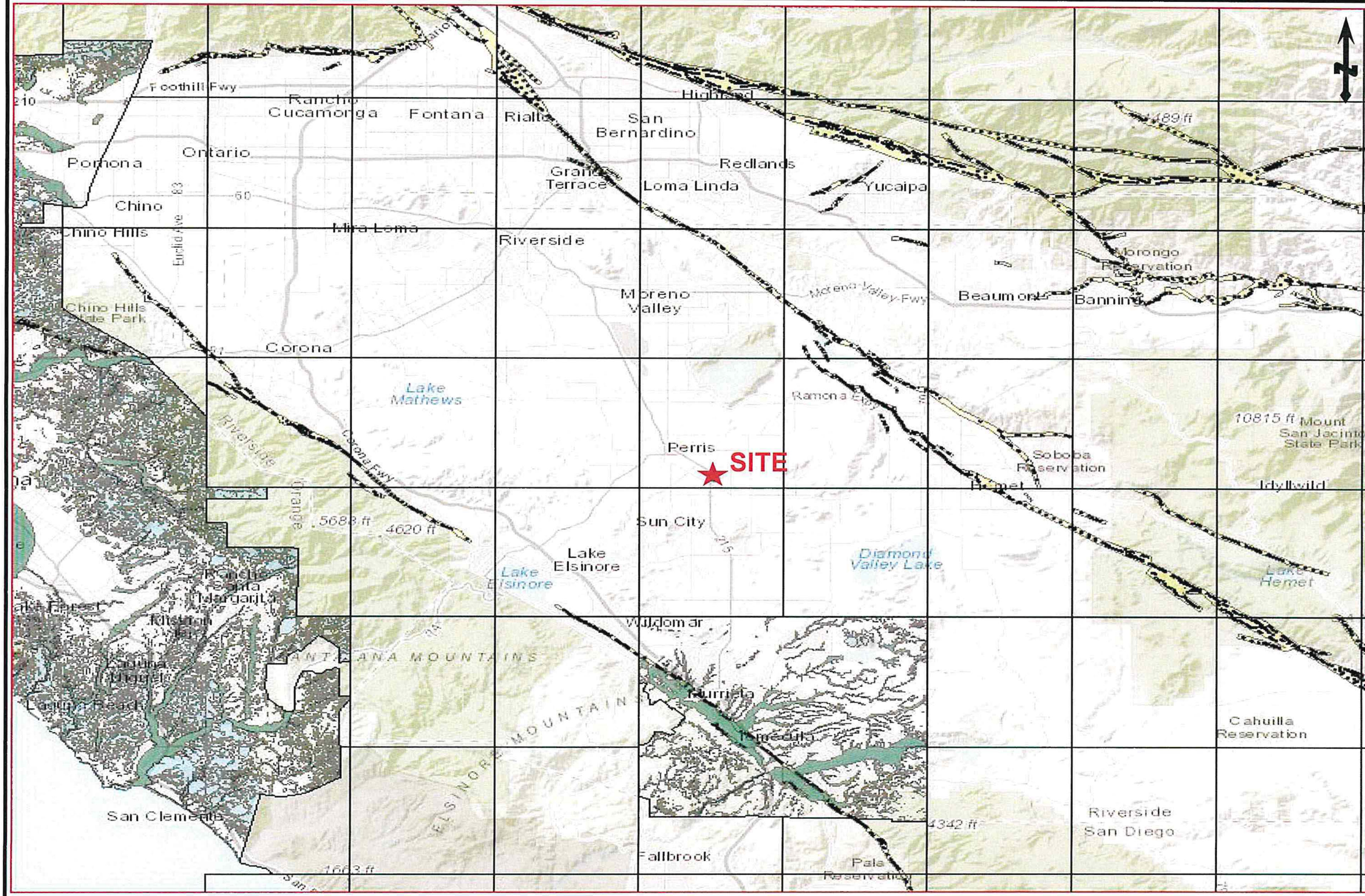
Site Regional Geologic Map



Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	E

Geotechnical Solutions, Inc.

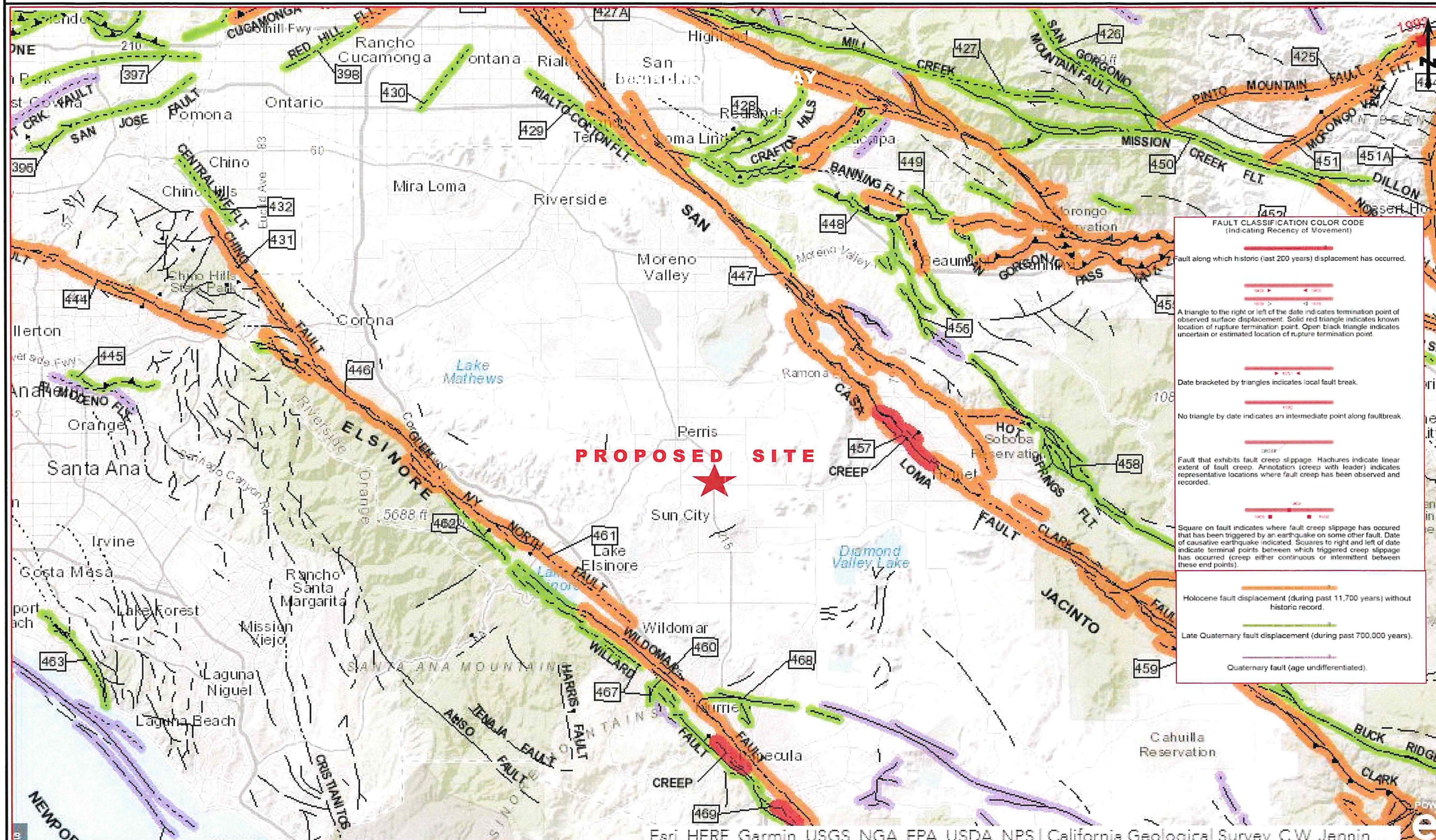
Seismic Hazard Map



Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	F

Geotechnical Solutions, Inc.

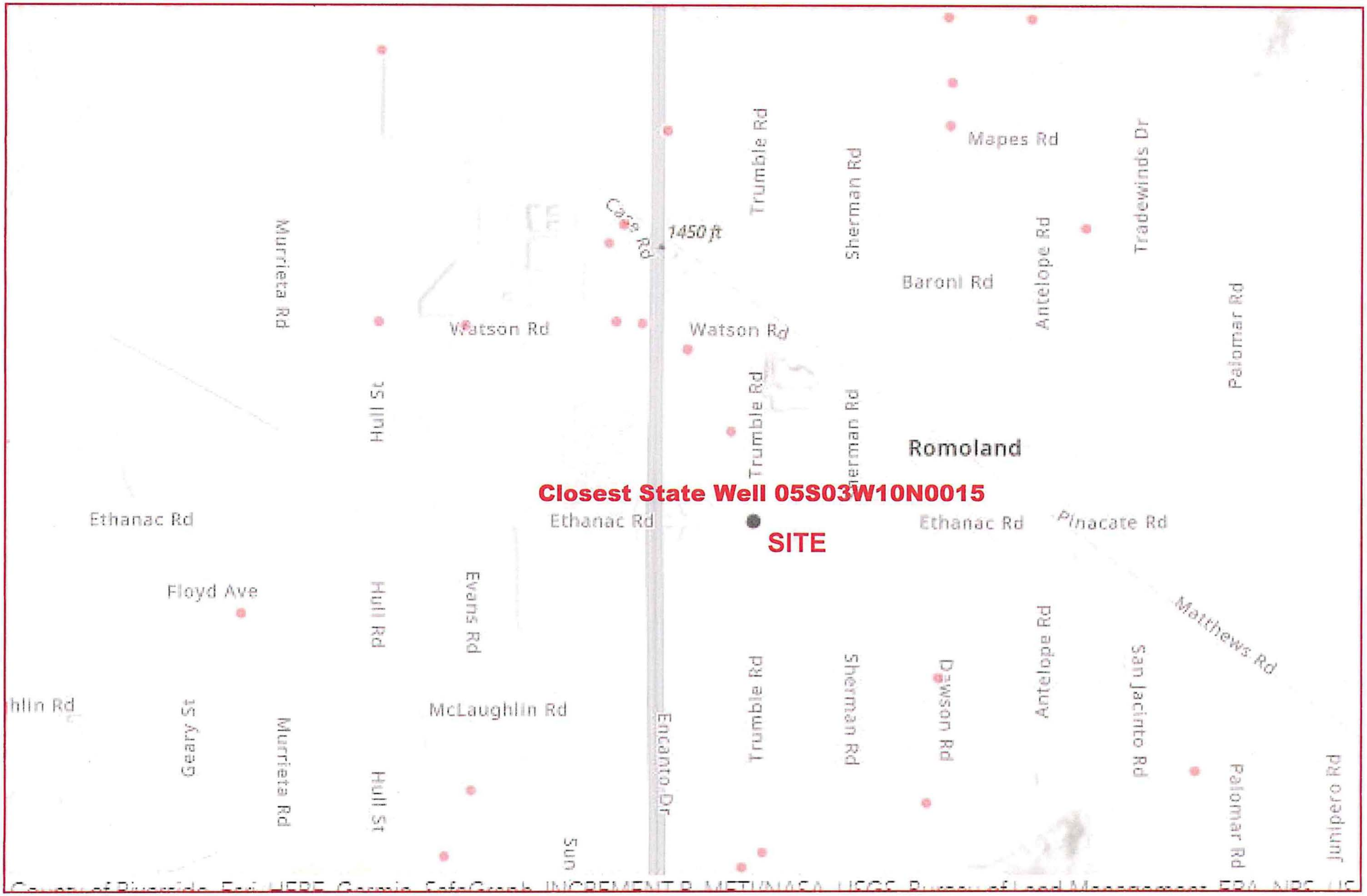
FAULT, LIQUEFACTION, FLOOD ZONES



Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	G

Geotechnical Solutions, Inc.

GROUNDWATER MAP - CLOSEST WELL DATA



Travel Plaza - Perris		Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California		Plate:	H-1

Geotechnical Solutions, Inc.

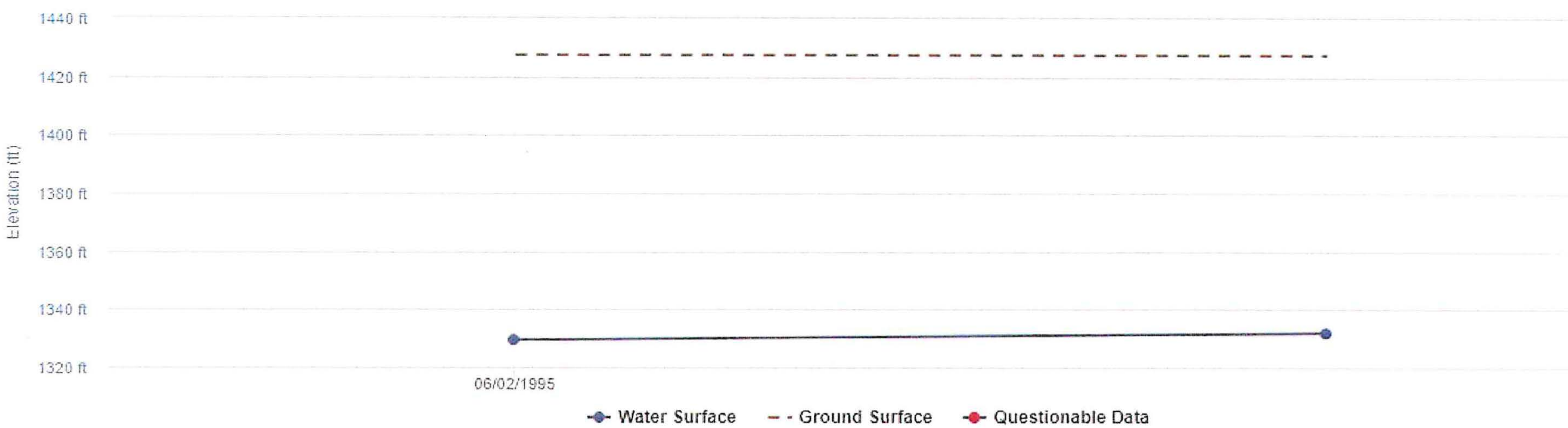
GROUNDWATER MAP - WELL DATA

Groundwater Level Report

Station 337464N1171859W001

Station Data   Groundwater Level Data

Groundwater Levels for Well 337464N1171859W001 **(Site Code)**



Measurement Date (PST)	Reference Point Elevation	Ground Surface Elevation	Distance from RP to WS	Groundwater Elevation	Ground Surface to Water Surface	Measurement Issue	Collecting Agency
06/02/1995 00:00:00	1427.490	1427.490	97.98	1329.51	97.98		Department of Water Resou...
09/13/1995 00:00:00	1427.490	1427.490	95.63	1331.86	95.63		Department of Water Resou...

Travel Plaza - Perris		Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California		Plate:	H-2

Geotechnical Solutions, Inc.

Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No.	B-1
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No.	I-1
Project Number :	G-5908-01		Page 1 of	1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	10
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**Covered with dry weeds**				
			Bag #1				Older Alluvium: Silty Sand (SM), light brown, medium dense				
	2		C-1	19-54/6"		> 100	@2': Sand (SP), silty, light brown, slightly moist, very dense	6	127		
1421	5		C-2	20-50/6"		> 100	@5':Sand (SP), poorly graded, very dense, gray, slightly moist, medium to coarse grained	7	122		
1416	10									11	HD: 89(SA) :7(SI) : 4(CL)
1411	15						End of Boring = 10 feet 2" Gravel on Bottom Drilled for Percolation test No groundwater encountered No Caving Backfilled w/Cuttings after percolation test				
1406	20										
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

Geotechnical Solutions, Inc.

Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No.	B-2
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No.	I-2a
Project Number :	G-5908-01		Page 1 of	2

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	51.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**Bareground**				
			Bag #1				Older Alluvium: Clayey Sand (SC), light brown, medium dense			28	HD:72 SA:10 SI: 18 CL
	2		C-1	50/6"		100	@2': Sand (SP), Silty, light brown, slightly moist, very dense	7	121		
1421	5		C-2	18-37-44		81	@5':Sand (SP), poorly graded, very dense, gray, moist, medium to coarse grained	10	126		
1416	10		C-3	17-32-34		66	@10':Sand (SP), variety of color, moist, very dense, medium to coarse grained	9	95		DS: P=Peak / Ult=Ultimate $\phi = 34^0$, c =250 psf (P) $\phi = 33^0$, c = 200 psf (Ult)
1411	15		S-1	14-28-33		61	@15': Sand (SP), hard to drill, slightly moist, dark gray	5	-		
1406	20		S-2	15-34-39		73	@20': Same as above	5	-		
1401	25		S-3	19-31-37		68	@25': Same as above	5	-		
1396	30		S-4	14-19-27		46	@ 30': Same as above	4	-		
1391	35		S-5	11-18-26		44	@ 35': Sand(SP), poorly graded, dark gray, moist, dense, medium to coarse grained	11	-		
1386	40		S-6	20-27-39		66	@40': Sand(SP), poorly graded, dark gray, slightly moist, very dense, medium to coarse grained	3	-		
1381	45										

Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No.	B-2
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No.	I-2b
Project Number :	G-5908-01		Page 2 of	2

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	51.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES: Type	SAMPLES: Number	SAMPLES: Penetration Resistance, Blows / 6"	SAMPLES: Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1381	45		S-7	21-29-48		77	@45': Sand (SP), poorly graded, dark gray, slightly moist, very dense, coarse grained	4	-		
1376	50		S-8	24-30-61		91	@ 50':Same as above,	3	-		
1371	55						End of Boring = 51.5 feet No groundwater encountered No Caving Backfilled w/Cuttings				
1366	15										
1361	20										
1356	25										
1351	30										
1346	35										
1341	40										
1336	45										

Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No.	B-3
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No.	I-3
Project Number :	G-5908-01		Page 1 of	1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	16.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**Bareground**				
			Bag #1				Older Alluvium: Silty Sand/ Sand (SM/SP), dark brown, dry				
	2		C-1	50/6"		100	@2': Sand (SP), silty, dark brown, slightly moist, very dense fine to coarse grained	6	127		
1421	5		C-2	20-50/6"		100	@5':Sand (SP), poorly graded, very dense, dark brown, moist, medium to coarse grained	7	122		
1416	10		C-3	8-10-33		43	@10':Same as above, slightly moist	3	-		
1411	15		S-1	10-20-40		60	@10':Same as above	3	-		
1406	20						End of Boring = 16.5 feet No groundwater encountered No Caving Backfilled w/Cuttings				
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No. B-4
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No. I-4
Project Number :	G-5908-01		Page 1 of 1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	21.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						Bareground				
			Bag #1				Older Alluvium: Silty Sand (SM), light brown, dry				
	2		C-1	28-50/6"		100	@2': Sand (SP), Silty, light brown, slightly moist, very dense	8	117		
1421	5		C-2	9-13-16		29	@5':Silty Sand (SM), medium dense, brown, moist, medium to coarse grained	6	113		
1416	10		C-3	10-12-18		30	@10':Silty Sand/Sand (SM/SP), dark brown, moist, medium dense, medium to coarse grained	3	103		
1411	15		S-1	16-26-39		65	@15': Sand (SP), dark brown, slightly moist, very dense, coarse grained	3	-		
1406	20		S-2	20-27-43		70	@20': Same as above	3	-		
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No. B-5
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No. I-5
Project Number :	G-5908-01		Page 1 of 1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	21.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES: Type	SAMPLES: Number	SAMPLES: Penetration Resistance, Blows / 6"	SAMPLES: Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**covered with dry grass**				
			Bag #1				Older Alluvium: Silty Sand (SM), light brown, dry				
	2		C-1	51-50/1"		>100	@2': Sand (SP), trace Silt, light brown, slightly moist, very dense, medium to coarse grained	10	111		
1421	5		C-2	26-50/5"		>100	@5':Same as Above	11	103		
1416	10		C-3	37-50/4"		>100	@10':Same as above	8	119		
1411	15		S-1	29-36-44		80	@15': Sand (SP), dark brown, slightly moist, very dense, coarse grained	5	-		
1406	20		S-2	30-35-47		82	@20': Same as above	5	-		
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

Geotechnical Solutions, Inc.

Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No.	B-6
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No.	I-6
Project Number :	G-5908-01		Page 1 of	1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	11.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						Dry grass				
			Bag #1				Older Alluvium: Silty Sand / Sand (SM/SP), light brown, medium dense				
	2		C-1	26-50/4"		> 100	@2': Sand (SP), silty, light brown, slightly moist, very dense	6	123		
1421	5		C-2	28-50/5"		> 100	@5':Sand (SP), very dense, gray, moist, medium to coarse grained	8	129		DS: P=Peak / Ult=Ultimate $\phi = 33^0$, c =250 psf (P) $\phi = 32^0$, c = 200 psf (Ult)
1416	10		S-1	15-25-30		55	@10':Sand/Silty Sand (SP/SM), light gray, slightly moist, very dense, coarse grained	3	-		
							End of Boring = 11.5 feet No groundwater encountered No Caving but possible Backfilled w/Cuttings				
1411	15										
1406	20										
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

Geotechnical Solutions, Inc.

Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No. B-7
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No. I-7
Project Number :	G-5908-01		Page 1 of 1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	21.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						covered with dry grass				
			Bag #1				Older Alluvium: Clayey Sand (SC), light brown, dry			39	HD: 61 SA:17 SI: 22 CL
	2		C-1	50/4"		>100	@2': Clayey Sand (SC), trace Silt, light brown, very moist, very dense, medium to coarse grained	18	95		
1421	5		C-2	24-50/5"		>100	@5':Sand (SP), dark brown, very dense, moist, medium to coarse grained	6	127		
1416	10		C-3	18-24-32		56	@10':Sand with Silt (SP/SM), dense, brown, very moist,	14	114		
1411	15		S-1	15-18-18		36	@15': Sand (SP), dark brown, slightly moist, dense, coarse grained	5	-		
1406	20		S-2	20-20-23		43	@20': Same as above	4	-		
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No.	B-8
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No.	I-8
Project Number :	G-5908-01		Page 1 of	1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	11.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Penetration Resistance, Blows / 6"	SAMPLES Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**Covered with dry weeds**				
			Bag #1				Older Alluvium: Clayey Sand (SC), light brown, dry			43	HD: 57 SA:21 SI: 22 CL
	2		C-1	22-50/6"		> 100	@2': Sand (SP), silty, light brown, slightly moist, very dense	5	120		
1421	5		C-2	25-50/6"		> 100	@5':Sand (SP), poorly graded, very dense, gray, slightly moist, medium to coarse grained	4	118		
1416	10		S-1	15-21-26		47	@10':Sand/Silty Sand (SP/SM), light gray, slightly moist, dense	3	-		
1411	15						End of Boring = 11.5 feet No groundwater encountered No Caving but possible Backfilled w/Cuttings				
1406	20										
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

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Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No.	B-9
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No.	I-9
Project Number :	G-5908-01		Page 1 of	1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	11.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**Covered with dry weeds**				
			Bag #1				Older Alluvium: Clayey Sand (SC), light brown, dry			32	HD: 68 SA :12 SI : 20 CL
	2		C-1	24-50/6"		> 100	@2': Sand (SP), silty, light brown, slightly moist, very dense	4	118		
1421	5		C-2	27-50/6"		> 100	@5':Sand (SP), poorly graded, very dense, gray, slightly moist, medium to coarse grained	3	116		
1416	10		S-1	15-18-21		39	@10':Sand/Silty Sand (SP/SM), light gray, slightly moist, dense	3	-		
1411	15						End of Boring = 11.5 feet No groundwater encountered No Caving but possible Backfilled w/Cuttings				
1406	20										
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

Project :	Travel Plaza - Perris		LOG OF TEST HOLE	Borehole No.	B-10
Project Location :	Corner of Trumble Road and Ethanac, Perris, California			Plate No.	I-10
Project Number :	G-5908-01			Page 1 of	1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	11.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**Covered with dry weeds**				
			Bag #1				Older Alluvium: Clayey Sand (SC), light brown, dry				
	2		C-1	30-50/6"		100	@2': Sand (SP), silty, light brown, slightly moist, very dense	7	121		
1421	5		C-2	29-50/6"		100	@5':Sand (SP), poorly graded, very dense, gray, slightly moist, medium to coarse grained	6	120		
1416	10		S-1	165-19-23		42	@10':Sand/Silty Sand (SP/SM), light gray, slightly moist, dense	4	-		
							End of Boring = 11.5 feet No groundwater encountered No Caving but possible Backfilled w/Cuttings				
1411	15										
1406	20										
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No.	B-11
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No.	I-11
Project Number :	G-5908-01		Page 1 of	1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	10
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES: Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**Covered with dry grass**				
							Older Alluvium: Clayey Sand (SC), light brown, dry				
	2		C-1	32-50/6"		100	@2': Sand (SP), silty, light brown, slightly moist, very dense	6	122		
1421	5		C-2	31-50/6"		100	@5':Sand (SP), poorly graded, very dense, gray, slightly moist, medium to coarse grained	5	121		
1416	10						@10': Same as above			10	HD: 90(SA) : 8(SI) : 2(CL)
1411	15						End of Boring = 10 feet 2" of Gravel on Bottom Drilled to 10 feet for Percolation Test Backfilled w/ cuttings after the Test				
1406	20										
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

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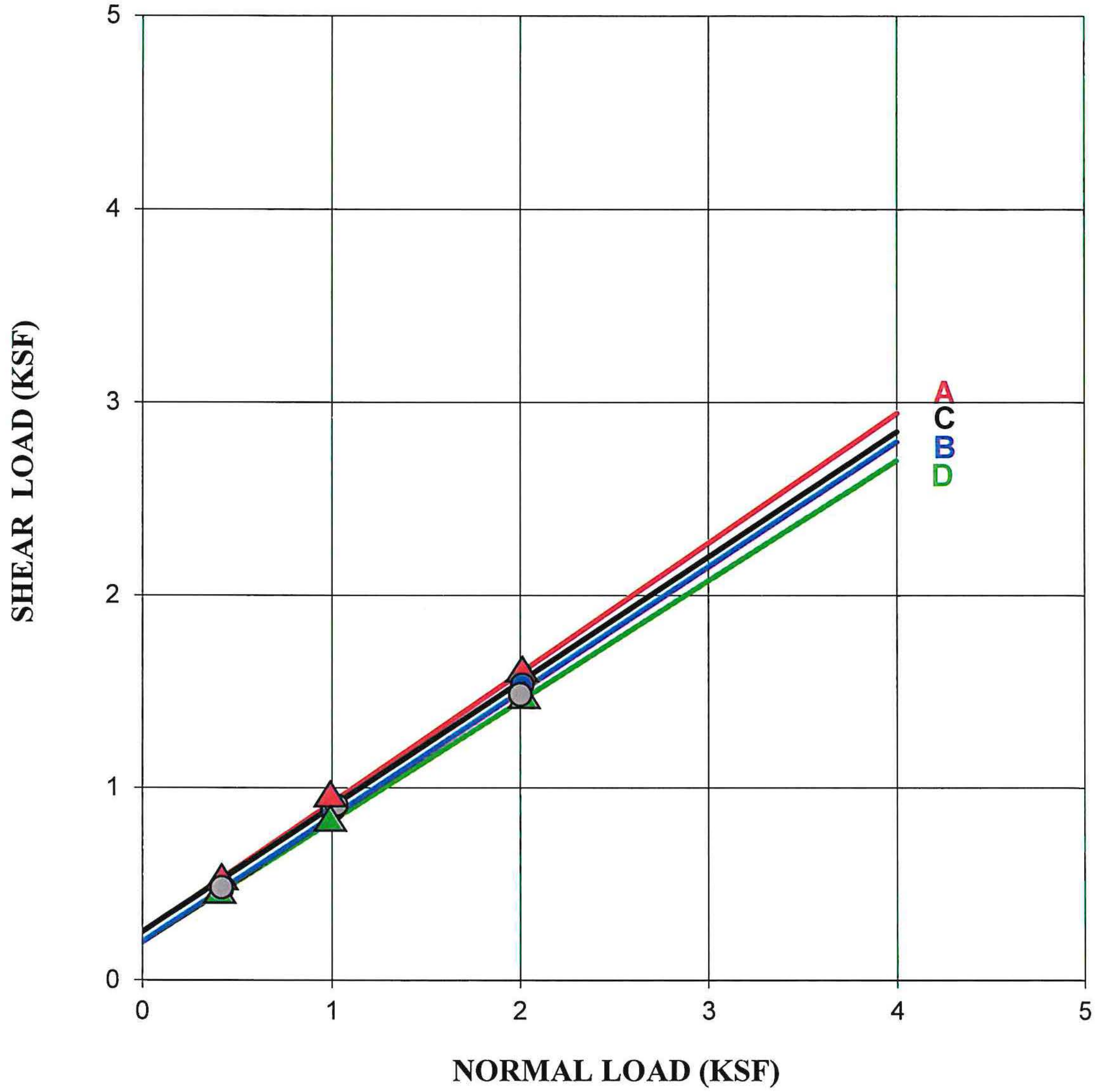
DIRECT SHEAR



SYMBOL	LOCATION	DEPTH (FT)	TEST CONDITION		COHESION (PSF)	FRICTION (DEG)
A	B-2	10'	Saturated - Drained	Peak	250	34
B	B-2	10'	Saturated - Drained	Ultimate	200	33
C	B-6	5'	Saturated - Drained	Peak	250	33
D	B-6	5'	Saturated - Drained	Ultimate	200	32

Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	J

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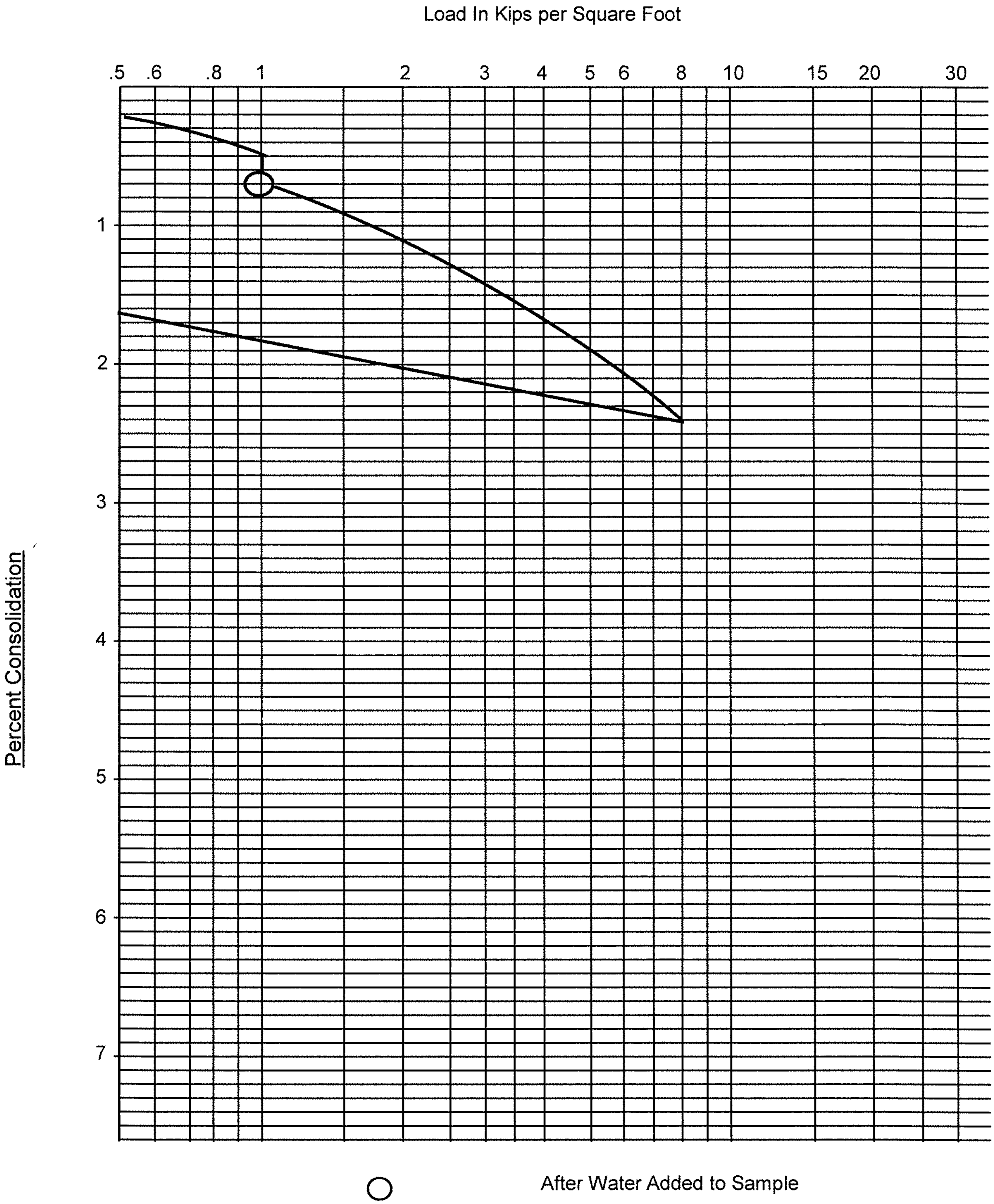
CONSOLIDATION



B-2 @ 10'

Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	K

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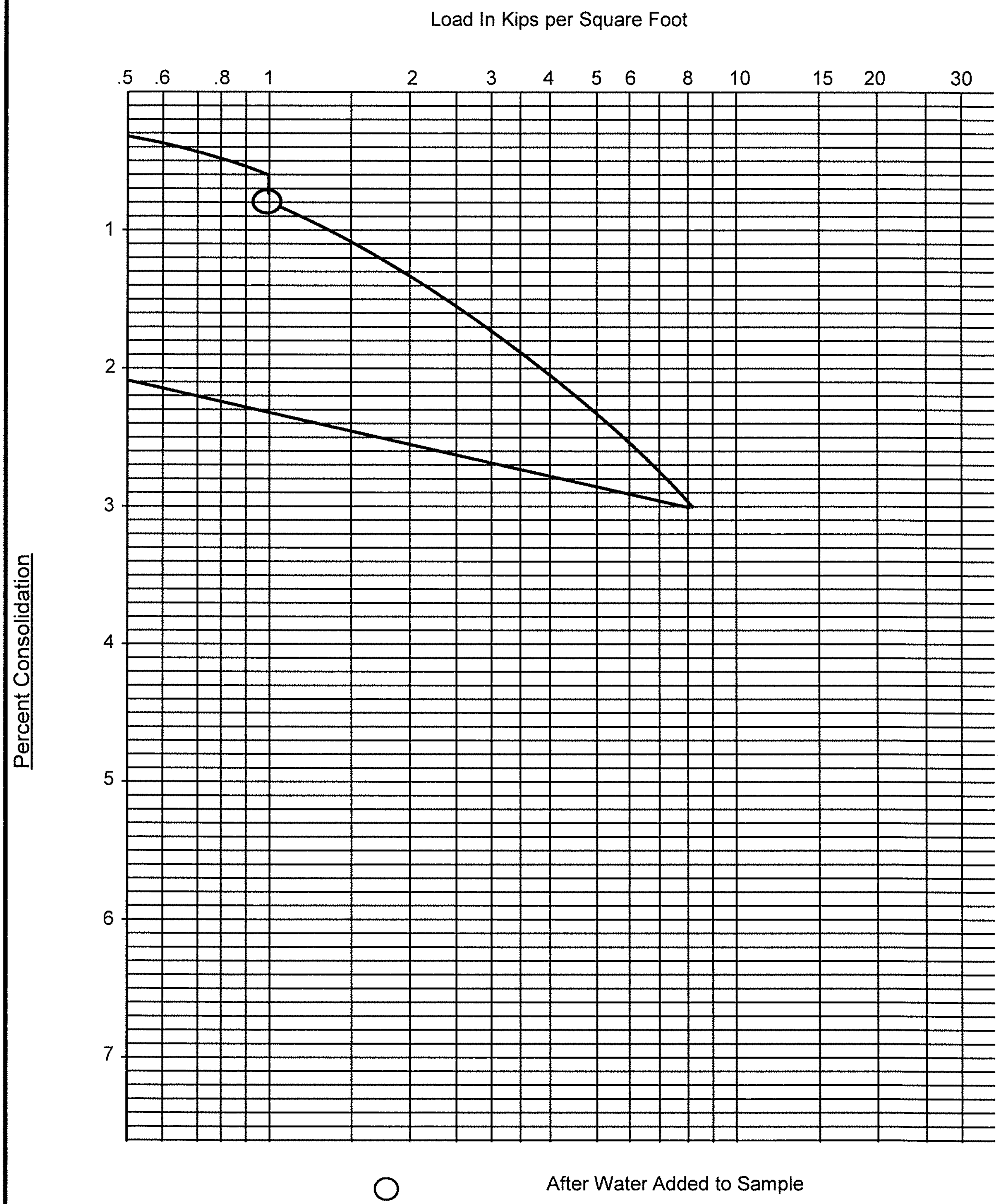
CONSOLIDATION



B-6 @ 5'

Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	L

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Appendix B

Seismic Data

- Table 1 - Faults Table
- Unified Hazard Tool – Hazard Curve
- U.S. Seismic Design Maps Summary & Detailed Report (SEAOC / OSHPD)

Table - 1
2008 National Seismic Hazard Maps - Source Parameters
Travel Plaza - Perris

Distance in Miles	Name	State	Pref Slip Rate (mm/yr)	Dip (degrees)	Dip Dir	Slip Sense	Rupture Top (km)	Rupture Bottom (km)	Length (km)
9.56	Elsinore;GI	CA	5	90	V	strike slip	0	13	37
9.56	Elsinore;W+GI	CA	n/a	81	NE	strike slip	0	14	83
10.22	San Jacinto;A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	178
10.22	San Jacinto;A+CC+B	CA	n/a	90	V	strike slip	0.1	15	152
10.22	San Jacinto;A+C	CA	n/a	90	V	strike slip	0	17	118
10.22	San Jacinto;A	CA	9	90	V	strike slip	0	17	71
10.22	San Jacinto;A+CC	CA	n/a	90	V	strike slip	0	16	118
10.37	Elsinore;GI+T+J+CM	CA	n/a	86	NE	strike slip	0	16	195
10.37	Elsinore;W+GI+T+J+CM	CA	n/a	84	NE	strike slip	0	16	241
10.37	Elsinore;GI+T	CA	5	90	V	strike slip	0	14	78
10.37	Elsinore;W+GI+T+J	CA	n/a	84	NE	strike slip	0	16	199
10.37	Elsinore;W+GI+T	CA	n/a	84	NE	strike slip	0	14	124
10.37	Elsinore;GI+T+J	CA	n/a	86	NE	strike slip	0	17	153
10.63	Elsinore;T+J	CA	n/a	86	NE	strike slip	0	17	127
10.63	Elsinore;T+J+CM	CA	n/a	85	NE	strike slip	0	16	169
10.63	Elsinore;T	CA	5	90	V	strike slip	0	14	52
11.45	San Jacinto;SBV+SJV+A+CC	CA	n/a	90	V	strike slip	0	16	181
11.45	San Jacinto;SBV+SJV+A+C	CA	n/a	90	V	strike slip	0	17	181
11.45	San Jacinto;SBV+SJV+A	CA	n/a	90	V	strike slip	0	16	134
11.45	San Jacinto;SJV+A+CC	CA	n/a	90	V	strike slip	0	16	136
11.45	San Jacinto;SJV+A+C	CA	n/a	90	V	strike slip	0	17	136
11.45	San Jacinto;SJV+A	CA	n/a	90	V	strike slip	0	17	89
11.45	San Jacinto;SBV+SJV+A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	241
11.45	San Jacinto;SBV+SJV+A+CC+B	CA	n/a	90	V	strike slip	0.1	15	215
11.45	San Jacinto;SJV+A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	196

11.45	San Jacinto;SJV+A+CC+B	CA	n/a	90	V	strike slip	0.1	15	170
12.01	San Jacinto;SJV	CA	18	90	V	strike slip	0	16	43
12.01	San Jacinto;SBV+SJV	CA	n/a	90	V	strike slip	0	16	88
19.04	San Jacinto;SBV	CA	6	90	V	strike slip	0	16	45
22.54	Chino, alt 2	CA	1	65	SW	strike slip	0	14	29
23.98	Elsinore;W	CA	2.5	75	NE	strike slip	0	14	46
24.79	S. San Andreas;NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	13	213
24.79	Chino, alt 1	CA	1	50	SW	strike slip	0	9	24
24.79	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	512
24.79	S. San Andreas;SSB+BG	CA	n/a	71		strike slip	0	13	101
24.79	S. San Andreas;NSB+SSB+BG+CO	CA	n/a	79		strike slip	0.2	12	206
24.79	S. San Andreas;CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	322
24.79	S. San Andreas;CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	85		strike slip	0	14	380
24.79	S. San Andreas;CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	449
24.79	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	384
24.79	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	86		strike slip	0	14	442
24.79	S. San Andreas;NM+SM+NSB+SSB+BG	CA	n/a	83		strike slip	0	14	271
24.79	S. San Andreas;NM+SM+NSB+SSB+BG+CO	CA	n/a	84		strike slip	0.1	13	340
24.79	S. San Andreas;NSB+SSB	CA	n/a	90	V	strike slip	0	13	79
24.79	S. San Andreas;NSB+SSB+BG	CA	n/a	75		strike slip	0	14	136

24.79	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0.1	13	421
24.79	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	86		strike slip	0.1	13	479
24.79	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	548
24.79	S. San Andreas;SM+NSB+SSB	CA	n/a	90	V	strike slip	0	13	176
24.79	S. San Andreas;SM+NSB+SSB+BG	CA	n/a	81		strike slip	0	13	234
24.79	S. San Andreas;SM+NSB+SSB+BG+CO	CA	n/a	83		strike slip	0.1	13	303
24.79	S. San Andreas;SSB	CA	16	90	V	strike slip	0	13	43
24.79	S. San Andreas;SSB+BG+CO	CA	n/a	77		strike slip	0.2	12	170
24.79	S. San Andreas;BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	263
24.79	S. San Andreas;BB+NM+SM+NSB+SSB+BG	CA	n/a	84		strike slip	0	14	321
24.79	S. San Andreas;BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	85		strike slip	0.1	13	390
26.4	S. San Andreas;BG+CO	CA	n/a	72		strike slip	0.3	12	125
26.4	S. San Andreas;BG	CA	n/a	58		strike slip	0	13	56
28.06	S. San Andreas;BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	220
28.06	S. San Andreas;CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	279
28.06	S. San Andreas;NSB	CA	22	90	V	strike slip	0	13	35
28.06	S. San Andreas;SM+NSB	CA	n/a	90	V	strike slip	0	13	133
28.06	S. San Andreas;CH+CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	341
28.06	S. San Andreas;NM+SM+NSB	CA	n/a	90	V	strike slip	0	13	170

28.06	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0.1	13	377
29.62	Elsinore;J	CA	3	84	NE	strike slip	0	19	75
29.62	Elsinore;J+CM	CA	3	84	NE	strike slip	0	17	118
29.9	San Joaquin Hills	CA	0.5	23	SW	thrust	2	13	27
33.36	Cucamonga	CA	5	45	N	thrust	0	8	28
34.27	Pinto Mtn	CA	2.5	90	V	strike slip	0	16	74
36.79	Cleghorn	CA	3	90	V	strike slip	0	16	25
37.33	Newport-Inglewood (Offshore)	CA	1.5	90	V	strike slip	0	10	66
37.33	Newport Inglewood Connected alt 1	CA	1.3	89		strike slip	0	11	208
37.33	Newport Inglewood Connected alt 2	CA	1.3	90	V	strike slip	0	11	208
38.59	San Jose	CA	0.5	74	NW	strike slip	0	15	20
39.78	North Frontal (West)	CA	1	49	S	reverse	0	16	50
40.6	Puente Hills (Coyote Hills)	CA	0.7	26	N	thrust	2.8	15	17
41.18	Sierra Madre	CA	2	53	N	reverse	0	14	57
41.18	Sierra Madre Connected	CA	2	51		reverse	0	14	76
41.65	San Jacinto;CC+B	CA	n/a	90	V	strike slip	0.2	14	77
41.65	San Jacinto;CC+B+SM	CA	n/a	90	V	strike slip	0.2	14	103
41.65	San Jacinto;CC	CA	4	90	V	strike slip	0	16	43
42.56	San Jacinto;C	CA	14	90	V	strike slip	0	17	47
44.04	Newport-Inglewood, alt 1	CA	1	88		strike slip	0	15	65
44.6	S. San Andreas;NM+SM	CA	n/a	90	V	strike slip	0	14	134
44.6	S. San Andreas;PK+CH+CC+BB+NM+SM	CA	n/a	90	V	strike slip	0.1	13	342
44.6	S. San Andreas;BB+NM+SM	CA	n/a	90	V	strike slip	0	14	184
44.6	S. San Andreas;CH+CC+BB+NM+SM	CA	n/a	90	V	strike slip	0	14	306
44.6	S. San Andreas;SM	CA	29	90	V	strike slip	0	13	98
44.6	S. San Andreas;CC+BB+NM+SM	CA	n/a	90	V	strike slip	0	14	243
44.97	Rose Canyon	CA	1.5	90	V	strike slip	0	8	70
45.34	Helendale-So Lockhart	CA	0.6	90	V	strike slip	0	13	114
46.48	North Frontal (East)	CA	0.5	41	S	thrust	0	16	27

47.6	Burnt Mtn	CA	0.6	67	W	strike slip	0	16	21
49.55	Puente Hills (Santa Fe Springs)	CA	0.7	29	N	thrust	2.8	15	11

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

^ Input

Edition

Conterminous U.S. 2008 (v3.2.x)

Spectral Period

Peak Ground Acceleration

Latitude

Decimal degrees

33.7441

Time Horizon

Return period in years

475 Travel Plaza Perris

Longitude

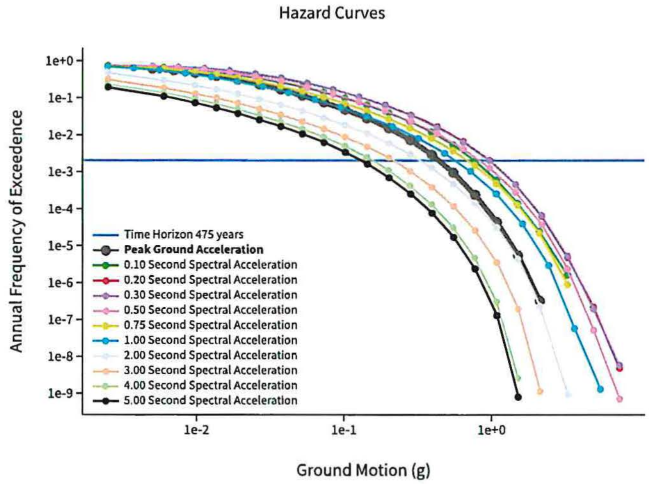
Decimal degrees, negative values for western longitudes

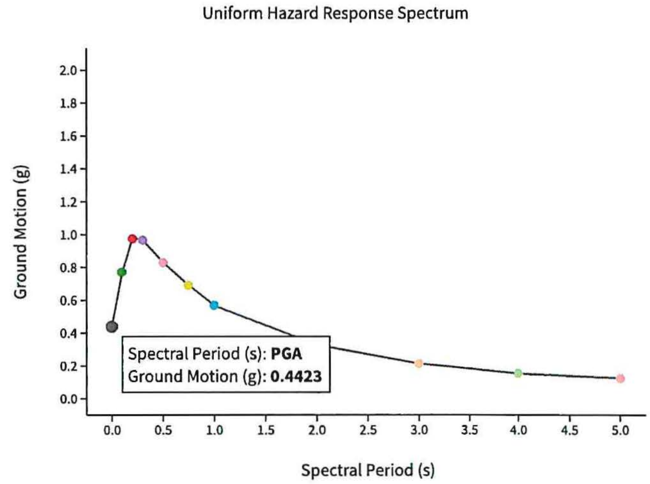
-117.1868

Site Class

259 m/s (Site class D)

Hazard Curve





View Raw Data

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Conterminous U.S. 2008 (v3.2.x)

Spectral Period

Peak Ground Acceleration

Latitude

Decimal degrees

33.7441

Time Horizon

Return period in years

975 Travel Plaza Perris

Longitude

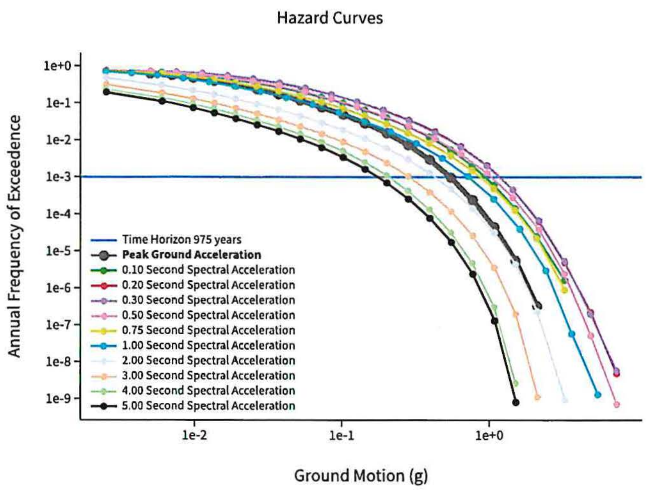
Decimal degrees, negative values for western longitudes

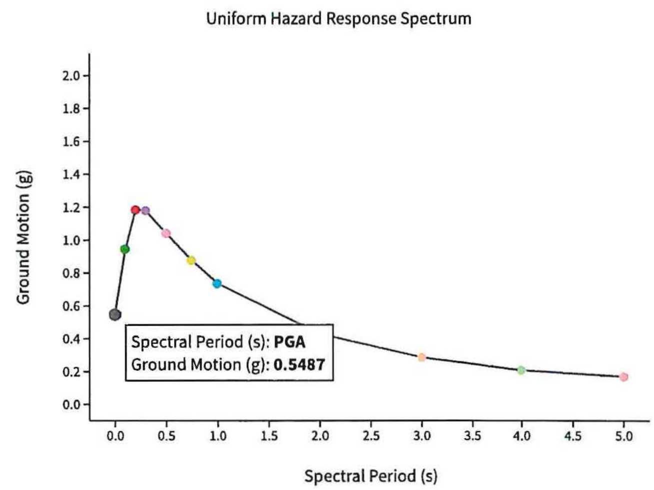
-117.1868

Site Class

259 m/s (Site class D)

Hazard Curve





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U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

^ Input

Edition

Conterminous U.S. 2008 (v3.2.x)

Latitude
Decimal degrees

33.7441

Longitude
Decimal degrees, negative values for western longitudes

-117.1868

Site Class

259 m/s (Site class D)

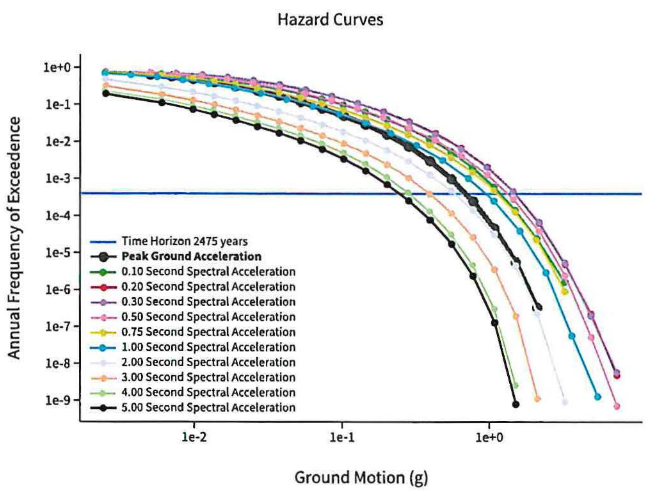
Spectral Period

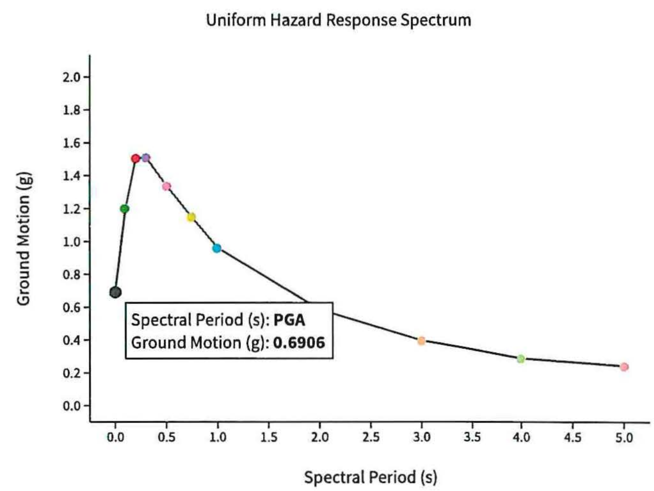
Peak Ground Acceleration

Time Horizon
Return period in years

2475 Travel Plaza Perris

^ Hazard Curve

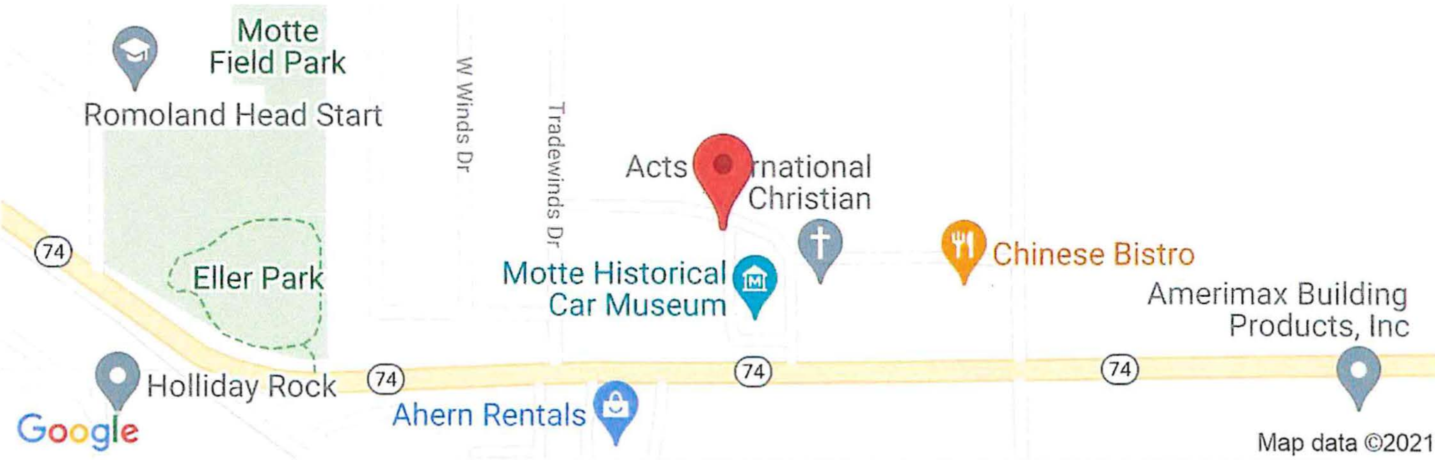




[View Raw Data](#)

Travel Plaza Perris

Latitude, Longitude: 33.7441, -117.1658



Date	5/28/2021, 10:30:36 AM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Default (See Section 11.4.3)

Type	Value	Description
S_S	1.428	MCE_R ground motion. (for 0.2 second period)
S_1	0.532	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.714	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.143	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.5	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.6	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.428	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.531	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.532	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.581	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.933	Mapped value of the risk coefficient at short periods
C_{R1}	0.915	Mapped value of the risk coefficient at a period of 1 s

DISCLAIMER

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Appendix C

Recommended Earthwork Specifications

RECOMMENDED EARTHWORK SPECIFICATIONS

1.0 General

1.1 Description

1.1.1 These specifications cover preparation of the subject site to receive fills, the type of soils suitable for use in fills, the compaction standards, and the methods of testing compacted fills.

1.1.2 The Contractor shall furnish all labor, supervision, equipment, operations, and materials to excavate to the required grade, support existing underground facilities, stockpile material, compact fill and backfill, and fine grade. The work of the Contractor shall include all clearing and grubbing, removing existing unsatisfactory material, preparing areas to be filled, spreading and compacting of fill in the areas to be filled and all other work necessary to complete the grading of the filled areas. It shall be the Contractor's responsibility to place, spread, moisten or dry, and compact the fill in strict accordance with these specifications to the lines and grades indicated on project plans or as directed in writing by the Civil Engineer.

1.1.3 Deviations from these specifications will be permitted only upon written authorization from the Owner or his representative.

1.2 Role of the Geotechnical Engineer

1.2.1 Construction - The Owner will employ a Geotechnical Consultant to observe and test this work as it is being performed. The Contractor shall cooperate with the Geotechnical Consultant and allow his unrestricted access to the site as required for the performance of his duties.

The Contractor shall provide a minimum notice of 48 hours to the Geotechnical Engineer before beginning or restarting earthwork operations that will require the presence of the Geotechnical Engineer or his representative on site.

1.2.2 Subsurface Investigations - A geotechnical engineering report for design purposes was prepared by Geotechnical Solutions, Inc., Irvine, California. Any recommendations made in the geotechnical report or subsequent reports are made part of these specifications. These reports are available for review upon request to the Owner.

1.2.3 Observation and Testing - The Geotechnical Engineer's representative shall observe the clearing and grubbing, excavation, filling and compacting operations and shall take density tests in the fill material so that he can state his opinion as to whether or not the fill was constructed in accordance with the specifications. All fill will be tested shortly after its placement to ascertain that the required compaction is achieved. A minimum of one density test will be made on each 500 cubic yards of fill placed, with a minimum of at least one test per every 2 feet of vertical height of fill. If the surface is disturbed, the density tests shall be made in the compacted materials below the disturbed zone. When these tests indicate that the density or water content of any layer of fill or portion thereof does not meet the specified density or water content, the particular layer or portions thereof shall be reworked until the specified density and water content have been obtained.

After the completion of grading, the Geotechnical Engineer will prepare a written opinion of grading. Neither the testing performed by the Geotechnical Consultant nor his opinion as to whether or not the fill was constructed in accordance with these Specifications shall relieve the Contractor of his responsibility to construct the fills in accordance with the Contract Documents.

1.3 Reference Standards

The following ASTM (American Society for Testing and Materials) codes and standards shall be used to the extent indicated by references herein. The most recent revision of the standards shall be used.

D 1556 - "Standard Test Method for Density of Soil in Place by the Sand-Cone Method"

D1557 - "Standard Test Methods for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10-lb (4.54 kg) and 18-inch (457-mm) Drop"

D2216 - "Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures"

D4318 - "Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils"

D4718 - "Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles"

D4829 - "Standard Test Method for Expansion Index of Soils"

D4944 - "Standard Test Method for Field Determination of Water (Moisture) Content of Soil by the Calcium Carbide Gas Pressure Tester Method."

D5195 - "Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)"

D6938 - "Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)"

D7928 - "Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis"

1.4 Degree of Fill Compaction

The degree to which fill is to be compacted is expressed in terms of "relative compaction." Relative compaction is defined as the ratio; expressed in percent, of the in-place dry density of the compacted fill to the reference maximum dry density. The reference maximum dry density shall be obtained following ASTM D1557. Optimum water content shall be obtained in the same test used to obtain the reference maximum dry density. Correction of the maximum dry density and optimum water content for

oversize particles of gravel and cobbles shall be made following ASTM D4718 when, in the opinion of the Geotechnical Engineer, such correction is appropriate. The in-place density shall be obtained following ASTM D1556 (sand cone method) or ASTM D6938 (nuclear method-shallow depth) test method. The in-place water content shall be obtained following ASTM D4944 (calcium carbide gas pressure meter), ASTM D5195 (nuclear method-shallow depth), or ASTM D2216 (oven drying). Correction of the in-place density and water content for oversize particles of gravel and cobbles shall be made following ASTM D4718 when, in the opinion of the Geotechnical Engineer, such correction is appropriate.

If any of the test methods specified in this section are judged by the Geotechnical Engineer to be impractical or unreliable because the material has a coarse particle size distribution, or for other reasons, the Geotechnical Engineer shall establish other procedures to obtain the required soil characteristics.

2.0 Products

2.1 Materials

2.1.1 General - During grading operations, soil types other than those identified in the geotechnical investigation report may be encountered by the Contractor. Consult the Geotechnical Consultant for his evaluation of the suitability of using these soils a fill material prior to placement or disposal.

2.1.2 General Fill - Materials for compacted fill shall consist of material imported from outside the site or excavated from the site that, in the opinion of the Geotechnical Engineer, is suitable for use in constructing engineered fills. The material shall not contain rocks or hard lumps greater than 6 inches in maximum dimension, and at least 70 percent (by weight) of its particles shall pass through a U.S. Standard 3/8 inch sieve. Material greater than 3 inches, but less than 6 inches in maximum dimension, shall be placed by the Contractor so that it is completely surrounded by compacted, finer material;

no nesting of rocks shall be permitted. Do not use any perishable, spongy, hazardous, or other undesirable materials as fill.

2.1.3 Select Fill - Select fill shall meet all criteria for general fill but shall also contain no rocks or hard lumps greater than 3 inches in maximum dimension, and at least 80 percent (by weight) shall pass through a U.S. Standard 3/8-inch sieve. The expansion index of select material shall be less than 50 (i.e., 5.0 percent swell) when tested in accordance with ASTM D4829.

3.0 Execution

3.1 Clearing and Grubbing

Within the project limits, tile Contractor shall demolish structures as specified on the Drawings.

Unless otherwise indicated on the Drawings or by the Owner in writing, the Contractor shall clear and grub all trees, stumps, roots, brush, grass, and other vegetation within construction, fill and stockpile areas to a minimum depth of 3 feet below the existing ground surface or below finished grade, whichever is deeper, unless otherwise recommended by the Geotechnical Engineer's Field Representative.

Remove cleared and grubbed materials from the site and dispose of them legally. No onsite burning or burying of cleared and grubbed materials is permitted. No placement of cleared and grubbed materials in topsoil stockpiles is permitted. No mulching of branches or roots is permitted. Incorporating vegetative matter into stockpiled materials, which are to be used in fill, is not permitted.

Stockpile organic-laden topsoil separate from other fill materials.

Remove any remaining vegetative matter from the deeper excavated soils, which may result from roots deeper than those encountered during clearing and grubbing operations.

All material thereby removed shall be piled at a location away from the immediate work area so as to avoid burying of piled material.

3.2 Compacted Fills

3.2.1 Preparing Areas to be Filled - Brush, grass, and other objectionable materials shall be collected, piled, and disposed of as indicated in Section 3.1 by the Contractor so as to leave the areas that have been cleared with a neat and finished appearance, free from unsightly debris.

Remove all loose soil, uncertified fill, landslide debris, and weathered bedrock to firm material or in-situ bedrock, as approved by the Geotechnical Consultant. The Contractor shall obtain approval from the Geotechnical Engineer or his representative of stripping and site preparation before the compaction of any fill subgrade begins. The surface shall then be scarified to a minimum depth of 6 inches until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment used, and shall be brought to the specified water content and relative compaction. Compact scarified materials to a minimum relative compaction of 90 percent, relative to ASTM D1557, prior to placement of any fill material.

3.2.2 Placing, Spreading, and Compacting, Fill Material - Onsite soil obtained from removals, borrow, or cut areas may be reused as compacted fill provided it is free from deleterious debris and meets the other requirements of the "Materials" portion of this Specification Section.

Use of soil containing deleterious debris from the clearing and grubbing operation or from other sources is not permitted. The fill materials shall be placed by the Contractor in horizontal layers not greater than 8 inches thick, measured before compaction. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to obtain uniformity of material and moisture in each layer. The moisture content of material used for compacted fill should be adjusted to be at or above optimum water content as determined by ASTM D1557. When the water content of the fill material is too high, the

fill materials shall be aerated by the Contractor by blading, mixing, or other satisfactory methods until the water content is as specified.

After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted by the Contractor to a relative compaction of at least 90 percent of the maximum dry density as determined by ASTM D1557 for general fill, and 95 percent of the maximum dry density as determined by ASTM D1557 for select fill, compacted fill pads, and the upper 1 foot of pavement subgrade. Compaction shall be accomplished by: sheepsfoot rollers; vibratory rollers; multiple-wheel, pneumatic-tired rollers; or other types of acceptable compacting equipment. Equipment shall be of such design that it is able to compact the fill to the specified density. Compaction shall be continuous over the entire area, and the equipment shall make sufficient passes to obtain the desired density uniformly. All fill placed on site shall be treated in like manner until finished grades are attained. Jetting, puddling, and hydro consolidation techniques shall not be used, including backfill of utility trenches.

The placement of topsoil is subject to the approval of the Geotechnical Engineer. Topsoil shall not be placed beneath concrete flatwork, beneath or behind retaining walls, or within structural fill. All topsoil material is subject to the same moisture conditioning, placement, and compaction requirements as General Fill. Roots, branches and other organic debris are not permitted within the compacted topsoil layer.

When backfilling around footings and compacting behind retaining walls and flexible retaining structures, the Contractor shall use lightweight compaction equipment such as hand-operated equipment, shoring, or other means to avoid over-stressing structural walls. When using lightweight compaction equipment, the fill materials shall be spread in horizontal layers not greater than 6 inches thick, measured before compaction.

As an alternative, sand-cement slurry may be used to backfill trenches. The slurry shall have minimum cement content of 3 sacks per cubic yard within the zone of influence of foundations and other settlement sensitive structures. A minimum of 2 sacks per cubic

yard of slurry shall be used elsewhere within building limits, and a minimum of one sack per cubic yard of slurry shall be used elsewhere. Slurry shall not be used in those areas where such placement would result in the obstruction of water flow, and is subject to the approval of the Geotechnical Engineer.

3.3 Protection of Work and Adjacent Properties

3.3.1 During Construction - The Contractor shall grade all excavated surfaces to provide good drainage away from construction slopes and prevent ponding of water. He shall control surface water and the transport of silt and sediment to avoid damage to adjoining properties or to finished work on the site. The Contractor shall take remedial measures to prevent erosion of freshly graded areas until such time as permanent drainage and erosion control measures have been installed.

Dispose of all water resulting from dewatering operations legally and in ways that will not cause damage to public or private property, or constitute a nuisance or menace to the public, in accordance with municipal requirements.

The Contractor shall make every effort to minimize the amount of dust raised in excavating, on haul roads and access roads, and all other work areas in the course of construction activities.

Protect benchmarks, monuments, and other reference points against displacement or damage. Repair or replace benchmarks, monuments, and other permanent survey data that become displaced or damaged due to the performance of this work.

3.3.2 After Completion - After earthwork is completed and the, Geotechnical Engineer has finished his observations of the work, no further excavation, filling or backfilling shall be performed except under the observation of the Geotechnical Engineer.

GEOTECHNICAL ENGINEERING PERCOLATION / INFILTRATION TEST REPORT

TRAVEL PLAZA
PERRIS

AT

CORNER OF TRUMBLE ROAD &
ETHANAC ROAD
PERRIS, CALIFORNIA

PREPARED FOR:

BROADBENT, INC.
8 WEST PACIFIC AVENUE
HENDERSON, NEVADA 89015

PROJECT NO: G-5908-08

JUNE 11, 2021

GEOTECHNICAL SOLUTIONS, INC.
GEOTECHNICAL & ENVIRONMENTAL
ENGINEERING

Geotechnical Solutions, Inc.
Geotechnical, Structural & Environmental Engineering

AASHTO ACCREDITED

June 11, 2021

Project: G-5908-08

BROADBENT, INC.
8 West Pacific Avenue
Henderson, Nevada 89015

Attention: Mr. Mark E. Kazelskis, PG, CHG, CEM
Principal Geologist

Via Email: mkazelski@broadbentinc.com

Re: Geotechnical Engineering Percolation / Infiltration Report
Travel Plaza - Perris
Corner of Trumble Road & Ethanac Road
Perris, California 92570

Gentlemen:

Per your authorization, we have performed our geotechnical engineering field percolation tests to evaluate the subgrade percolation and infiltration rate at the referenced Travel Plaza - Perris site located at the corner of Trumble Road and Ethanac Road, just west of Trumble Road, Perris, San Bernardino County, California. Proposed development consists of improving or incorporating Storm Water Permanent Best Management Practice (BMP).

The accompanying geotechnical engineering report presents the results of our field borings, sampling of subgrade material, field percolation tests, reviewing site plan, performing laboratory tests, analyzing field and laboratory data and our conclusions and recommendations for the project.

Our services were performed using the standard of care ordinarily exercised in this locality, at the time when the report was prepared.

The investigation was made in accordance with generally accepted geotechnical engineering principles and procedures and included such field and laboratory tests considered necessary in the circumstances.

In the opinion of the undersigned, the accompanying report has been substantiated by data, observations, analysis, and opinions and presents fairly the design information requested by you.

This completes our scope of services for the initial design phase of the project. We have appreciated this opportunity to be of service to you on this project.

Respectfully Submitted,

Geotechnical Solutions, Inc.

Dharma Shakya, PhD, PE, GE
Principal Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
DHARMA R. SHAKYA
No. GE 2773
GEOTECHNICAL
STATE OF CALIFORNIA

Abraham S. Baha, PE, MASCE
Sr. Principal

REGISTERED PROFESSIONAL ENGINEER
ABRAHAM S. BAHA
No. C053067
CIVIL
STATE OF CALIFORNIA

Distribution: (3 +pdf) Addressee

TABLE OF CONTENTS

Introduction

Geotechnical Solutions, Inc. (GSI) has performed field investigations including borings and sampling of earth material and field percolation tests at the proposed locations as shown on Plot Plan & Percolation Tests Location Map (Plate B in Appendix A) at Travel Plaza, Perris, California.

The main purpose of this study is to provide infiltration rates of subgrade material based on field percolation tests so that an appropriate system incorporating Storm Water permanent best management practice (BMP) to manage surface water into the ground and the appropriate infiltration basin or any other approved system may be designed and existing drainage be improved.

Field Exploration

Field exploration consisted of drilling two borings for percolation tests, B-1 (PC-1) and B-2 (PC-2), 8-inches in diameter and extended to 10-feet below existing ground as shown on Plot Plan and Percolation Tests Location Map (Plate B).. The percolation test logs are presented on Plates D-1 and D-2 in Appendix A.

The attached logs tabulate data based on laboratory classification tests and visual observation by the field engineer at the site. During drilling bulk samples of earth material obtained for further laboratory test.

Groundwater

Groundwater was not encountered in any of our borings. Also, in accordance with the available groundwater well maps data, http://wdl.water.ca.gov/water_data_library, historical high groundwater level as shown on Plates C-1 and C-2 presented in Appendix A are much deeper than 50 feet. The potential for ground water to rise to the ground surface in the site area is considered very unlikely.

Laboratory Testing

Laboratory testing was programmed following a review of the field investigation data to be evaluated. Tests included physical testing to determine soil characteristics and selective tests. Test results are presented in Appendix A.

Mechanical Analysis (ASTM D-422)

Mechanical analyses by the hydrometer test method were performed to confirm field classifications. Test results are as follows:

Test Hole No.	Sample Depth (ft)	Sand Percent	Silt Percent	Clay Percent
B-1 (PC-1)	10.0	89	7	4
B-2 (PC-2)	10.0	90	8	2

Field Percolation Tests

We performed field percolation tests at B-1 (PC-1) and B-11 (PC-2) locations as shown on Plot Plan and Percolation Tests Location Map (Plate B). The percolation test procedure performed in accordance with the current acceptable method for shallow percolation test (less than 10 feet) by qualified personnel under the supervision of registered geotechnical engineer as per Technical Guidance Document, Orange County Public Works.

- Borehole diameter was 8 inches.
- Bottom elevation of test holes correspond to bottom elevation of proposed retention basins which are proposed at 10-feet in depth below the ground surface in accordance with the following locations:

B-1 (PC-1) 10 feet below the ground surface

B-11 (PC-2) 10 feet below the ground surface

- The bottom of the test hole was covered with 2 inches of gravel prior to testing.
- Sides of the hole were not smeared after drilling and there was no caving.
- Holes were filled with clear water to appropriate depths from the ground surface (Minimum required is 5 x radius of the hole (5 x 4" = 20 inches) from the bottom.
- On these two locations, two consecutive measurements showed that less than 6 inches of water seeped away in 25 minutes test (Pre-Percolation Data Sheets, Plates 1 and 3 in Appendix B). Thus, pre-soaking overnight for about 24 hours was required.
- The tests were then run the next day for an additional 6-hours duration, measurements being taken every 30 minutes interval (Percolation Test Results).
- The drop that occurs during the final reading is used to calculate the percolation and then infiltration rate.
- Field Percolation Tests for both PC-1 and PC-2 are presented as Plate 2 and 4 in Appendix B.
- Infiltration calculations (Porchet Method) are shown on Plates 5 and 6 and presented in Appendix C.
- Infiltration results using another method, Reduction Factor Method, Rf are presented on Plates 7 and 8 in Appendix D.
- Measurements were taken with a precision of 0.25 inches or better.
- All the field percolation tests are tabulated and are presented in Appendix B.
- The holes were backfilled with soil cuttings.

Percolation Rate Evaluation

To evaluate the percolation rates, testing was performed by filling the borehole with water and observing the rate of water drop from the fixed reference point on the ground surface. The depths of water drop for every 30 minutes intervals were noted and tabulated and plotted as shown on Plates 2 and 4, respectively for PC-1 and PC-2 in Appendix B.

Percolation rate, k can be correlated with the data in the form of the straight line equation as shown below:

$$t/R = b + kt$$

Where, t = average time in minutes

R = Δt / d

Δt = Time Interval, minutes

d = drop in inch = R1 – R2

R1 = Initial Readings, inch

R2 = Final Readings, inch

k = Percolation Rate inch/minute

R = 1/k at equilibrium rate

t/R is plotted against t as shown on the plots (Plates 2 and 6 for B-1 (PC-1) and B-11 (PC-2), respectively) and the regression analyses were performed to interpolate the data obtained in the field. Straight line interpolation gives the slope as a percolation rate, k.

Results of the Tests

The results obtained from the analyses are as follows:

1. Near surface material consisted of mainly Clayey to Silty Sand (SC/SM), dry to slightly moist, firm, light brown in color having dense to very dense in consistency.

2. Around and below 10 feet, the subgrade materials consisted mainly of the sandy material, Sand (SP) with some gravel, slightly moist to moist, dark brown to gray in color having dense to very dense in consistency.

3. Field Percolation tests were performed at 10-feet depth for both B-1 (PC-1) and B-11 (PC-2) and the results are tabulated as shown on the Table-1 below:

TABLE – 1
Percolation Test Results

Location	Coefficient of Permeability, k			
	Inch/minute	Cm/sec	**Inch/hour Average**	**Inch/hr** based on last 30 Minutes Reading
B-1 (PC-1)	**0.0135**	**6.0 x E-04**	**0.81**	**1.0**
B-11 (PC-2)	**0.0206**	**9.0 x E-04**	**1.236**	**1.5**
Average	**0.0171**	**7.5 x E-04**	**1.023**	**1.25**
		Average:	**1.137 inch/hour**	

4. Based on the data presented in this report and the testing information accumulated, it is our judgment that the percolation rate is an average of 1.137 inch per hour. It takes about **53 minutes to percolate 1 inch**. This conclusion regarding percolation rate is based on the results of our field exploration and testing.

5. General range of permeability for some of the subgrade soils are as follows:

Type of Soil	Permeability (Cm/Sec)
Medium to coarse gravel	> 10^{-1}
Coarse sand to fine sand	between $1x10^{-1}$ to $1x10^{-3}$
fine sand and silty sand	between $1x10^{-3}$ to $1x10^{-5}$
silt, clayey silt or silty clay	between $1x10^{-4}$ to $1x10^{-6}$
Clays	$1x10^{-7}$ or less

Since the percolation rate average is **7.5 x E-04 Cm/Sec**, it falls into **fine Sand and silty Sand category** as tabulated above.

As per Technical Guidance Document, Infiltration rate, I_t is calculated based on Percolation Rate Conversion using Porchet Method, aka Inverse Borehole Method.

The bottom of the proposed infiltration basin would be at 10-feet below the existing ground surface. Percolation tests were performed with the depth of the test hole set at the infiltration surface level (bottom of basin).

After the minimum required number of testing intervals, the test was complete. The data collected at the final interval was used to calculate infiltration rates.

The calculations and the results are tabulated and presented on Plates 5 and 6 in Appendix C.

Location	**Percolation Rate inch/hour Based on Average Reading**	**Infiltration Rate Inch/hour Based on Porchet Method aka Inverse Borehole Method**
B-1 (PC-1)	0.810	0.0370

PC-2	1.236	0.0596
Average	**1.137**	**0.0483**

Using factor of safety of 2.0 for uncertainty and bias, **percolation test result is 0.5685 inch per hour** and **Infiltration Rate = 0.0242 "/ hour**, which is less than **0.3"/hour** as per the requirement in accordance with **TGD VII.2.**

Thus, it **does not meet** the standard criteria, hence **FAILED**.

Reduction Factor (R_f) Method

We have used Reduction Factor (R_f) Method which is another acceptable and approved method for calculating Infiltration Rate, I_f.

Infiltration Rates as calculated by this method have been tabulated on Plates 7 and 8 in Appendix D. The results are as follows:

Location	I_f Using (Reduction Factor Method) (inch/hour)
B-1 (PC-1)	0.0559
B-11 (PC-2)	0.0801
AVERAGE:	**0.068**
With FOS = 2	**0.034**
	< 0.3 inch/hour - "FAILED"

Conclusions

The subgrade soils consist entirely of very firm alluvial soils, mainly sand with some gravel, medium to coarse grained, dark brown to gray in color, dry to slightly moist to moist, dense to very dense and hard in consistency. Percolation tests performed at two locations, B-1 (PC-1) and B-11 (PC-2) at 10 feet depth did not meet the prescribed criteria.

Also, since the groundwater is very deep more than 50 feet, there is a room for the basin. However, infiltration rate at both locations indicated that it is much less than the required infiltration rate of 0.3 inch per hour (**TGD VII.2**), hence we conclude that the project is **not feasible.**

Additional Services

This office will be available for further consultation.

Closure

Based on the data presented in this report and the testing information accumulated, it is the judgment of the writers of this report that BMP infiltration system seems to be **not feasible** at these locations. The conclusions presented in this report are based on the results of our field exploration, percolation tests, infiltration tests, and other laboratory tests.

This report has been compiled for the exclusive use on the above referenced site, for the purpose stated above. It should not be transferred to or used by another party, or applied to any other project on this site, other than as described herein, without consent and/or thorough review by this office.

Geotechnical Solutions, Inc.

References

California Building Code, 2019, California Code of Regulations, Title 24, Volume 2 of Part 2.

California Department of Water Resources groundwater well data **http://wdl.water.ca.gov**.

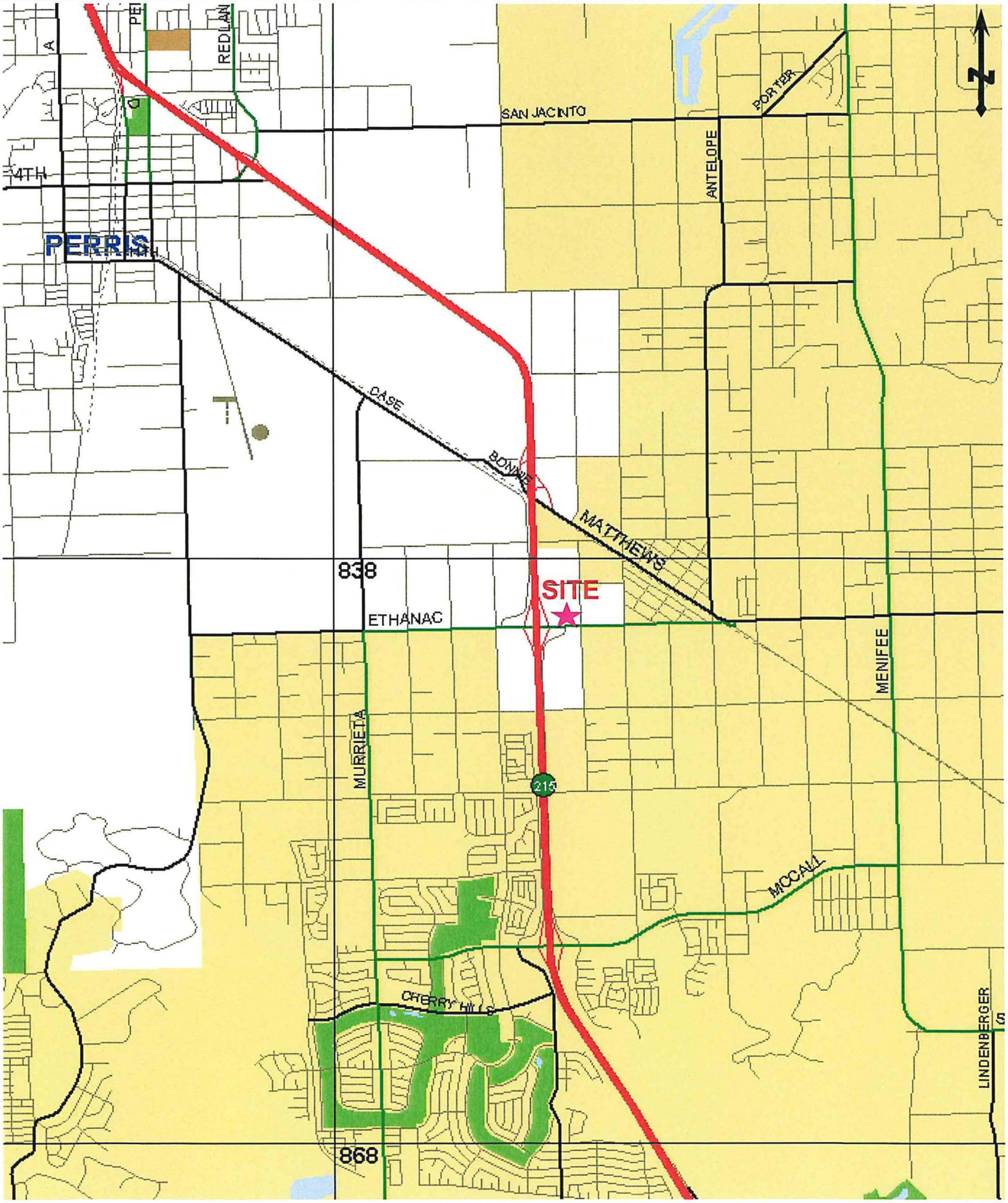
Orange County, Technical Guidance Document (TGD) for the Preparation of Conceptual / Preliminary and/or Project Water Quality Management Plans (WQMPs) dated December, 2013.

Appendix A

Plates:

- Vicinity Map
- Plot Plan & Percolation Tests Location Map
- Groundwater Map (Closest Well Data)
- Groundwater Map – Well Data
- Boring Logs, B-1 (PC-1) & B-11 (PC-2)

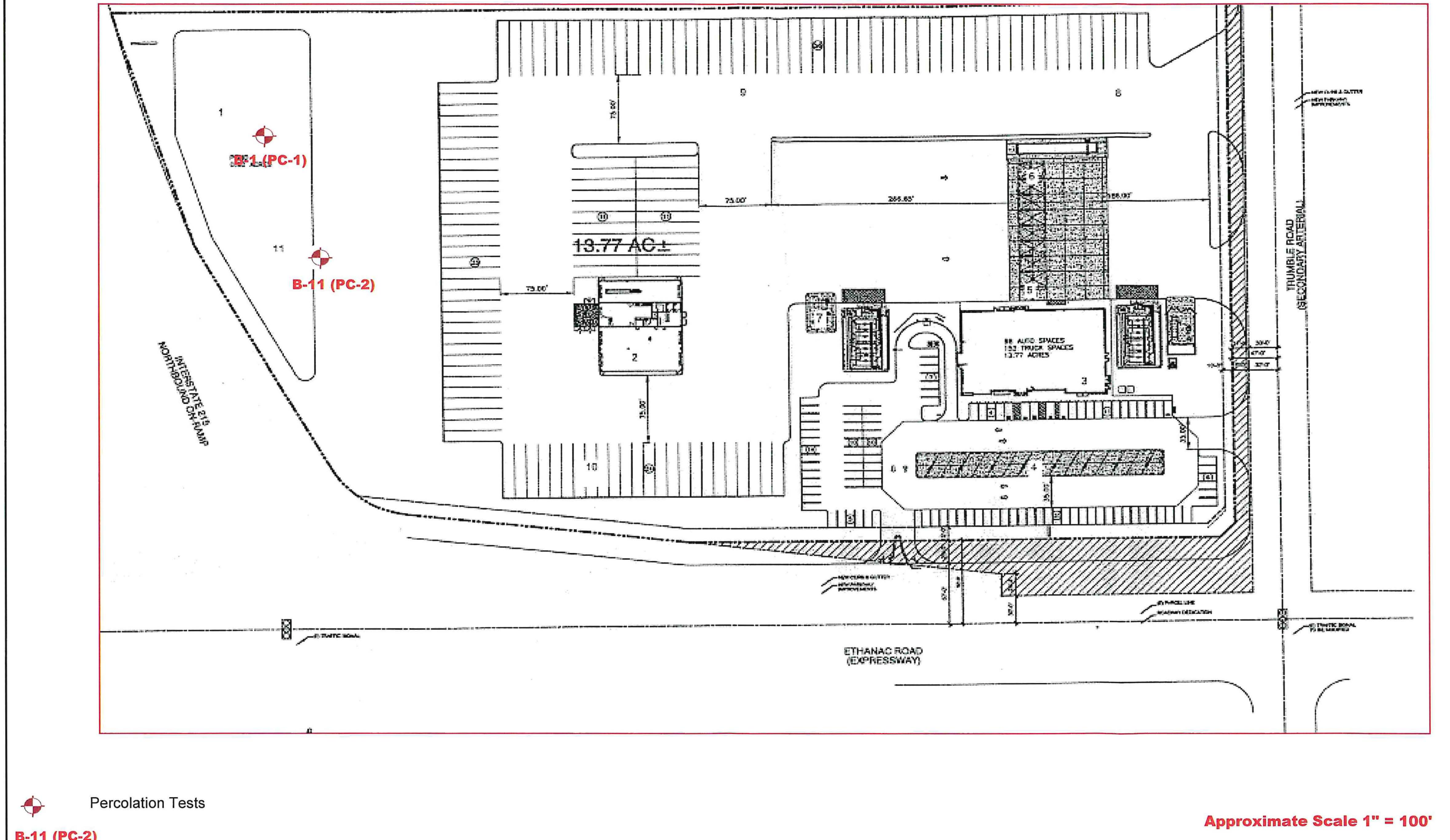
VICINITY MAP



Travel Plaza Perris - Percolation Tests	Project No.	G-5908-08
Corner of Trumble Road and Ethanac Road, Perris, California	Plate:	A

Geotechnical Solutions, Inc.

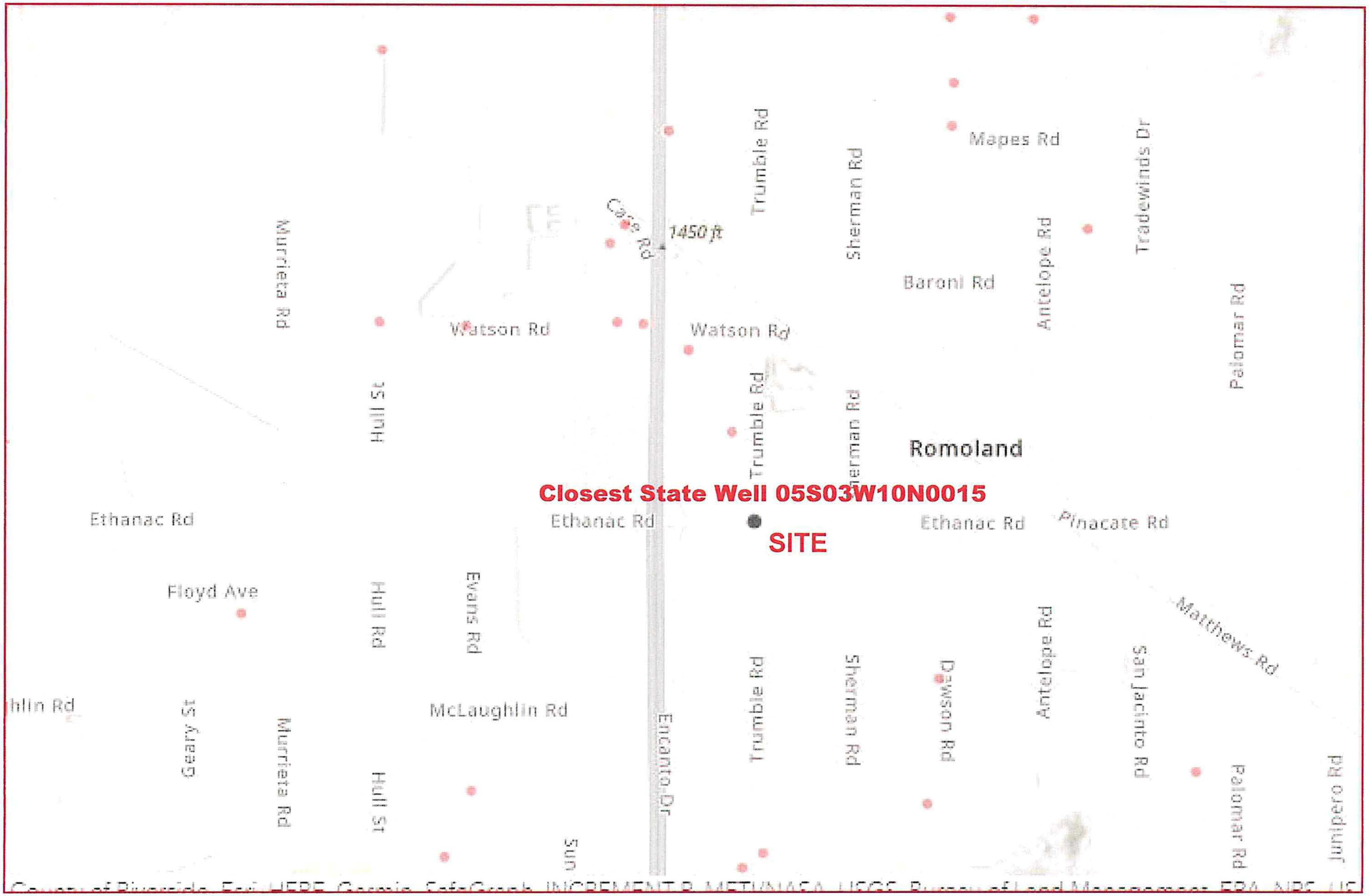
PLOT PLAN & PERCOLATION TEST LOCATIONS MAP



Travel Plaza Perris - Percolation Tests	Project No.	G-5908-08
Corner of Trumble Road and Ethanac Road, Perris, California	Plate:	B

Geotechnical Solutions, Inc.

GROUNDWATER MAP - CLOSEST WELL DATA



Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	C-1

Geotechnical Solutions, Inc.

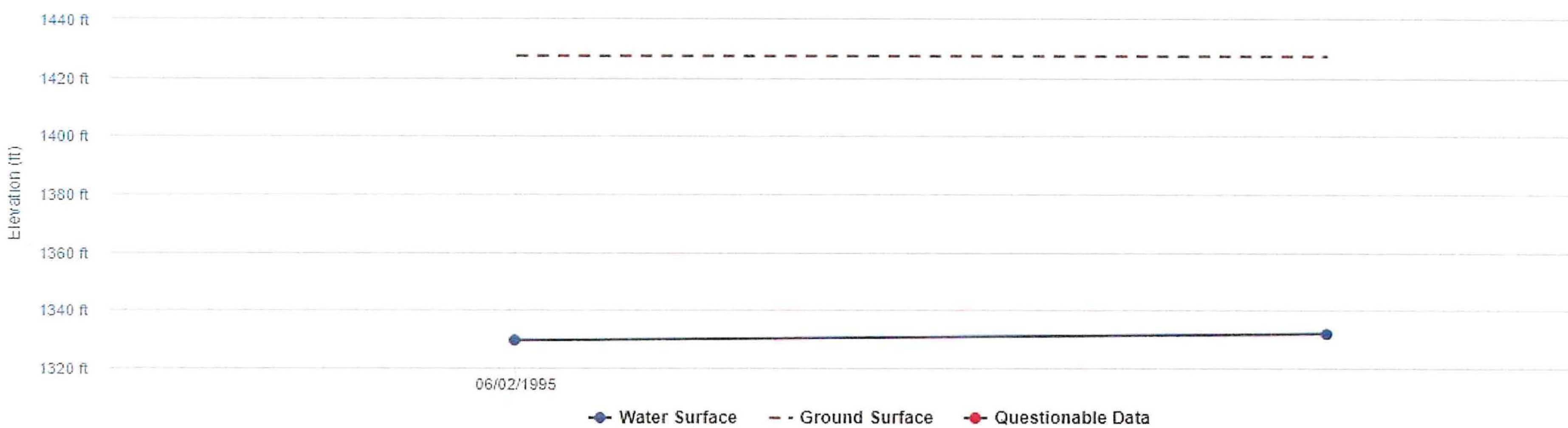
GROUNDWATER MAP - WELL DATA

Groundwater Level Report

Station 337464N1171859W001

Station Data   Groundwater Level Data

Groundwater Levels for Well 337464N1171859W001 **(Site Code)**



Measurement Date (PST)	Reference Point Elevation	Ground Surface Elevation	Distance from RP to WS	Groundwater Elevation	Ground Surface to Water Surface	Measurement Issue	Collecting Agency
06/02/1995 00:00:00	1427.490	1427.490	97.98	1329.51	97.98		Department of Water Resou...
09/13/1995 00:00:00	1427.490	1427.490	95.63	1331.86	95.63		Department of Water Resou...

Travel Plaza - Perris		Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California		Plate:	C-2

Geotechnical Solutions, Inc.

Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No.	B-1 (PC-1)
Project Location :	Corner of Ethanac Road and Trumble Road, Perris, CA		Plate No.	D-1
Project Number :	G-5908-08		Page 1 of	1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	10
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**Covered with dry weeds**				
			Bag #1				Older Alluvium: Silty Sand (SM), light brown, medium dense				
	2		C-1	19-54/6"		> 100	@2': Sand (SP), silty, light brown, slightly moist, very dense	6	127		
1421	5		C-2	20-50/6"		> 100	@5':Sand (SP), poorly graded, very dense, gray, slightly moist, medium to coarse grained	7	122		
1416	10						@10': Same as above			11	HD: 89 (SA) : 7(SI) : 4(CL)
							End of Boring = 10 feet 2" Gravel on Bottom Drilled for Percolation test No groundwater encountered No Caving Backfilled w/Cuttings after percolation test				
1411	15										
1406	20										
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

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Project :	Travel Plaza	LOG OF TEST HOLE	Borehole No.	B-11 (PC-2)
Project Location :	Corner of Ethanac Road and Trumble Road, Perris, CA		Plate No.	D-2
Project Number :	G-5908-08		Page 1 of	1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	10
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**Covered with dry grass**				
							Older Alluvium: Clayey Sand (SC), light brown, dry				
	2		C-1	32-50/6"		100	@2': Sand (SP), silty, light brown, slightly moist, very dense	6	122		
1421	5		C-2	31-50/6"		100	@5':Sand (SP), poorly graded, very dense, gray, slightly moist, medium to coarse grained	5	121		
1416	10						@10': Same as above			10	HD: 90 (SA) : 8(SI) : 2(CL)
1411	15						End of Boring = 10 feet 2" of Gravel on Bottom Drilled to 10 feet for Percolation Test Backfilled w/ cuttings after the Test				
1406	20										
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

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Appendix B

Pre-Test & Percolation Test Results

- Pre-Test Percolation Data Sheet (PC-1)
- Percolation Test Result at Location PC-1
- Pre-Test Percolation Data Sheet (PC-2)
- Percolation Test Result at Location PC-2

PRE- PERCOLATION TEST DATA SHEET

Project:	Travel Plaza - Perris		Project No.:	G-5908-08		Date:	5/24/2021
Test Hole Number:		PC-1	Tested By:	BA/AB			
Depth of Test Hole, DT		10'	USCS Soil Classification:		Sand (SP)		
Test Hole Dimensions (inches)					Length	Width	
Diameter (if Round) =		8"	Sides (if Rectangular) =				
Sandy Soil Criteria Test *							
Trial No.	Start Time	Stop Time	Time Interval (Min)	Initial Depth to Water (in)	Final Depth to Water (in)	Change in Water Level (in)	Greater than or Equal to 6"? y/n
1	8:30 AM	8:55 AM	25	65	66.25	1.3	< 6"
2	8:55 AM	9:20 AM	25	66.25	67.50	1.25	< 6"

* If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute Intervals) with a precision of at least 0.25".

PERCOLATION TEST

Borehole No. **B-1 (PC-1)** Depth **120** inch

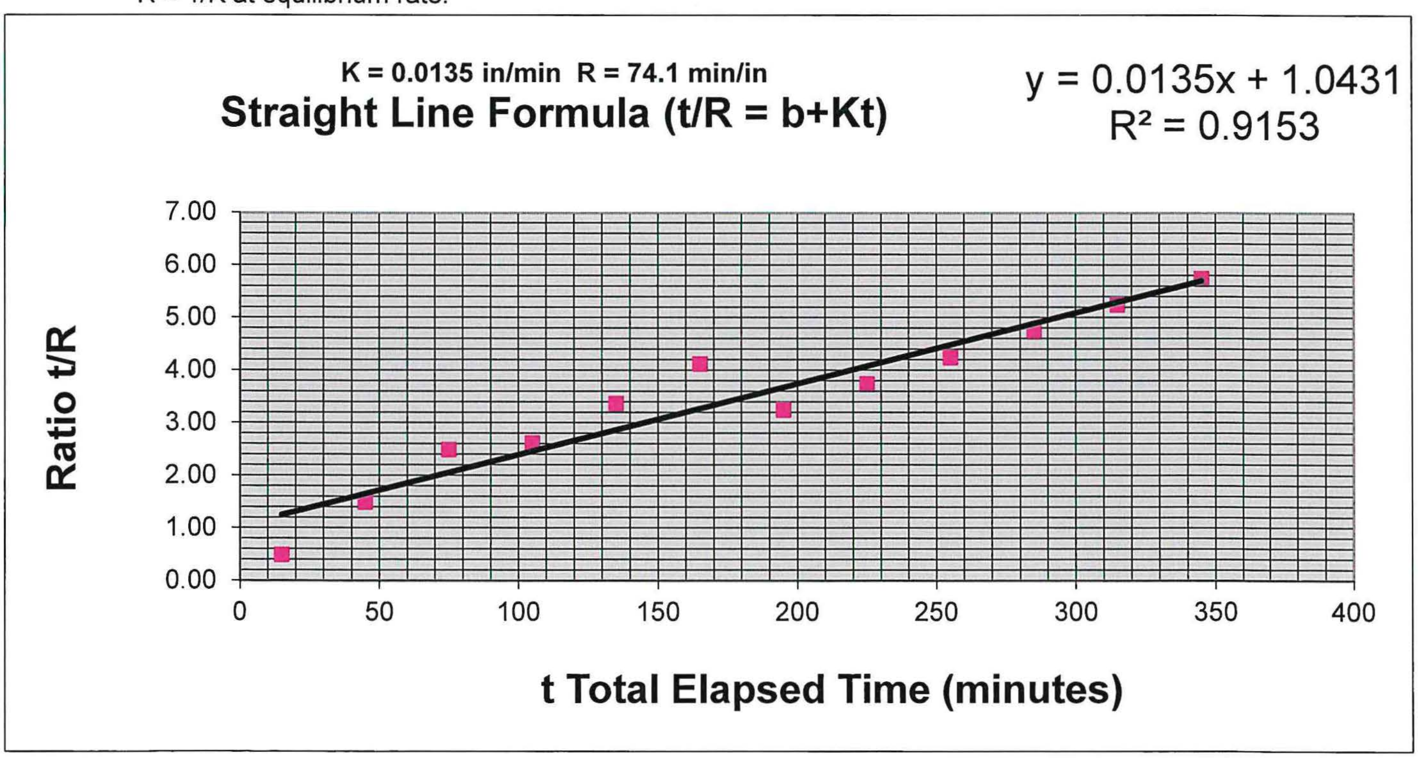
Date	Time of Reading	Δt (min.)	Total Elapsed Time (t)	Average t (minutes)	Reading R_1 (inches)	Reading R_2 (inches)	Drop d (inches)	R=Δt/d (min./in.)	t/R (in.)	k * 1000 (cm/s)
5/25/2021	9:30 AM	0	0							
	10:00 AM	30	30	15	60.00	61.00	1.00	30.00	0.50	1.4
	10:30 AM	30	60	45	61.00	62.00	1.00	30.00	1.50	1.4
	11:00 AM	30	90	75	62.00	63.00	1.00	30.00	2.50	1.4
	11:30 AM	30	120	105	63.00	63.75	0.75	40.00	2.63	1.1
	12:00 PM	30	150	135	63.75	64.50	0.75	40.00	3.38	1.1
	12:30 PM	30	180	165	64.50	65.25	0.75	40.00	4.13	1.1
	1:00 PM	30	210	195	65.25	65.75	0.50	60.00	3.25	0.7
	1:30 PM	30	240	225	65.75	66.25	0.50	60.00	3.75	0.7
	2:00 PM	30	270	255	66.25	66.75	0.50	60.00	4.25	0.7
	2:30 PM	30	300	285	66.75	67.25	0.50	60.00	4.75	0.7
	3:00 PM	30	330	315	67.25	67.75	0.50	60.00	5.25	0.7
	3:30 PM	30	360	345	67.75	68.25	0.50	60.00	5.75	0.7

Plot: t/R as ordinate vs. 't' as abscissa; tanOC = K.

R_1 = Vertical distance from reference point to water level after refilling at beginning of increment period.

R_2 = Vertical distance from reference point to water level at the end of increment period.

R = 1/K at equilibrium rate.



PRE - PERCOLATION TEST DATA SHEET

Project:	Travel Plaza - Perris		Project No.:	G-5908-08		Date:	5/24/2021
Test Hole Number:		PC-2	Tested By:	BA/AB			
Depth of Test Hole, DT		10'	USCS Soil Classification:				
Test Hole Dimensions (inches)					Length	Width	
Diameter (if Round) =		8"	Sides (if Rectangular) =				
Sandy Soil Criteria Test *							
Trial No.	Start Time	Stop Time	Time Interval (Min)	Initial Depth to Water (in)	Final Depth to Water (in)	Change in Water Level (in)	Greater than or Equal to 6"? y/n
1	9:35 AM	10:00 AM	25	65	67.0	2	< 6"
2	10:00 AM	10:25 AM	25	67	69.0	2	< 6"

* If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute Intervals) with a precision of at least 0.25".

PERCOLATION TEST

Borehole No. B-11 (**PC-2**) Depth **120** inch

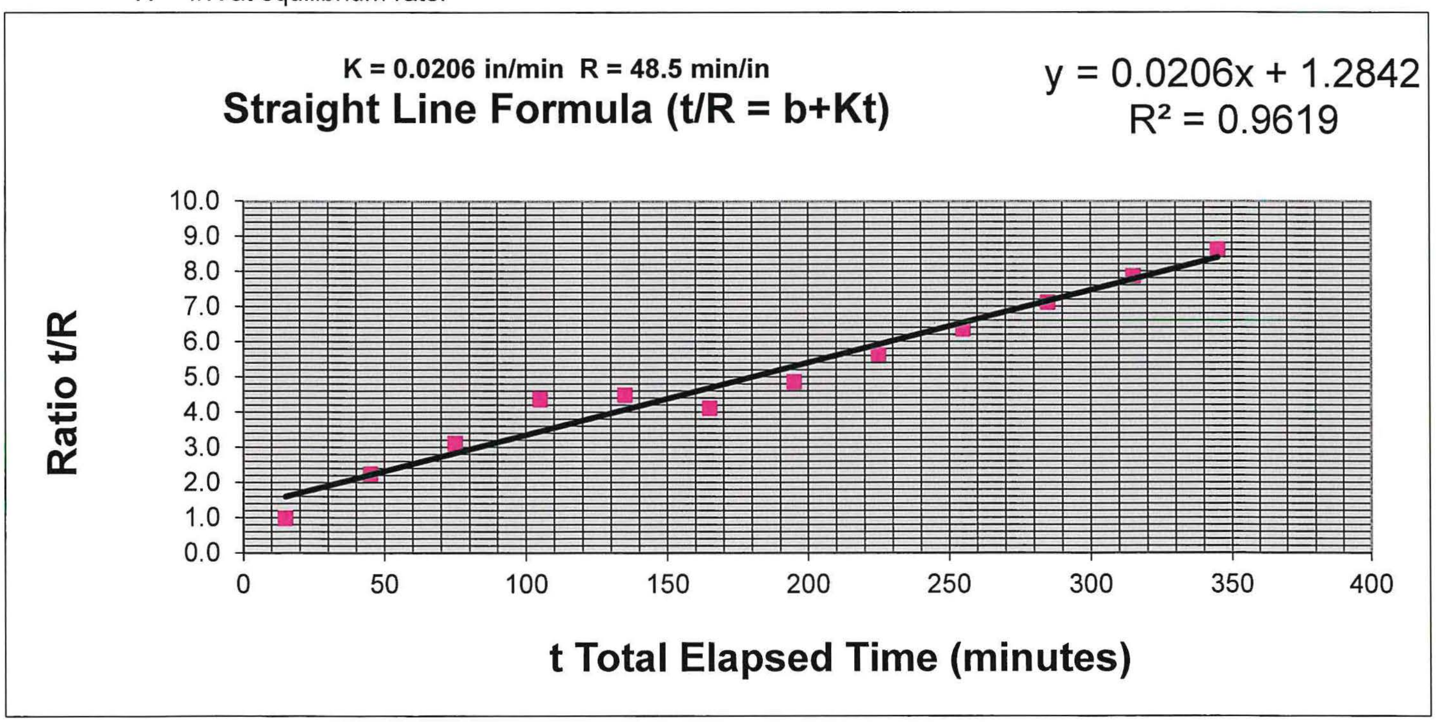
Date	Time of Reading	Δt (min.)	Total Elapsed Time (t)	Average t (minutes)	Reading R_1 (inches)	Reading R_2 (inches)	Drop d (inches)	R=Δt/d (min./in.)	t/R (in.)	k * 1000 (cm/s)
5/25/2021	9:40 AM	0	0							
	10:10 AM	30	30	15	60.00	62.00	2.00	15.00	1.00	2.8
	10:40 AM	30	60	45	62.00	63.50	1.50	20.00	2.25	2.1
	11:10 AM	30	90	75	63.50	64.75	1.25	24.00	3.13	1.8
	11:40 AM	30	120	105	64.75	66.00	1.25	24.00	4.38	1.8
	12:10 PM	30	150	135	66.00	67.00	1.00	30.00	4.50	1.4
	12:40 PM	30	180	165	67.00	67.75	0.75	40.00	4.13	1.1
	1:10 PM	30	210	195	67.75	68.25	0.75	40.00	4.88	1.1
	1:40 PM	30	240	225	68.25	69.00	0.75	40.00	5.63	1.1
	2:10 PM	30	270	255	69.00	69.75	0.75	40.00	6.38	1.1
	2:40 PM	30	300	285	69.75	70.50	0.75	40.00	7.13	1.1
	3:10 PM	30	330	315	70.50	71.25	0.75	40.00	7.88	1.1
	3:40 PM	30	360	345	71.25	72.00	0.75	40.00	8.63	1.1

Plot: t/R as ordinate vs. 't' as abscissa; tanOC = K.

R_1 = Vertical distance from reference point to water level after refilling at beginning of increment period.

R_2 = Vertical distance from reference point to water level at the end of increment period.

R = 1/K at equilibrium rate.



Travel Plaza Perris - Percolation Tests		Project:	G-5908-08
Corner of Trumble Road and Ethanac Road, Perris, California		Plate:	4

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Appendix C – Infiltration Rates

Infiltration Rate I_f Calculations

- PC-1
- PC-2

Percolation Rate Conversion
Infiltration Rate, I_t
Porchet Method, aka Inverse Borehole Method

Travel Plaza - Perris
Project No: G-5908-08

Percolation Test PC-1

As per Test Result, Average Percolation Rate = 0.0135 inch/Min = 0.81 inch/hour

Data collected at the Final Interval analysed: 1.0 inch/hour

Time Interval, Δt	=	**30**	Minutes	Initial Depth to Water, D_0	=	**67.75**	Inches
Total Depth of Test Hole, D_t	=	**120**	Inches	Final Depth to Water, D_f	=	**68.25**	Inches
Test Hole Radius, r	=	**4**	Inches				

Initial Height of Water at the selected time interval, H_0	=	52.25	Inches	$(D_t - D_0)$
Final Height of Water at the Selected time interval, H_f	=	51.75	Inches	$(D_t - D_f)$
Change in Height over the time interval, ΔH	=	0.5	Inches	$(H_0 - H_f)$
Average Head Height over the time interval, H_{avg}	=	52	Inches	$(H_0 + H_f)/2$

Tested Infiltration Rate, I_t = $\Delta H\,(60\,r) / ((\Delta t)(r + 2\,H_{avg}))$ **in/hr**

Therefore, I_t = **0.037037 inch/hour**

I_t = **0.018519 inch/hour** **FS: 2**

< 0.3 inch/hour requirement
FAILED

Percolation Rate Conversion

Infiltration Rate, I_t

Porchet Method, aka Inverse Borehole Method

Travel Plaza - Perris

Project No: G-5908-08

Percolation Test PC-2

As per Test Result, Average Percolation Rate = 0.0206 inch/Min = 1.236 inch/hour

Data collected at the Final Interval analysed: 1.5 inch/hour

Time Interval, Δt	=	**30**	Minutes	Initial Depth to Water, D_0	=	**71.25**	Inches
Total Depth of Test Hole, D_t	=	**120**	Inches	Final Depth to Water, D_f	=	**72.00**	Inches
Test Hole Radius, r	=	**4**	Inches				

Initial Height of Water at the selected time interval, H_0	=	48.75	Inches	$(D_t - D_0)$
Final Height of Water at the Selected time interval, H_f	=	48	Inches	$(D_t - D_f)$
Change in Height over the time interval, ΔH	=	0.75	Inches	$(H_0 - H_f)$
Average Head Height over the time interval, H_{avg}	=	48.375	Inches	$(H_0 + H_f)/2$

Tested Infiltration Rate, I_t = $\Delta H (60 r) / ((\Delta t)(r + 2 H_{avg}))$ **in/hr**

Therefore, I_t = **0.0596 inch/hour**

I_t = **0.029777 inch/hour** **FS: 2**

< 0.3 inch/hour- FAILED

Appendix D

Infiltration Rates Using Reduction Factor Method R_f

- PC-1
- PC-2

REDUCTION FACTOR, R_f					
Project:	Travel Plaza - Perris	Project No.:	G-5908-08	Date:	5/25/2021
Test Hole Number:	**PC-1**	Tested By:	BA/AB		
Depth of Test Hole, DT	10'	Initial Water Depth (Inches)	67.75		
Test Hole Dimensions (inches)				Length	Width
Diameter (if Round), Dia =	8	Sides (if Rectangular) =			
Percolation Test	Pre-Adjusted Percolation Rate, in/hr	Initial Depth to Water, **d1** (in)	Water level Drop, Δ**d** (in)	$\mathbf{R_f}$	$\mathbf{I_f}$
PC-1	1	67.75	0.5	17.88	0.0559

The average drop of the stabilized rate over the last three consecutive readings is the pre-adjusted percolation rate at the test location in inches per hour.

The pre-adjusted percolation rate must be reduced to account for the discharge of water from both the sides and bottom of the boring (non-vertical flow).

Use the Formula: Reduction Factor, $R_f = [(2d1 - \Delta d) / Dia] + 1$ where d_1 = Initial water Depth, in

Δ d = Water level drop of Final Period or Stabilized Rate (in)

REDUCTION FACTOR, R_f

Project:	Travel Plaza - Perris	Project No.:	G-5908-08	Date:	5/25/2021
Test Hole Number:	**PC-2**	Tested By:	BA/AB		
Depth of Test Hole, DT	10'	Initial Water Depth (Inches)	71.25		
Test Hole Dimensions (inches)				Length	Width
Diameter (if Round), Dia =	8	Sides (if Rectangular) =			
Percolation Test	Pre-Adjusted Percolation Rate, in/hr	Initial Depth to Water, **d1** (in)	Water level Drop, Δ**d** (in)	**R_f**	**I_f**
PC-2	1.5	71.25	0.75	18.72	0.0801

The average drop of the stabilized rate over the last three consecutive readings is the pre-adjusted percolation rate at the test location in inches per hour.

The pre-adjusted percolation rate must be reduced to account for the discharge of water from both the sides and bottom of the boring (non-vertical flow).

Use the Formula: Reduction Factor, $R_f = [(2d1 - \Delta d) / Dia] + 1$ where d_1 = Initial water Depth, in

Δd = Water level drop of Final Period or Stabilized Rate (in)

GEOTECHNICAL ADDENDUM REPORT

TRAVEL PLAZA
PERRIS

AT

CORNER OF TRUMBLE ROAD &
ETHANAC ROAD
PERRIS, CALIFORNIA

PREPARED FOR:

BROADBENT, INC.
WEST PACIFIC AVENUE
HENDERSON, NEVADA, 89015

PROJECT NO: G-5908-01

JUNE 11, 2021

PREPARED BY:

GEOTECHNICAL SOLUTIONS, INC.
GEOTECHNICAL & ENVIRONMENTAL
ENGINEERING

June 11, 2021

Project No: G-5908-01

Broadbent, Inc.
8 West Pacific Avenue
Henderson, Nevada, 89015

Attention: Mr. Mark E. Kazelskis, PG, CHG, CEM
Principal Geologist

Via Email: mkazelskis@broadbentinc.com

Re: Geotechnical Engineering Addendum Report
Travel Plaza - Perris
Corner of Trumble Road &
Ethanac Road
Perris, California 92570

Gentlemen:

Submitted herewith is the addendum report to our geotechnical engineering report dated June 11, 2021 conducted by this office for Travel Plaza Perris at the referenced project site.

Recommendations regarding over excavation have been included in this addendum report for the Travel Plaza Perris located just northwest of the intersection of Trumble Road and Ethanac Road, just west of Trumble Road in Perris, San Bernardino County, California as shown on Vicinity Map (Plate A) and Google Map (Plate C).

Site Clearing

Prior to grading, all debris, grass, weeds including construction materials should entirely be removed from the site and disposed of off-site. Existing any undesirable materials should also be removed and hauled off-site. Existing utilities (if Any) should be removed and relocated as required. Any construction debris or ant buried or other contaminated exposed during site clearance should be removed and hauled away from the site. The resulting excavation from any removal should be cleared of loose material then backfilled with compacted soil. Oversized rocks greater than 6 inches should be removed.

Excavation

Excavations into the on-site soils may encounter a variety of challenges for example, very firm and dense to very dense alluvial soils. Some Caving on clean sands may be encountered. The contractor should be made responsible for designing and constructing stable, temporary excavations as required to maintain stability of the excavation sides. All excavations should be sloped or shored in the interest of safety following local and federal regulations including current OSHA excavation and trench safety standards.

Heavy equipments for breaking the very dense alluvial materials may be required for the excavations for shallow foundations, drilled shafts, and utility trenches for the proposed construction. The speed and ease of excavation are dependent on the nature of the deposit, the type of equipment used, and the skill and experience of the equipment operator.

Building Pad Over-excavation (Above Ground Storage Tanks, AST's)

After removal of existing debris, the above ground storage tank areas should be over-excavated at least 3 feet below the lowest grade or 24 inches below the bottom of the footings whichever is greater. Excavation should be extended 3-feet outside building perimeters. Over-excavation may be hard due to the presence of very dense alluviums, therefore heavy equipments may be required. Remove and replace any loose or disturbed soils prior to placing any additional fill materials required to reach the finished subgrade elevations. The over-excavation should be backfilled to the foundation base elevation with the compacted engineering fill in accordance with the recommendations presented in this report.

Compliance

Recommendations for foundations and slabs-on-grade supported on compacted fills or prepared subgrade depend upon compliance with the General Grading and Recommended Earthwork Specifications in Appendix B.

To assess compliance, observation and testing should be performed under the direction of a geotechnical engineer. Please contact us to provide observation and testing services.

Backfill Materials

On-site clean, low-expansive potential soils, or imported materials may be used as fill material for the following:

- Foundation Areas
- Interior Slab Areas
- Pavement Areas
- Backfill

Any earth materials imported or excavated on the property may be utilized in the fill provided that each material has been determined to be suitable by the soil engineer. These materials should be free of roots, tree branches, other organic matter or other deleterious materials. Soils of poor gradation, undesirable expansion potential, or substandard strength characteristics may be designated by the consultant as unsuitable and may require blending with other soils to serve as a satisfactory fill material. Also, rocks of sizes bigger than 3 inches should be discarded for the site material to be used for backfill.

Gradation (as per ASTM C136) should be as follows:

Size	% by Weight
6"	100

4"	85-100
¾"	70-100
No 4 Sieve	50-100
No. 200 Sieve	15 (max)

Any import material should have an expansion Index, EI less than 20. Import material should also meet the following criteria:

Soil Properties	**Values**
Liquid Limit	35 (Max)
Plastic Limit	6 (Max)

Placement and Compaction

Place and compact approved fill material in nearly horizontal layers that when compacted should not exceed 6 inches in thickness.

Use appropriate equipment and procedures that will produce recommended densities and water contents throughout the lift. Moisture condition, blending, and mixing of the fill layer should continue until the fill materials have a uniform moisture content at or above optimum moisture.

Uncompacted fill lifts should not exceed 8 inches.

Materials should be compacted to the following:

On-site or imported soil, reworked and fill:	Minimum % (ASTM D-1557 Laboratory Standard)
Subgrade Below Footings	90
Subgrade Below Slab-on Grade	90
Subgrade Below Pavement	90
Crush Rock Below Slab-on-Grade	95
Aggregate Base below pavement	95

Excavations at Pavement Areas

Subgrade Preparation

After removing the existing deleterious materials, dense to very dense alluvial materials on the pavement areas and hauled offsite, all surficial deposits of loose soil material should be removed and excavate 12 inches below the base and recompacted as recommended. The bottom is further scarified to a depth of at least 6 inches; moisture conditioned as necessary and compacted to 90 percent of the maximum laboratory density as determined by ASTM Test Method D-1557.

Deleterious material, excessively wet or dry pockets, and any other unsuitable materials encountered during excavation or grading should be removed. The compacted fill material should then be brought to the elevation of the proposed subgrade for the pavement. The subgrade should be proof-rolled in order to ensure a uniform, firm and unyielding surface. All grading and fill placement should be observed by the project soils engineer and/or his representative.

Aggregate Base

Compaction and rolling are required for the recommended base section. Minimum relative compaction required will be 95 percent of the laboratory maximum density as determined by ASTM Test Designation D-1557. Aggregate base should be in accordance with 200-2.2 crushed Aggregate base Class II base (minimum R-value=78) and sample should be brought for testing and approval prior to delivery to the site. No crushed miscellaneous base (CMB) should be accepted.

Asphalt Concrete Pavement

Asphalt concrete pavement should be Performance Grade PG 64-10 1/2" maximum aggregate size and should be placed and compacted in two layers. Asphalt concrete shall be compacted to 95 percent of the Hveem Laboratory Standard.

Earthwork Observations:

Relative compaction of all fill materials placed on site should be tested in accordance with ASTM D6938. All new fill shall be brought to near optimum moisture, placed in layers not exceeding six inches in thickness, and compacted to at least 90 percent relative compaction for subgrade and 95 percent relative compaction for aggregate base. No jetting or water tamping of fill soils shall be permitted. All imported soil for engineered fill should be pre-approved by the Geotechnical Engineer and consist of clean, granular, non-expansive soil, free of vegetation and other debris with an Expansion Index of 20 or less.

At all times, the contractor should have a responsible field superintendent on the project in full charge of the work, with authority to make decisions. He should cooperate fully with the Geotechnical Engineer in carrying out the work.

All footing trenches for continuous and spread footings and subgrade for the slab areas should be observed by the project Geotechnical Engineer to verify that over-excavation and re-compaction operations of adequate depth, thickness, and compaction have been performed as specified. All footing excavations should be trimmed neat, level and square. All loose, sloughed or moisture softened soil should be removed and replaced with properly compacted soil.

General Grading

All grading should conform to the guidelines presented in the California Building Code (CBC, 2019), the City of Perris, San Bernardino County, International Conference of Building Officials (ICBO, 2018), and Appendix B in this report, except where specifically superceded in the text of this report. When code references are not equivalent, the more stringent code should be followed. During earthwork construction, all site preparation and the general grading procedures of the contractor should be observed, and the fill selectively tested by a representative (s) of Geotechnical Solutions, Inc. (GSI). If unusual or unexpected conditions are exposed in the field, they should be reviewed by this office and if warranted, modified and /or additional recommendations will be offered. All applicable requirements of local and national construction and general industry safety orders, the Occupational Safety and Health Act and the construction Safety Act should be met.

Closure

The Conclusions and recommendations contained herein are based on the findings and observations made at the test boring locations. It is not unusual to find conditions between and beyond such locations, which differ from the conditions encountered. If conditions are encountered during construction, which appear to differ from those previously disclosed, this office should be notified so as to consider the need for modifications. On-site construction observations and wherever appropriate, tests should be performed during the course of construction by a representative of this office to evaluate compliance with the design concepts, specifications, and recommendations contained herein.

This report has been compiled for the exclusive use of our client, it shall not be transferred to, or used by, other parties, or applied to any project on this site other than described herein without consent and /or thorough review by this office.

The investigation was made in accordance with generally accepted geotechnical engineering principles and procedures and included such field and laboratory tests considered necessary under the circumstances.

In the opinion of the undersigned, the accompanying report has been substantiated by mathematical and other data and presents fairly the design information requested by your organization.

Respectfully Submitted,

Geotechnical Solutions, Inc.

REGISTERED PROFESSIONAL ENGINEER
DHARMA R. SHAKYA
No. GE 2773
GEOTECHNICAL
STATE OF CALIFORNIA

Dharma Shakya, PhD, PE, GE
Principal Geotechnical Engineer

Abraham S. Baha, PE, M. ASCE
Sr. Principal

REGISTERED PROFESSIONAL ENGINEER
ABRAHAM S. BAHA
No. C053067
CIVIL
STATE OF CALIFORNIA

Distribution: (3+pdf) Addressee

References

Geotechnical Solutions, Inc., 2021, "Geotechnical Evaluation Report for Travel Plaza Perris, Located at the corner of Trumble Road and Ethanac Road, Perris, California", Project Number G-5908-01, dated June 11.

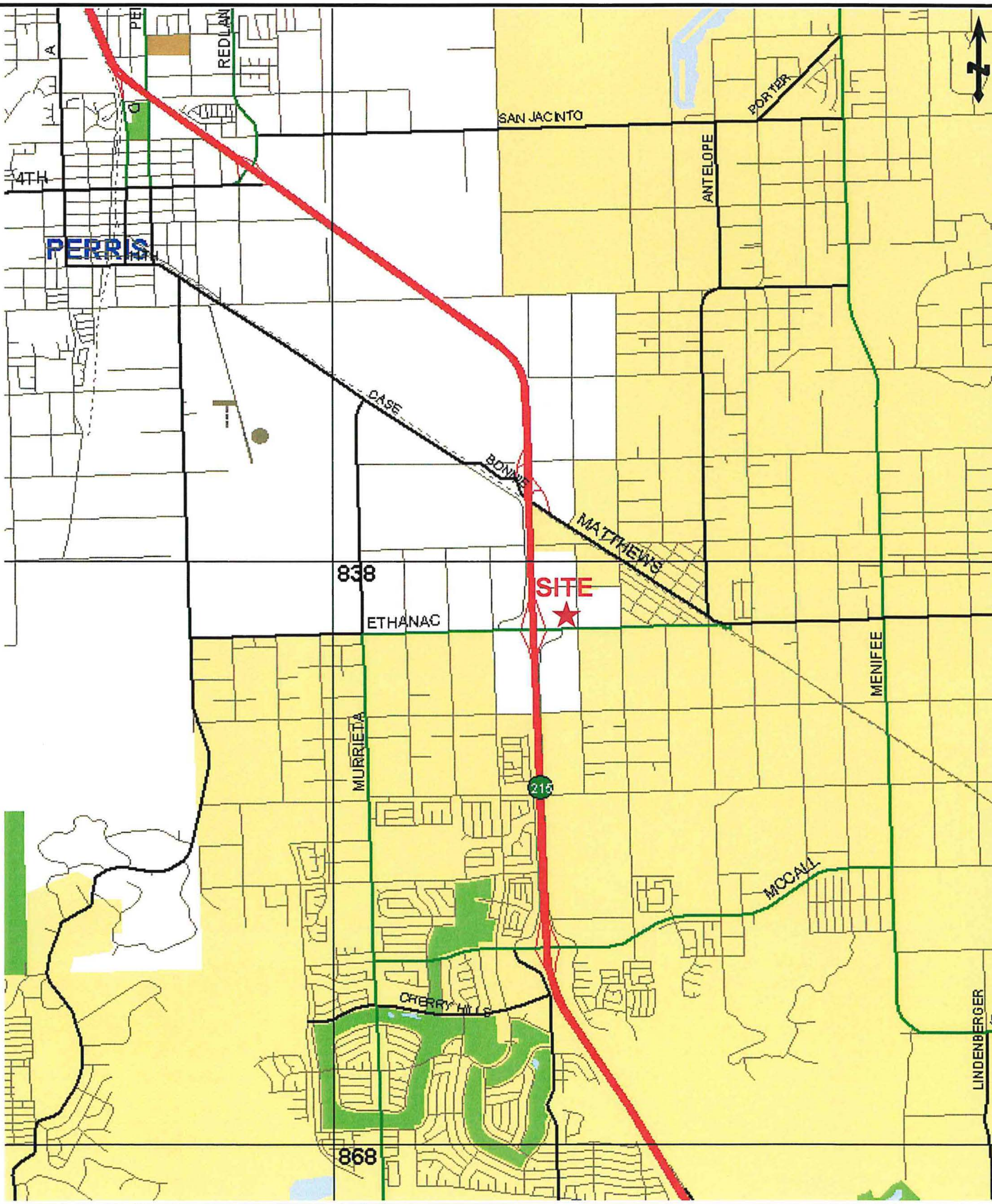
International Conference of Building Officials (ICBO), 2019, California Building Code, California Code of Regulations, Title 24, Part 2, Volume 2.

Appendix A

Plates

- **Vicinity Map**
- **Plot Plan**
- **Google Map**

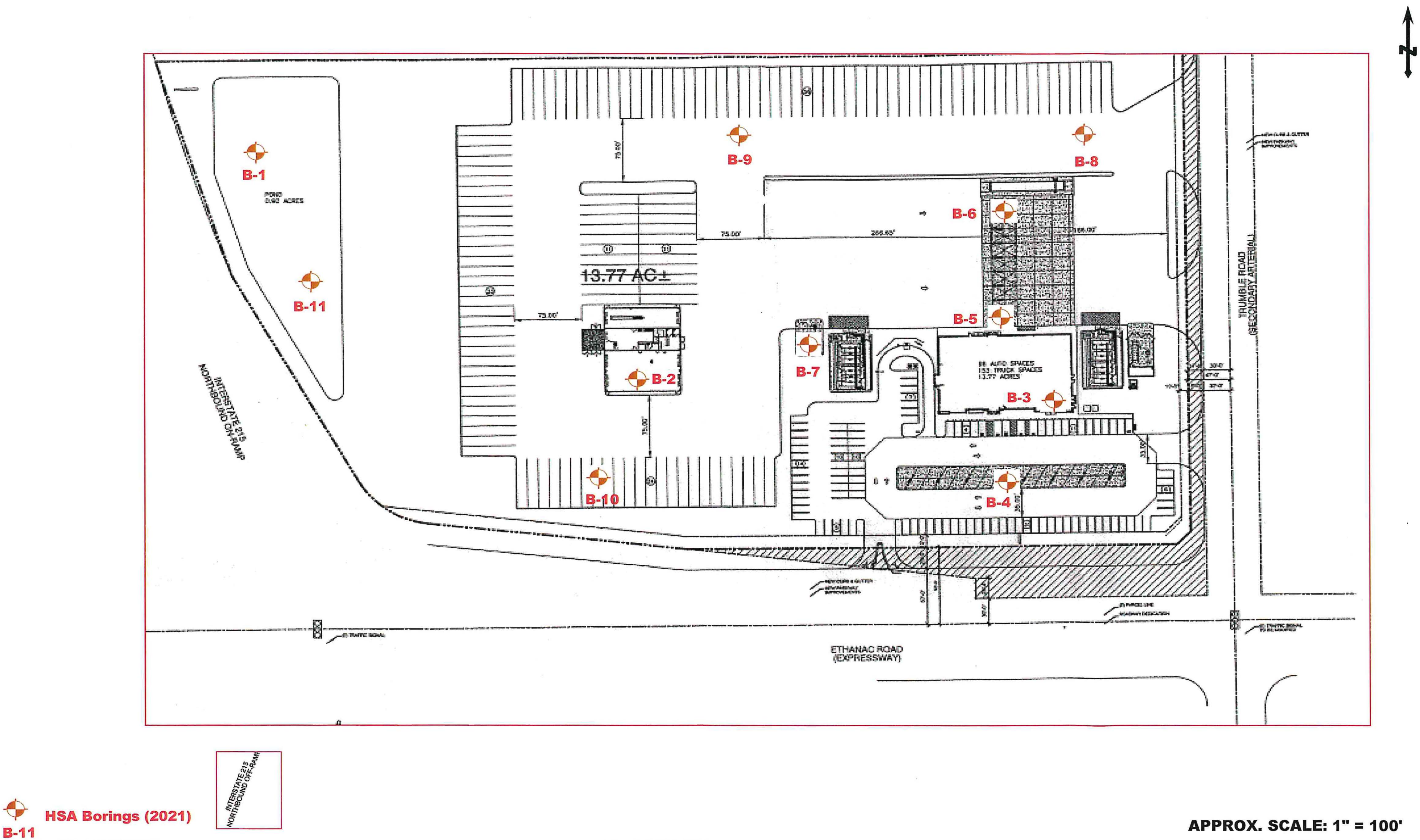
VICINITY MAP



Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	A

Geotechnical Solutions, Inc.

PLOT PLAN & BORING LOCATION MAP



APPROX. SCALE: 1" = 100'

Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	B

Geotechnical Solutions, Inc.

GOOGLE MAP

Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	C

Geotechnical Solutions, Inc.

Appendix B

Recommended Earthwork Specifications

RECOMMENDED EARTHWORK SPECIFICATIONS

1.0 General

1.1 Description

1.1.1 These specifications cover preparation of the subject site to receive fills, the type of soils suitable for use in fills, the compaction standards, and the methods of testing compacted fills.

1.1.2 The Contractor shall furnish all labor, supervision, equipment, operations, and materials to excavate to the required grade, support existing underground facilities, stockpile material, compact fill and backfill, and fine grade. The work of the Contractor shall include all clearing and grubbing, removing existing unsatisfactory material, preparing areas to be filled, spreading and compacting of fill in the areas to be filled and all other work necessary to complete the grading of the filled areas. It shall be the Contractor's responsibility to place, spread, moisten or dry, and compact the fill in strict accordance with these specifications to the lines and grades indicated on project plans or as directed in writing by the Civil Engineer.

1.1.3 Deviations from these specifications will be permitted only upon written authorization from the Owner or his representative.

1.2 Role of the Geotechnical Engineer

1.2.1 Construction - The Owner will employ a Geotechnical Consultant to observe and test this work as it is being performed. The Contractor shall cooperate with the Geotechnical Consultant and allow his unrestricted access to the site as required for the performance of his duties.

The Contractor shall provide a minimum notice of 48 hours to the Geotechnical Engineer before beginning or restarting earthwork operations that will require the presence of the Geotechnical Engineer or his representative on site.

1.2.2 Subsurface Investigations - A geotechnical engineering report for design purposes was prepared by Geotechnical Solutions, Inc., Irvine, California. Any recommendations made in the geotechnical report or subsequent reports are made part of these specifications. These reports are available for review upon request to the Owner.

1.2.3 Observation and Testing - The Geotechnical Engineer's representative shall observe the clearing and grubbing, excavation, filling and compacting operations and shall take density tests in the fill material so that he can state his opinion as to whether or not the fill was constructed in accordance with the specifications. All fill will be tested shortly after its placement to ascertain that the required compaction is achieved. A minimum of one density test will be made on each 500 cubic yards of fill placed, with a minimum of at least one test per every 2 feet of vertical height of fill. If the surface is disturbed, the density tests shall be made in the compacted materials below the disturbed zone. When these tests indicate that the density or water content of any layer of fill or portion thereof does not meet the specified density or water content, the particular layer or portions thereof shall be reworked until the specified density and water content have been obtained.

After the completion of grading, the Geotechnical Engineer will prepare a written opinion of grading. Neither the testing performed by the Geotechnical Consultant nor his opinion as to whether or not the fill was constructed in accordance with these Specifications shall relieve the Contractor of his responsibility to construct the fills in accordance with the Contract Documents.

1.3 Reference Standards

The following ASTM (American Society for Testing and Materials) codes and standards shall be used to the extent indicated by references herein. The most recent revision of the standards shall be used.

D 1556 - "Standard Test Method for Density of Soil in Place by the Sand-Cone Method"

D1557 - "Standard Test Methods for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10-lb (4.54 kg) and 18-inch (457-mm) Drop"

D2216 - "Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures"

D4318 - "Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils"

D4718 - "Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles"

D4829 - "Standard Test Method for Expansion Index of Soils"

D4944 - "Standard Test Method for Field Determination of Water (Moisture) Content of Soil by the Calcium Carbide Gas Pressure Tester Method."

D5195 - "Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)"

D6938 - "Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)"

D7928 - "Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis"

1.4 Degree of Fill Compaction

The degree to which fill is to be compacted is expressed in terms of "relative compaction." Relative compaction is defined as the ratio; expressed in percent, of the in-place dry density of the compacted fill to the reference maximum dry density. The reference maximum dry density shall be obtained following ASTM D1557. Optimum water content shall be obtained in the same test used to obtain the reference maximum dry density. Correction of the maximum dry density and optimum water content for

oversize particles of gravel and cobbles shall be made following ASTM D4718 when, in the opinion of the Geotechnical Engineer, such correction is appropriate. The in-place density shall be obtained following ASTM D1556 (sand cone method) or ASTM D6938 (nuclear method-shallow depth) test method. The in-place water content shall be obtained following ASTM D4944 (calcium carbide gas pressure meter), ASTM D5195 (nuclear method-shallow depth), or ASTM D2216 (oven drying). Correction of the in-place density and water content for oversize particles of gravel and cobbles shall be made following ASTM D4718 when, in the opinion of the Geotechnical Engineer, such correction is appropriate.

If any of the test methods specified in this section are judged by the Geotechnical Engineer to be impractical or unreliable because the material has a coarse particle size distribution, or for other reasons, the Geotechnical Engineer shall establish other procedures to obtain the required soil characteristics.

2.0 Products

2.1 Materials

2.1.1 General - During grading operations, soil types other than those identified in the geotechnical investigation report may be encountered by the Contractor. Consult the Geotechnical Consultant for his evaluation of the suitability of using these soils a fill material prior to placement or disposal.

2.1.2 General Fill - Materials for compacted fill shall consist of material imported from outside the site or excavated from the site that, in the opinion of the Geotechnical Engineer, is suitable for use in constructing engineered fills. The material shall not contain rocks or hard lumps greater than 6 inches in maximum dimension, and at least 70 percent (by weight) of its particles shall pass through a U.S. Standard 3/8 inch sieve. Material greater than 3 inches, but less than 6 inches in maximum dimension, shall be placed by the Contractor so that it is completely surrounded by compacted, finer material;

no nesting of rocks shall be permitted. Do not use any perishable, spongy, hazardous, or other undesirable materials as fill.

2.1.3 Select Fill - Select fill shall meet all criteria for general fill but shall also contain no rocks or hard lumps greater than 3 inches in maximum dimension, and at least 80 percent (by weight) shall pass through a U.S. Standard 3/8-inch sieve. The expansion index of select material shall be less than 50 (i.e., 5.0 percent swell) when tested in accordance with ASTM D4829.

3.0 Execution

3.1 Clearing and Grubbing

Within the project limits, tile Contractor shall demolish structures as specified on the Drawings.

Unless otherwise indicated on the Drawings or by the Owner in writing, the Contractor shall clear and grub all trees, stumps, roots, brush, grass, and other vegetation within construction, fill and stockpile areas to a minimum depth of 3 feet below the existing ground surface or below finished grade, whichever is deeper, unless otherwise recommended by the Geotechnical Engineer's Field Representative.

Remove cleared and grubbed materials from the site and dispose of them legally. No onsite burning or burying of cleared and grubbed materials is permitted. No placement of cleared and grubbed materials in topsoil stockpiles is permitted. No mulching of branches or roots is permitted. Incorporating vegetative matter into stockpiled materials, which are to be used in fill, is not permitted.

Stockpile organic-laden topsoil separate from other fill materials.

Remove any remaining vegetative matter from the deeper excavated soils, which may result from roots deeper than those encountered during clearing and grubbing operations.

All material thereby removed shall be piled at a location away from the immediate work area so as to avoid burying of piled material.

3.2 Compacted Fills

3.2.1 Preparing Areas to be Filled - Brush, grass, and other objectionable materials shall be collected, piled, and disposed of as indicated in Section 3.1 by the Contractor so as to leave the areas that have been cleared with a neat and finished appearance, free from unsightly debris.

Remove all loose soil, uncertified fill, landslide debris, and weathered bedrock to firm material or in-situ bedrock, as approved by the Geotechnical Consultant. The Contractor shall obtain approval from the Geotechnical Engineer or his representative of stripping and site preparation before the compaction of any fill subgrade begins. The surface shall then be scarified to a minimum depth of 6 inches until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment used, and shall be brought to the specified water content and relative compaction. Compact scarified materials to a minimum relative compaction of 90 percent, relative to ASTM D1557, prior to placement of any fill material.

3.2.2 Placing, Spreading, and Compacting, Fill Material - Onsite soil obtained from removals, borrow, or cut areas may be reused as compacted fill provided it is free from deleterious debris and meets the other requirements of the "Materials" portion of this Specification Section.

Use of soil containing deleterious debris from the clearing and grubbing operation or from other sources is not permitted. The fill materials shall be placed by the Contractor in horizontal layers not greater than 8 inches thick, measured before compaction. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to obtain uniformity of material and moisture in each layer. The moisture content of material used for compacted fill should be adjusted to be at or above optimum water content as determined by ASTM D1557. When the water content of the fill material is too high, the

fill materials shall be aerated by the Contractor by blading, mixing, or other satisfactory methods until the water content is as specified.

After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted by the Contractor to a relative compaction of at least 90 percent of the maximum dry density as determined by ASTM D1557 for general fill, and 95 percent of the maximum dry density as determined by ASTM D1557 for select fill, compacted fill pads, and the upper 1 foot of pavement subgrade. Compaction shall be accomplished by: sheepsfoot rollers; vibratory rollers; multiple-wheel, pneumatic-tired rollers; or other types of acceptable compacting equipment. Equipment shall be of such design that it is able to compact the fill to the specified density. Compaction shall be continuous over the entire area, and the equipment shall make sufficient passes to obtain the desired density uniformly. All fill placed on site shall be treated in like manner until finished grades are attained. Jetting, puddling, and hydro consolidation techniques shall not be used, including backfill of utility trenches.

The placement of topsoil is subject to the approval of the Geotechnical Engineer. Topsoil shall not be placed beneath concrete flatwork, beneath or behind retaining walls, or within structural fill. All topsoil material is subject to the same moisture conditioning, placement, and compaction requirements as General Fill. Roots, branches and other organic debris are not permitted within the compacted topsoil layer.

When backfilling around footings and compacting behind retaining walls and flexible retaining structures, the Contractor shall use lightweight compaction equipment such as hand-operated equipment, shoring, or other means to avoid over-stressing structural walls. When using lightweight compaction equipment, the fill materials shall be spread in horizontal layers not greater than 6 inches thick, measured before compaction.

As an alternative, sand-cement slurry may be used to backfill trenches. The slurry shall have minimum cement content of 3 sacks per cubic yard within the zone of influence of foundations and other settlement sensitive structures. A minimum of 2 sacks per cubic

yard of slurry shall be used elsewhere within building limits, and a minimum of one sack per cubic yard of slurry shall be used elsewhere. Slurry shall not be used in those areas where such placement would result in the obstruction of water flow, and is subject to the approval of the Geotechnical Engineer.

3.3 Protection of Work and Adjacent Properties

3.3.1 During Construction - The Contractor shall grade all excavated surfaces to provide good drainage away from construction slopes and prevent ponding of water. He shall control surface water and the transport of silt and sediment to avoid damage to adjoining properties or to finished work on the site. The Contractor shall take remedial measures to prevent erosion of freshly graded areas until such time as permanent drainage and erosion control measures have been installed.

Dispose of all water resulting from dewatering operations legally and in ways that will not cause damage to public or private property, or constitute a nuisance or menace to the public, in accordance with municipal requirements.

The Contractor shall make every effort to minimize the amount of dust raised in excavating, on haul roads and access roads, and all other work areas in the course of construction activities.

Protect benchmarks, monuments, and other reference points against displacement or damage. Repair or replace benchmarks, monuments, and other permanent survey data that become displaced or damaged due to the performance of this work.

3.3.2 After Completion - After earthwork is completed and the, Geotechnical Engineer has finished his observations of the work, no further excavation, filling or backfilling shall be performed except under the observation of the Geotechnical Engineer.

Appendix G

Romoland Master Drainage Plan

102770_13

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
RIVERSIDE, CALIFORNIA

ROMOLAND

MASTER DRAINAGE PLAN

Zone 4

Original Plan - April 1988
Revision No.1 – March 2006

Warren D. Williams
General Manager – Chief Engineer

UNDERGROUND STORM DRAINS

The proposed underground storm drains generally consist of reinforced concrete pipe ranging in size from 27 inches to 96 inches in diameter. Reinforced concrete boxes are usually placed under dedicated road crossings or where the flow rates or hydraulic necessities exceed the capacity of standard pipe sizes. The underground storm drains proposed within this revision consist of pre-cast reinforced concrete pipe or reinforced concrete box.

DETENTION BASINS

The purpose of the detention basin proposed in this plan is, by the use of temporary storage, to reduce fairly high inflow rates to substantially lesser outflow rates. This peak reduction allows the use of smaller and thus less costly downstream facilities. It should be pointed out that the detention basin proposed in this plan is designed for ultimate 100-year frequency storms. Flows exceeding the design capacity of the basin would pass through the emergency spillway in flow patterns approximating present condition.

MAJOR REVISIONS

This section describes some of the major revisions to the previously adopted Romoland Master Drainage Plan. Revisions may include alignment changes, facility types and sizes and or flow-rate adjustments. Minor changes (such as the downstream extension of Line A-2, elimination of downstream portions of Line A-4, the deletion of Line A-14b and A-6) were the result of mainline realignments described below. **FIGURE 3** depicts the realignment, and modifications made by this master plan revision.

Line A

This facility has been completely realigned and redesigned to account for basin additions in the Homeland area that have decreased the flow rate anticipated from that area. Line A will be proposed as an earthen open channel west of the freeway, where the alignment closely resembles the District's 1990 preliminary drawings titled "Romoland Channel Line A Stage 1" (project number: 4-0-310, drawing number: 4-552). The portion of Line A upstream of the 215 freeway is a combination of concrete-lined open channel, reinforced concrete box, and reinforced concrete pipe.

The existing topography on the east side of the Interstate 215 is steeper than the west side. As a result, the average slope is greater. The velocities on the east side of Interstate 215 range from 12 feet per second to over 20 feet per second. An earthen channel with that range of velocities would tend to scour and create deposition in the San Jacinto River. This deposition would constitute a hydrologic condition of concern for the San Jacinto River. In addition, this sediment could lead to further impairment of Lake Elsinore (which is listed on the federal Clean Water Act 303(d) list as impaired for sedimentation/siltation). In order to minimize scour potential and significantly reduce the right-of-way required, Line A is proposed as a concrete-lined channel between of Interstate 215 and Palomar Road.

Line A-3

This facility consists of a concrete-lined open channel along Varela Lane and reinforced concrete box on Palomar Road. The alignment was altered to combine both Line A-3 and Line A-3e. This eliminates a portion of the north-south alignment of Line A-3 and will simplify construction.

Line A-8 & A-12
The upstream portion of Line A-8 located on Murrieta road was extended northerly and incorporated as a part of Line A-12. Consequently, portions of Line A-8 from Murrieta to Hull Street have been deleted. Facility sizes and flow rates were revised accordingly.

Line A-15
This facility was revised to an underground storm drain and realigned downstream of Ethanac Road to travel north along Goetz Road to the San Jacinto River.

Line A-16, Line A-17, Line A-18
Lines A-16, A-17, and A-18 are new facilities that connect to the revised Line A alignment near the intersections of Sherman Road, Dawson Road and Antelope Road respectively. These lines are underground storm drains that extend south from Line A approximately 300 ft.

SECTION VI – ALTERNATIVES

Several alternatives were developed and studied during the generation of this revision to the Romoland Master Drainage Plan. These alternatives considered different alignment schemes for the major storm drains and open channels; sizing of the proposed detention basins; and various hydraulic considerations. As the study progressed, alternatives considered for the main facilities proposed in this Plan were presented to the District management and staff. General concurrence with the Plan selected was obtained based on cost differentials, accessibility to collector drains, right-of-way restrictions and ease of construction.

SECTION VII – ESTIMATED COST

A cost summary for the MDP facilities is shown in **TABLE 1 "Cost Summary"**. Cost were based on the 2005 Planning Unit Cost sheets and include construction, right of way and 34% for engineering, environmental mitigation, administration and contingencies.

The cost of the drains shown in **TABLE 1** includes manholes and catch basins in addition to the cost of the pipe installed. Manholes are located as necessary with a maximum spacing of 500 feet. Catch basins are not specifically located but the total number of lineal feet is computed and costed.

SECTION VIII – CONCLUSIONS

Based on the studies and investigations made for this report it is concluded that:

1. The Romoland area has experienced serious flooding problems in the past. As this area continues to urbanize these damages are expected to increase. A more orderly growth pattern can safely occur with the construction of these proposed facilities.

2. A drainage system is required to safely convey storm runoff through the area with the least interruption to public services. The Master Drainage Plan presented in this report is such a system and is the most feasible of the alternatives studied.

3. The proposed Plan lends itself to stage construction as funds become available.

4. The total cost of the recommended improvements, including construction, rights of way, engineering, administration and contingencies, is estimated to be **$64,221,206.00**.

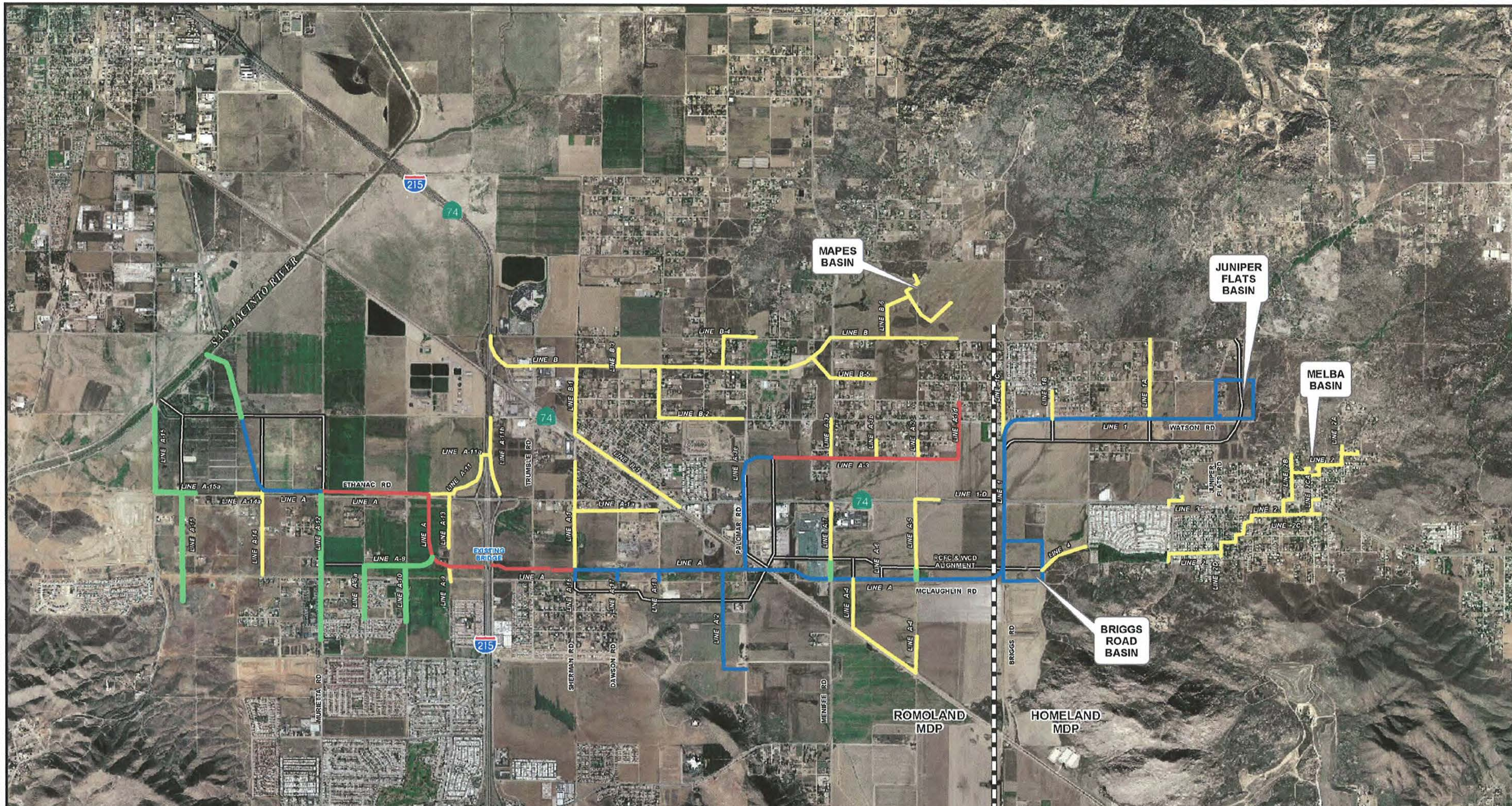
SECTION IX – RECOMMENDATIONS

It is recommended that:

1. The Master Drainage Plan, as set forth herein, be adopted by the Riverside County Flood Control and Water Conservation District's Board of Supervisors as part of the overall master plan for the County of Riverside.

2. The Master Drainage Plan, as set forth herein, be used as a guide for all future developments in the study area and that such developments be required to conform to the Plan insofar as possible.

3. The rights of way required for the Plan be protected from encroachment.



Source: AirPhoto USA
February 2004

N
W E
S

0 3,000 6,000 Feet

ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS

LEGEND

- PHASE I - PROPOSED REVISIONS
- PHASE I - PREVIOUSLY ADOPTED
- FUTURE FACILITIES - PROPOSED REVISIONS
- FUTURE FACILITIES - PREVIOUSLY ADOPTED
- PREVIOUSLY ADOPTED, TO BE ELIMINATED

Figure 3

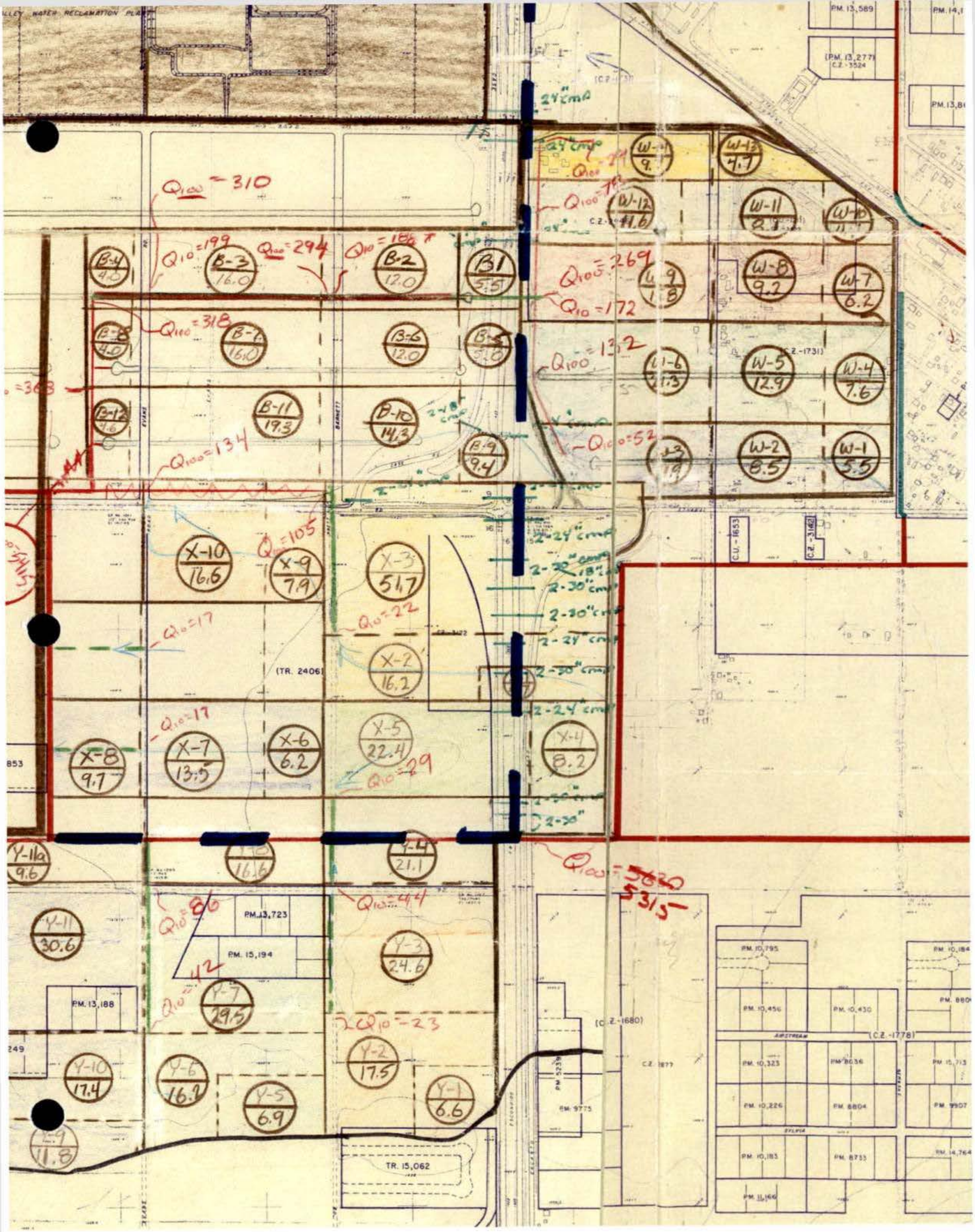
MDP's - Adopted and Revised

Romoland / Homeland MDP/ADP

G:\2003\03-0141\Gis\drainageEIR_fig_I-2-D.mxd; Map revised Aug. 10, 2005


MAPES DETENTION BASIN
STORAGE VOLUME =92 Ac.-ft.
100 YEAR MAX INFLOW = 1230 cfs
100 YEAR MAX OUTFLOW = 150 cfs
100 YEAR MAX WATER SURFACE ELEV 1604.5
R/W REQUIRMENT = 21 Ac.
FOR FACILITIES EAST OF BRIGGS ROAD SEE THE HOMELAND MASTER DRAINAGE PLAN
HOMELAND MDP BRIGGS ROAD BASIN
LINE A
LINE A-1
LINE A-1a
LINE A-2
LINE A-3
LINE A-3a
LINE A-3b
LINE A-3c
LINE A-3d
LINE A-4
LINE A-5
LINE A-7
LINE A-8
LINE A-9
LINE A-10
LINE A-11
LINE A-11a
LINE A-11b
LINE A-12
LINE A-13
LINE A-14
LINE A-14a
LINE A-15
LINE A-15a
LINE A-16
LINE A-17
LINE A-18
LINE B
LINE B-1
LINE B-2
LINE B-3
LINE B-4
LINE B-5
LINE B-6
MAPES RD.
WATSON RD.
HIGHWAY 74
ETHANAC RD.
McLAUGHLIN RD.
ROUSE RD.
CHAMBERS AVE.
THORNTON AVE
BLUE DIAMOND LN.
ALICANTE DR
MATHEWS RD.
CASE RD.
BNSF RR
GOETZ RD.
MURRIETA RD.
HULL ST.
EVANS RD.
BARNETT RD.
ENCANTO DR.
INTERSTATE-215
TRUMBLE RD.
SHERMAN RD.
BRUNER RD.
ANTELOPE RD.
PALOMAR RD.
MENIFEE RD.
CUMMING AVE
MALAGA RD.
MALONE AVE.
BRIGGS RD.
BYERS ST.
GEARY ST.
DAWSON RD.
BRADLEY RD.
EXISTING BRIDGE CROSSING
SCALE: 1 inch = 600 feet
LEGEND
MASTER PLAN BOUNDARY
PROPOSED STORM DRAIN
PROPOSED BASIN
PROPOSED OPEN CHANNEL (CONCRETE SIDESLOPE=1.5:1 UNLESS OTHERWISE NOTED)
EXISTING FACILITY
Q=45 10-YEAR FLOWRATE (CFS)
Q 100 = 350 100-YEAR FLOWRATE (CFS)
SATELLITE IMAGERY CREATED IN 2013
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
ROMOLAND
MASTER DRAINAGE PLAN
REVISION NO. 1
MARCH 2006
ORIGINAL ADOPTION DATE
APRIL 1988

Hydrology



PM. 13,589
PM. 13,277
C.Z. - 3524
PM. 13,8
Q_{100} = 310
Q_{10} = 199
Q_{100} = 294
Q_{10} = 186
B-4 4.0
B-3 16.0
B-2 12.0
B1 5.5
B-8 4.0
B-7 16.0
B-6 12.0
B-5 5.8
Q_{100} = 318
B-12 4.6
B-11 19.3
B-10 14.3
B-9 9.4
Q_{100} = 134
W-13 4.7
W-12 41.6
W-11
W-10
Q_{100} = 269
Q_{10} = 172
W-9
W-8 9.2
W-7 6.2
Q_{100} = 132
W-6
W-5 12.9
W-4 7.6
C.Z. - 1731
Q_{100} = 52
W-2 8.5
W-1 5.5
24" cmp
C.U. - 1653
C.Z. - 3162
X-10 16.6
X-9 7.9
X-3 51.7
Q_{100} = 105
Q_{10} = 22
Q_{10} = 17
X-2 16.2
(TR. 2406)
2-24" cmp
2-30" cmp
2-30" cmp
2-30" cmp
2-24" cmp
2-30" cmp
2-24" cmp
2-30"
Q_{10} = 17
X-8 9.7
X-7 13.5
X-6 6.2
X-5 22.4
X-4 8.2
Q_{10} = 29
Y-11a 9.6
16.6
21.1
Q_{100} = 5630 5315
Q_{10} = 86
Q_{10} = 44
PM. 13,723
PM. 15,194
Y-11 30.6
Y-3 24.6
Q_{10} = 42
Y-7 29.5
PM. 13,188
Q_{10} = 23
(C.Z. - 1680)
C.Z. 1877
PM. 10,795
PM. 10,456
PM. 10,430
(C.Z. - 1778)
AIRSTREAM
PM. 10,323
PM. 8636
PM. 10,226
PM. 8804
PM. 9907
SYLVIA
PM. 10,183
PM. 8733
PM. 14,764
PM. 11,166
PM. 9775
PM. 5239
Y-10 17.4
Y-6 16.2
Y-2 17.5
Y-5 6.9
Y-1 6.6
11.8
TR. 15,062

RCFC & WCD HYDROLOGY MANUAL
RATIONAL METHOD CALCULATION FORM

Sheet No. 3 of __ Sheets

PROJECT: Romoland - West of 395

FREQUENCY: 100 yr.

Calculated by: [signature] 4-25-83 (DATE)

Checked by: ________ (DATE)

DRAINAGE AREA	Soil & Development	A Acres	I In/hr.	C	ΔQ CFS	Σ Q CFS	SLOPE	SECTION	V FPS	L FT.	T MIN.	Σ T	REMARKS
W-1	D-Comm	5.5	2.85	.892	14.0				H=2	600	12.1	12.1	
W-2	"	8.5	2.34	.890	17.7	14.0	.004	66' st.	2.3	800	5.8	17.9	
W-3	"	11.9	1.92	.888	20.3	32	.003	66' st.	2.4	1250	8.7	26.6	
			1.89			52	.003	Tr. Chan.	6	350	1.0	27.6	(A)
									H=2	550	11.5		
W-4	D-Comm	7.6	2.92	.892	19.8							11.5	
W-5	"	12.9	2.38	.890	27	19.8	.004	66' st.	2.3	800	5.8	17.3	
W-6	"	21.3	2.00	.890	38	47	.003	66' st.	2.8	1250	7.4	24.7	(B)
						85							

$Q_p = 85 + 52\left(\frac{24.7}{27.6}\right) = 132 \quad T_c = 24.7$

DRAINAGE AREA	Soil & Development	A Acres	I In/hr.	C	ΔQ CFS	Σ Q CFS	SLOPE	SECTION	V FPS	L FT.	T MIN.	Σ T	REMARKS
									H=2	500	10.9		
W-7	D-Comm	6.2	3.00	.893	16.6							10.9	
W-8	"	9.2	2.50	.89	20.5	16.6	.005	66' st.	2.6	750	4.8	15.7	
W-9	"	15.8	2.02	.889	28	37	.003	66' st.	2.5	1250	8.3	24.0	(B)
						65							
												24.7	
			1.94			132	.003	Tr. Chan.	6	550	1.5	26.2	(A)

$Q_p = 132 + 65\left(\frac{1.94}{2.02}\right) = 194 \quad T_c = 26.2$ (B)

RCFC & WCD HYDROLOGY MANUAL

RATIONAL METHOD CALCULATION FORM

Sheet No. ~~3~~ 4 of ___ Sheets

PROJECT: Romoland - West of 395

Calculated by: West DATE: 4-26-83

Checked by: ________ DATE: ________

FREQUENCY: 100 yr.

DRAINAGE AREA	Soil & Development	A Acres	I In/hr.	C	ΔQ CFS	Σ Q CFS	SLOPE	SECTION	V FPS	L FT.	T MIN.	Σ T	REMARKS
W-13	D-Comm	4.7	2.70	.891	11.3				H=4	900	13.5	13.5	
						11.3	.003	66'∆	2.0	1200	10.0		
W-14	C-Comm	9.7	2.05	.886	17.6							23.5	
						29	.003	TR. CHAN.	5	500	1.7		
			1.98									25.2	(B)
									H=4	500	9.5		
W-10	D-Comm	4.1	3.22	.894	11.8							9.5	
						11.8	.003	66'∆	2	1000	8.3		
W-11	"	8.1	2.35	.89	16.9							17.8	
						29	.003	66'∆	2.2	1000	7.6		
W-12	"	11.6	1.97	.888	20.							25.4	(A)
						49							
		Qp = 49 + 29				(197/198) = 78							
												25.4	
						78	.003	TR. CHAN.	5	600	2.0		
			1.89									27.4	(A)
		Qp = 194 + 78				(262/274) = 269			Tc = 26.2				
	TRAVEL TO d/s B-4												
												26.2	
						269	.002	84"∅	7.5	3100	6.9		
			1.72									33.1	(B)

RCFC & WCD Hydrology Manual
RATIONAL METHOD CALCULATION FORM

Sheet No. 1 of __ Sheets

PROJECT Romoland - West of 395

LINE A-11

FREQUENCY 10 yr. ←

Calculated by Wust 4-25-83 DATE

Checked by ______ DATE

DRAINAGE AREA	Soil & Development	A Acres	I In/hr	C	ΔQ CFS	ΣQ CFS	SLOPE	SECTION	V FPS	L FT.	T MIN.	ΣT	REMARKS
W-1	D-Comm	5.5	1.83	.885	8.9				H=2	600	12.1	12.1	
						8.9	.004	66'st.	2.3	800	5.8		
W-2	D-Comm	8.5	1.50	.88	11.2							17.9	
						20	.003	66'st.	2.1	1250	9.9		
W-3	D-Comm	11.9	1.21	.878	12.6							27.8	
						33	.003	Tr. Chan	5.3	350	1.1	28.9	(A)
									H=2	550	11.5		
W-4	D-Comm	7.6	1.87	.887	12.6							11.5	
						12.6	.004	66'st.	2.3	800	5.8		
W-5	"	12.9	1.53	.881	17.4							17.3	
						30	.003	66'st.	2.3	1250	9.1		
W-6	"	21.3	1.24	.877	23							26.4	(B)
						53							

$$Q_P = 53 + 33\left(\frac{26.4}{28.9}\right) = 83 \qquad T_c = 26.4$$

DRAINAGE AREA	Soil & Development	A Acres	I In/hr	C	ΔQ CFS	ΣQ CFS	SLOPE	SECTION	V FPS	L FT.	T MIN.	ΣT	REMARKS
												26.4	
						83	.003	Tr. Chan	6.8	550	1.3		
			1.21									27.7	(A)
									H=2	500	10.9		
W-7	D-Comm	6.2	1.92	.888	10.6							10.9	
						10.6	.005	66'st.	2.5	750	5.0		
W-8	"	9.2	1.59	.883	12.9							15.9	
						23.5	.003	66'st.	2.1	1250	9.9		
W-9	"	15.8	1.25	.878	17.3							25.8	(B)
						41							

$$Q_P = 83 + 41\left(\frac{1.21}{1.25}\right) = 123 \qquad T_c = 27.7$$

RCFC & WCD HYDROLOGY MANUAL
RATIONAL METHOD CALCULATION FORM

Sheet No. 3 of ___ Sheets

PROJECT ______________________

FREQUENCY 10 yr.

Calculated by Dust 4-28-83 DATE

Checked by ED DATE

DRAINAGE AREA	Soil & Development	A Acres	I In/hr	C	ΔQ CFS	Σ Q CFS	SLOPE	SECTION	V FPS	L FT.	T MIN.	Σ T	REMARKS
									H=4	900	13.5		
W-13	D-Com	4.7	1.73	.885	7.2							13.5	
						7.2	.003	66' st.	1.95	1200	10.3		
W-14	C-Com	9.7	1.30	.875	11.1							23.8	
						18.3	.003	TR. CH.	4.7	500	1.7		
			1.26									25.5	(B)
									H=4	500	9.5		
W-10	D-Comm	4.1	2.06	.888	7.5							9.5	
						7.5	.003	66' st.	1.95	1000	8.5		
W-11	"	8.1	1.50	.881	10.7							18.0	
						18.2	.003	66' st	2.1	1000	7.9		
W-12	"	11.6	1.25	.878	12.7							25.9	(A)
						31							

$Q_p = 31 + 18\left(\frac{1.25}{1.26}\right) = 49$ $T_c = 25.9$

												25.9	
						49	.003	TR. CH.	5.5	600	1.8		
			1.21									27.7	

$T_A = T_B$ $Q_p = 123 + 49 = 172$ $T_c = 27.7$

TRAVEL TO d/s B-2

												27.7	
						172	.002	84" ⌀	4.5	1500	5.6		
			1.10									33.3	

Hydraulics

DUSTY.PLAN,ROMOLAND FC102.PGMET WED, JUN 1, 1983, 2:17 PM PAGE 1

PROJECT 4-6-954-00 000-0 RUN: LINE A - 12a

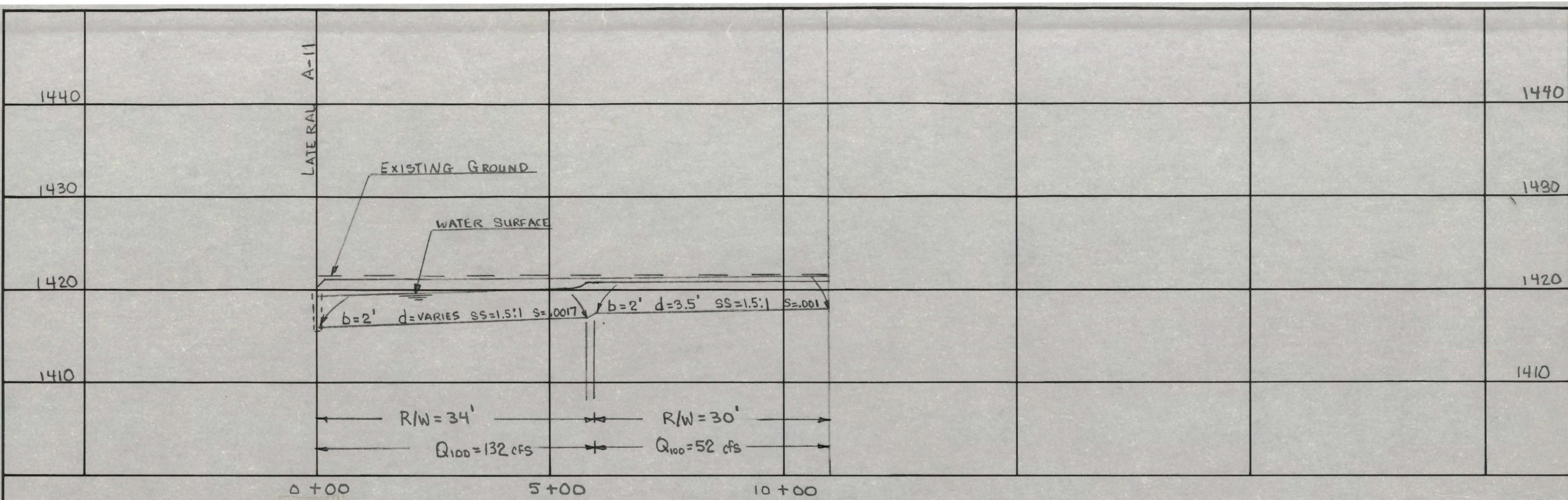
WATER SURFACE PROFILE INPUT DIRECTION = UP (SUBCRITICAL) STARTING DEPTH = 3.39

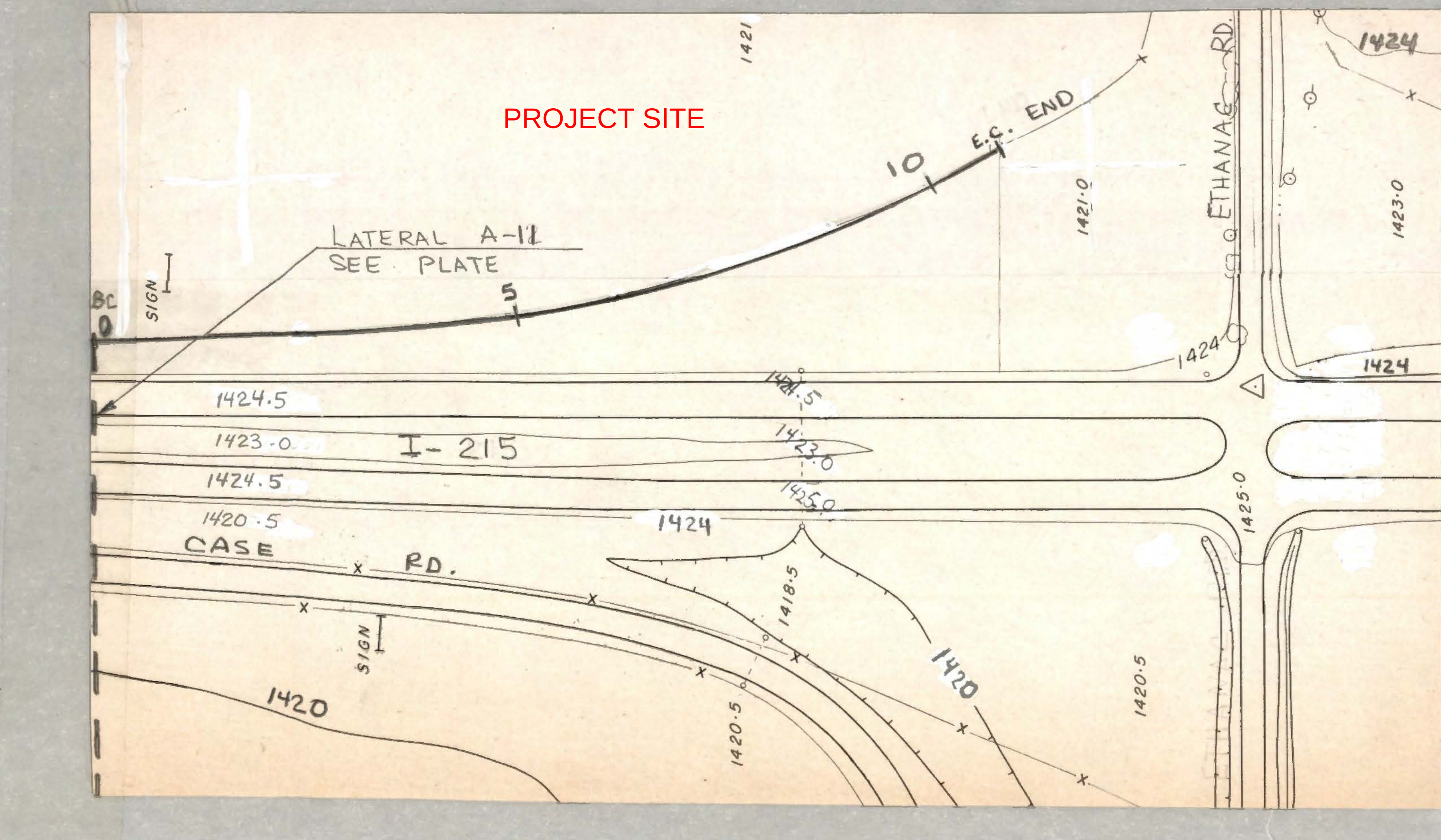
STATION	INVERT ELEV	Q	N	DIST INC	BOTTOM WIDTH	SIDE SLOPE	RADIUS (M+P)
0+00.00	1416.00	132	.015	100	2.00	1.500	-1
5+80.00	1417.00	52	.015	100	2.00	1.500	-1
6+00.00	1417.50	52	.015	100	2.00	1.500	-1
11+00.00	1418.00	52	.015	100	2.00	1.500	-1

PROJECT 4-6-954-00 000-0 RUN: LINE A - 12a

WATER SURFACE PROFILE FOR SUBCRITICAL FLOW

STATION	WATER ELEV	WATER DEPTH	INVERT ELEV	VELO	VH	CD	SUPER M+P	Q	N	BOTTOM WIDTH	SIDE SLOPE
0+00.00	1419.39	3.39	1416.00	5.5	.47	2.8	54	132	.015	2.00	1.500
1+00.00	1419.53	3.36	1416.17	5.6	.48	2.8	53				
2+00.00	1419.68	3.34	1416.34	5.6	.49	2.8	53				
3+00.00	1419.84	3.33	1416.52	5.7	.50	2.8	53				
4+00.00	1420.00	3.31	1416.69	5.7	.51	2.8	53				
5+00.00	1420.17	3.31	1416.86	5.7	.51	2.8	53				
5+80.00	1420.75	3.75	1417.00	1.8	.05	1.8	43	52	.015	2.00	1.500
6+00.00	1420.73	3.23	1417.50	2.4	.09	1.8	31	52	.015	2.00	1.500
7+00.00	1420.75	3.15	1417.60	2.5	.09	1.8	30				
8+00.00	1420.78	3.08	1417.70	2.6	.10	1.8	28				
9+00.00	1420.81	3.01	1417.80	2.7	.11	1.8	27				
10+00.00	1420.84	2.94	1417.90	2.8	.12	1.8	26				
11+00.00	1420.88	2.88	1418.00	2.9	.13	1.8	25	52	.015	2.00	1.500





HORIZ. 1"=200'
VERT. 1"=10'

NOTE: Ground line in profile was taken from orthophoto map dated Aug. 8, 1977. Plan view is from topographic map dated Feb. 25, 1959.

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

M.D.P. - ROMOLAND AREA

LATERAL A-11 A

APPROVED: CHIEF ENGINEER	DRAWN BY: D.B.
DATE:	CHECKED BY:
	DATE DRAWN: 7/12/83

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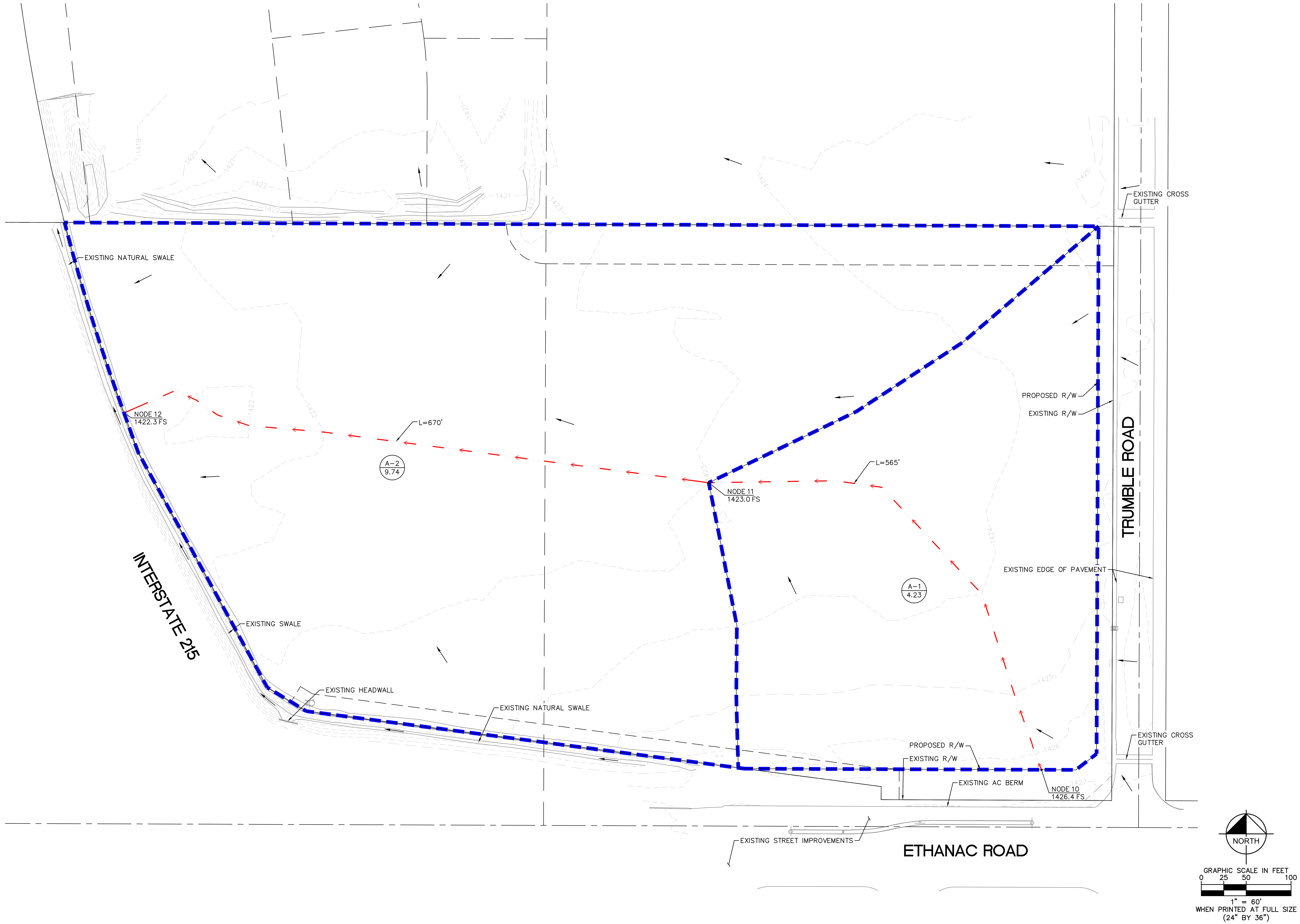
Appendix H

Drainage Maps

LEGEND

(1695)	EXISTING CONTOUR
	PROPERTY LINE
	DMA BOUNDARY
	FLOW PATH
	FLOW ARROW
NODE 10 50.00 FS	NODE ID AND ELEVATION
X XX	DA NAME DA AREA (IN ACRES)
	RIGHT OF WAY

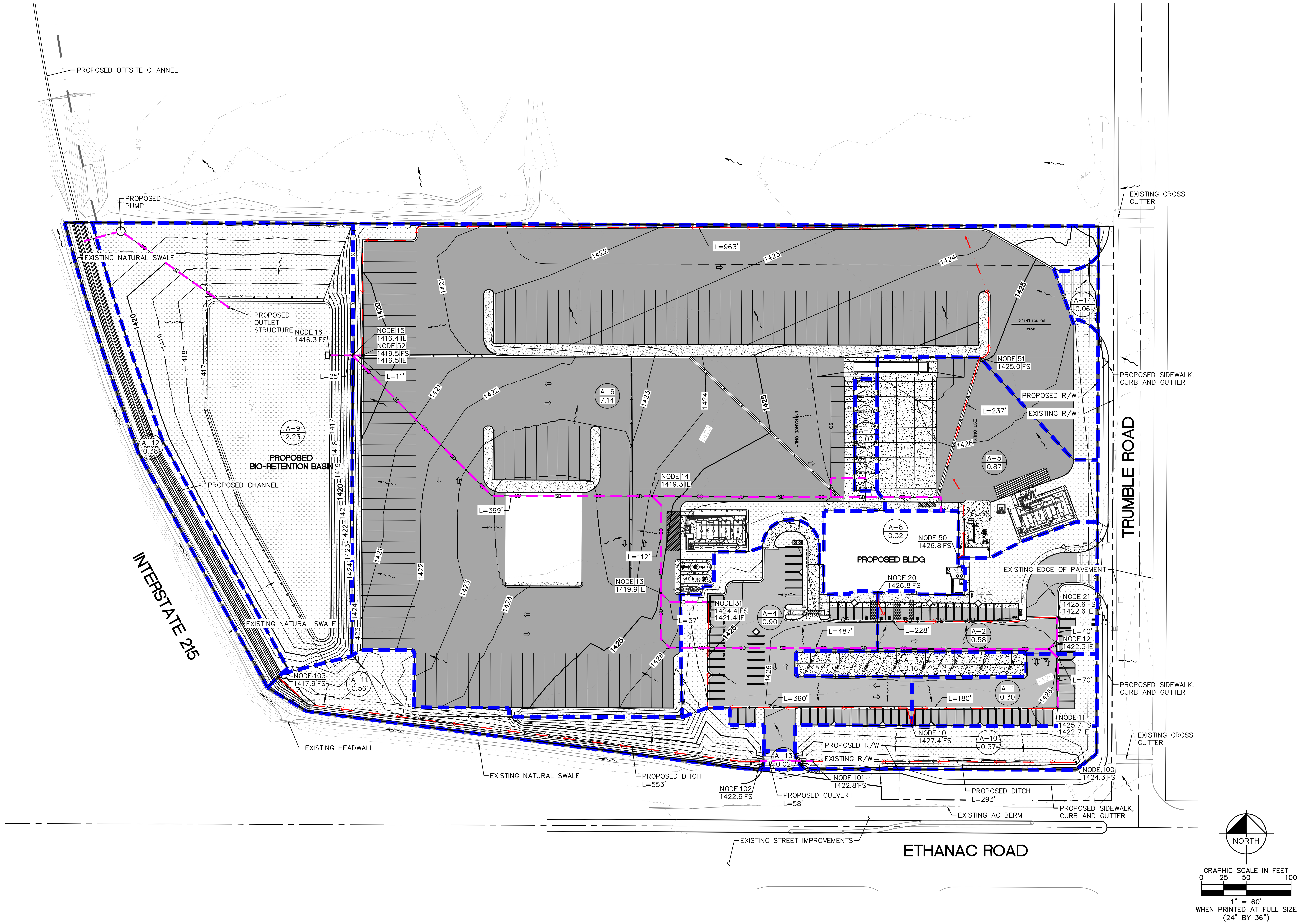


Kimley»Horn

EXISTING DRAINAGE EXHIBIT
PILOT PERRIS
12/7/2021

LEGEND

1695	PROPOSED CONTOUR
(1695)	EXISTING CONTOUR
	PROPERTY LINE
	DMA BOUNDARY
	PROPOSED STORM DRAIN
	FLOW PATH
	FLOW ARROW
NODE 10 50.00 FS	NODE ID AND ELEVATION
X	DA NAME
XX	DA AREA (IN ACRES)
	RIGHT OF WAY



Kimley»Horn

PROPOSED DRAINAGE EXHIBIT
PILOT PERRIS
3/9/2022

Appendix I

Rational Method Analysis

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
        Rational Hydrology Study        Date: 12/07/21  File:PP10E.out
------------------------------------------------------------------------
PILOT PERRIS
EXIST 10-YR
XO 12/7/21

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 6443

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [ Perris Valley ] area used.
10 year storm 10 minute intensity =  1.880(In/Hr)
10 year storm 60 minute intensity =  0.780(In/Hr)
100 year storm 10 minute intensity =  2.690(In/Hr)
100 year storm 60 minute intensity =  1.120(In/Hr)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.780(In/Hr)
Slope of intensity duration curve = 0.4900




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       11.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   565.000(Ft.)
Top (of initial area) elevation =    26.400(Ft.)
Bottom (of initial area) elevation =    23.000(Ft.)
Difference in elevation =     3.400(Ft.)
Slope =    0.00602  s(percent)=       0.60
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   18.587 min.
Rainfall intensity =      1.385(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.804
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      4.712(CFS)
Total initial stream area =        4.230(Ac.)
Pervious area fraction = 1.000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station      12.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of natural channel elevation =      23.000(Ft.)
End of natural channel elevation =      22.300(Ft.)
Length of natural channel  =   670.000(Ft.)
Estimated mean flow rate at midpoint of channel =     10.138(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   0.81(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0010
Corrected/adjusted channel slope =  0.0010
Travel time =   13.78 min.     TC =   32.36  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.778
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.056(In/Hr) for a    10.0 year storm
Subarea runoff =      8.003(CFS) for      9.740(Ac.)
Total runoff =     12.716(CFS)  Total area =      13.970(Ac.)
End of computations, total study area =           13.97 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  89.0
```

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
        Rational Hydrology Study       Date: 03/15/22  File:PP10P.out

------------------------------------------------------------------------
PILOT PERRIS
PROP 10-YR
XO 3/15/22



------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file


------------------------------------------------------------------------


Program License Serial Number 6523


------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [ Perris Valley ] area used.
10 year storm 10 minute intensity =  1.880(In/Hr)
10 year storm 60 minute intensity =  0.780(In/Hr)
100 year storm 10 minute intensity =  2.690(In/Hr)
100 year storm 60 minute intensity =  1.120(In/Hr)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.780(In/Hr)
Slope of intensity duration curve = 0.4900




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      10.000 to Point/Station      11.000
**** INITIAL AREA EVALUATION ****
```

```
Initial area flow distance =   180.000(Ft.)
Top (of initial area) elevation =    27.400(Ft.)
Bottom (of initial area) elevation =    25.700(Ft.)
Difference in elevation =     1.700(Ft.)
Slope =    0.00944  s(percent)=       0.94
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.551 min.
Rainfall intensity =      2.309(In/Hr) for a    10.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.871
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.200; Impervious fraction =  0.800
Initial subarea runoff =      0.603(CFS)
Total initial stream area =        0.300(Ac.)
Pervious area fraction = 0.200
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
```

```
Upstream point/station elevation =    22.700(Ft.)
Downstream point/station elevation =    22.300(Ft.)
Pipe length  =    70.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     0.603(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     0.603(CFS)
Normal flow depth in pipe =    4.21(In.)
Flow top width inside pipe =    8.98(In.)
Critical Depth =    4.23(In.)
Pipe flow velocity =      2.98(Ft/s)
Travel time through pipe =    0.39 min.
Time of concentration (TC) =     6.94 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       12.000
**** CONFLUENCE OF MINOR STREAMS ****
```

```
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.300(Ac.)
Runoff from this stream =      0.603(CFS)
Time of concentration =    6.94 min.
Rainfall intensity =     2.244(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      20.000 to Point/Station      21.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   228.000(Ft.)
Top (of initial area) elevation =    26.800(Ft.)
Bottom (of initial area) elevation =    25.600(Ft.)
Difference in elevation =     1.200(Ft.)
Slope =    0.00526  s(percent)=      0.53
TC = k(0.336)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.419 min.
Rainfall intensity =      2.042(In/Hr) for a    10.0 year storm
MOBILE HOME PARK subarea type
Runoff Coefficient = 0.860
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.250; Impervious fraction =  0.750
Initial subarea runoff =      1.018(CFS)
Total initial stream area =        0.580(Ac.)
Pervious area fraction = 0.250
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      21.000 to Point/Station      12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    22.600(Ft.)
Downstream point/station elevation =    22.300(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     1.018(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.018(CFS)
Normal flow depth in pipe =    5.32(In.)
Flow top width inside pipe =    8.85(In.)
Critical Depth =    5.56(In.)
Pipe flow velocity =      3.75(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =     8.60 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      12.000 to Point/Station      12.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.580(Ac.)
Runoff from this stream =      1.018(CFS)
Time of concentration =    8.60 min.
```

```
Rainfall intensity =     2.021(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        0.603      6.94                 2.244
2        1.018      8.60                 2.021
Largest stream flow has longer time of concentration
Qp =      1.018 + sum of
          Qb         Ia/Ib
           0.603 *    0.901 =      0.543
Qp =      1.561

Total of 2 streams to confluence:
Flow rates before confluence point:
       0.603       1.018
Area of streams before confluence:
        0.300       0.580
Results of confluence:
Total flow rate =      1.561(CFS)
Time of concentration =     8.597 min.
Effective stream area after confluence =      0.880(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station      13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
```

```
Upstream point/station elevation =    22.300(Ft.)
Downstream point/station elevation =    19.900(Ft.)
Pipe length  =   487.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     1.561(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     1.561(CFS)
Normal flow depth in pipe =    6.53(In.)
Flow top width inside pipe =   11.95(In.)
Critical Depth =    6.37(In.)
Pipe flow velocity =      3.57(Ft/s)
Travel time through pipe =    2.27 min.
Time of concentration (TC) =    10.87 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station      13.000
**** SUBAREA FLOW ADDITION ****
```

```
COMMERCIAL subarea type
Runoff Coefficient = 0.882
Decimal fraction soil group A = 0.000
```

```
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    10.87 min.
Rainfall intensity =      1.802(In/Hr) for a    10.0 year storm
Subarea runoff =      0.254(CFS) for      0.160(Ac.)
Total runoff =      1.816(CFS)  Total area =       1.040(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       13.000
**** CONFLUENCE OF MINOR STREAMS ****
```

```
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.040(Ac.)
Runoff from this stream =      1.816(CFS)
Time of concentration =   10.87 min.
Rainfall intensity =     1.802(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       31.000
**** INITIAL AREA EVALUATION ****
```

```
Initial area flow distance =   360.000(Ft.)
Top (of initial area) elevation =    27.400(Ft.)
Bottom (of initial area) elevation =    24.400(Ft.)
Difference in elevation =     3.000(Ft.)
Slope =    0.00833  s(percent)=       0.83
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.863 min.
Rainfall intensity =      1.991(In/Hr) for a    10.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.867
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.200; Impervious fraction =  0.800
Initial subarea runoff =      1.554(CFS)
Total initial stream area =        0.900(Ac.)
Pervious area fraction = 0.200
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.000 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
```

```
Upstream point/station elevation =    21.400(Ft.)
Downstream point/station elevation =    19.900(Ft.)
Pipe length  =    57.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     1.554(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.554(CFS)
Normal flow depth in pipe =    4.68(In.)
Flow top width inside pipe =    8.99(In.)
Critical Depth =    6.88(In.)
Pipe flow velocity =      6.69(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =     9.00 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       13.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.900(Ac.)
Runoff from this stream =      1.554(CFS)
Time of concentration =    9.00 min.
Rainfall intensity =     1.976(In/Hr)
Summary of stream data:

Stream   Flow rate      TC             Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)


1        1.816     10.87                  1.802
2        1.554      9.00                  1.976
Largest stream flow has longer time of concentration
Qp =      1.816 + sum of
          Qb         Ia/Ib
           1.554 *    0.912 =      1.417
Qp =      3.233

Total of 2 streams to confluence:
Flow rates before confluence point:
       1.816      1.554
Area of streams before confluence:
        1.040       0.900
Results of confluence:
Total flow rate =      3.233(CFS)
Time of concentration =    10.870 min.
Effective stream area after confluence =      1.940(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       14.000
```

```
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =    19.900(Ft.)
Downstream point/station elevation =    19.300(Ft.)
Pipe length  =   112.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     3.233(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.233(CFS)
Normal flow depth in pipe =    8.65(In.)
Flow top width inside pipe =   14.82(In.)
Critical Depth =    8.68(In.)
Pipe flow velocity =      4.41(Ft/s)
Travel time through pipe =    0.42 min.
Time of concentration (TC) =    11.29 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       14.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.882
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    11.29 min.
Rainfall intensity =      1.768(In/Hr) for a    10.0 year storm
Subarea runoff =      0.109(CFS) for      0.070(Ac.)
Total runoff =      3.342(CFS)  Total area =       2.010(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       14.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.882
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    11.29 min.
Rainfall intensity =      1.768(In/Hr) for a    10.0 year storm
Subarea runoff =      0.499(CFS) for      0.320(Ac.)
Total runoff =      3.841(CFS)  Total area =       2.330(Ac.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station      15.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    19.300(Ft.)
Downstream point/station elevation =    16.400(Ft.)
Pipe length  =   399.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     3.841(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.841(CFS)
Normal flow depth in pipe =    8.75(In.)
Flow top width inside pipe =   14.79(In.)
Critical Depth =    9.50(In.)
Pipe flow velocity =      5.16(Ft/s)
Travel time through pipe =    1.29 min.
Time of concentration (TC) =    12.58 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station      15.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.330(Ac.)
Runoff from this stream =      3.841(CFS)
Time of concentration =   12.58 min.
Rainfall intensity =     1.677(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.000 to Point/Station      51.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   237.000(Ft.)
Top (of initial area) elevation =    26.800(Ft.)
Bottom (of initial area) elevation =    25.000(Ft.)
Difference in elevation =     1.800(Ft.)
Slope =    0.00759  s(percent)=       0.76
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.094 min.
Rainfall intensity =      2.220(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.885
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
```

```
Initial subarea runoff =      1.710(CFS)
Total initial stream area =        0.870(Ac.)
Pervious area fraction = 0.100
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      51.000 to Point/Station      52.000
**** IMPROVED CHANNEL TRAVEL TIME ****
```

```
Upstream point elevation =    25.000(Ft.)
Downstream point elevation =    19.500(Ft.)
Channel length thru subarea  =   963.000(Ft.)
Channel base width      =    0.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank = 100.000
Estimated mean flow rate at midpoint of channel =      6.284(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =      6.284(CFS)
Depth of flow =   0.198(Ft.), Average velocity =   1.602(Ft/s)
Channel flow top width =   39.608(Ft.)
Flow Velocity =    1.60(Ft/s)
Travel time  =   10.02 min.
Time of concentration =   17.11 min.

Sub-Channel No. 1 Critical depth =      0.189(Ft.)
  '     '       '     Critical flow top width =     37.891(Ft.)
  '     '       '     Critical flow velocity=    1.751(Ft/s)
  '     '       '     Critical flow area =      3.589(Sq.Ft)

 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.879
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.442(In/Hr) for a    10.0 year storm
Subarea runoff =      9.051(CFS) for      7.140(Ac.)
Total runoff =     10.760(CFS)  Total area =       8.010(Ac.)
Depth of flow =   0.242(Ft.), Average velocity =   1.833(Ft/s)

Sub-Channel No. 1 Critical depth =      0.234(Ft.)
  '     '       '     Critical flow top width =     46.875(Ft.)
  '     '       '     Critical flow velocity=    1.959(Ft/s)
  '     '       '     Critical flow area =      5.493(Sq.Ft)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       52.000 to Point/Station       15.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    16.500(Ft.)
Downstream point/station elevation =    16.400(Ft.)
Pipe length  =    11.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    10.760(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    10.760(CFS)
Normal flow depth in pipe =   14.63(In.)
Flow top width inside pipe =   14.05(In.)
Critical Depth =   15.10(In.)
Pipe flow velocity =      7.00(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    17.14 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       15.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      8.010(Ac.)
Runoff from this stream =     10.760(CFS)
Time of concentration =   17.14 min.
Rainfall intensity =     1.441(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)      (min)                 (In/Hr)


1        3.841     12.58                 1.677
2       10.760     17.14                 1.441
Largest stream flow has longer time of concentration
Qp =     10.760 + sum of
          Qb         Ia/Ib
           3.841 *    0.859 =      3.301
Qp =     14.061

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.841      10.760
Area of streams before confluence:
        2.330        8.010
Results of confluence:
Total flow rate =     14.061(CFS)
Time of concentration =    17.137 min.
Effective stream area after confluence =     10.340(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      15.000 to Point/Station      16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    16.400(Ft.)
Downstream point/station elevation =    16.300(Ft.)
Pipe length  =    25.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    14.061(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    14.061(CFS)
Normal flow depth in pipe =   17.91(In.)
Flow top width inside pipe =   20.89(In.)
Critical Depth =   16.22(In.)
Pipe flow velocity =      5.59(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    17.21 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      16.000 to Point/Station      16.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.731
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  80.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    17.21 min.
Rainfall intensity =      1.438(In/Hr) for a    10.0 year storm
Subarea runoff =      2.343(CFS) for      2.230(Ac.)
Total runoff =     16.405(CFS)  Total area =      12.570(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      16.000 to Point/Station     103.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     12.570(Ac.)
Runoff from this stream =     16.405(CFS)
Time of concentration =   17.21 min.
Rainfall intensity =     1.438(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     100.000 to Point/Station     101.000
```

```
**** INITIAL AREA EVALUATION ****

Initial area flow distance =   293.000(Ft.)
Top (of initial area) elevation =    24.300(Ft.)
Bottom (of initial area) elevation =    22.800(Ft.)
Difference in elevation =     1.500(Ft.)
Slope =    0.00512  s(percent)=       0.51
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.763 min.
Rainfall intensity =      1.551(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.814
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.467(CFS)
Total initial stream area =        0.370(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    22.800(Ft.)
Downstream point/station elevation =    22.600(Ft.)
Pipe length  =    58.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     0.467(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     0.467(CFS)
Normal flow depth in pipe =    4.20(In.)
Flow top width inside pipe =    8.98(In.)
Critical Depth =    3.69(In.)
Pipe flow velocity =      2.31(Ft/s)
Travel time through pipe =    0.42 min.
Time of concentration (TC) =    15.18 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation =    22.600(Ft.)
Downstream point elevation =    17.900(Ft.)
Channel length thru subarea  =   553.000(Ft.)
Channel base width      =    0.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
```

```
Estimated mean flow rate at midpoint of channel =      0.783(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      0.783(CFS)
Depth of flow =   0.567(Ft.), Average velocity =   1.219(Ft/s)
Channel flow top width =    2.267(Ft.)
Flow Velocity =    1.22(Ft/s)
Travel time  =    7.56 min.
Time of concentration =   22.74 min.

Sub-Channel No. 1 Critical depth =      0.395(Ft.)
  '     '       '     Critical flow top width =      1.578(Ft.)
  '     '       '     Critical flow velocity=    2.516(Ft/s)
  '     '       '     Critical flow area =      0.311(Sq.Ft)

 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.796
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.255(In/Hr) for a    10.0 year storm
Subarea runoff =      0.559(CFS) for      0.560(Ac.)
Total runoff =      1.026(CFS)  Total area =       0.930(Ac.)
Depth of flow =   0.627(Ft.), Average velocity =   1.304(Ft/s)

Sub-Channel No. 1 Critical depth =      0.438(Ft.)
  '     '       '     Critical flow top width =      1.750(Ft.)
  '     '       '     Critical flow velocity=    2.679(Ft/s)
  '     '       '     Critical flow area =      0.383(Sq.Ft)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      16.000 to Point/Station     103.000
**** CONFLUENCE OF MINOR STREAMS ****
```

```
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.930(Ac.)
Runoff from this stream =      1.026(CFS)
Time of concentration =   22.74 min.
Rainfall intensity =     1.255(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       16.405     17.21                  1.438
```

```
2        1.026     22.74                 1.255
Largest stream flow has longer or shorter time of concentration
Qp =     16.405 + sum of
          Qa           Tb/Ta
           1.026 *    0.757 =      0.776
Qp =     17.181

Total of 2 streams to confluence:
Flow rates before confluence point:
      16.405       1.026
Area of streams before confluence:
       12.570       0.930
Results of confluence:
Total flow rate =     17.181(CFS)
Time of concentration =    17.212 min.
Effective stream area after confluence =     13.500(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      103.000
**** SUBAREA FLOW ADDITION ****
```

```
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.794
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    17.21 min.
Rainfall intensity =      1.438(In/Hr) for a    10.0 year storm
Subarea runoff =      0.434(CFS) for      0.380(Ac.)
Total runoff =     17.615(CFS)  Total area =      13.880(Ac.)
End of computations, total study area =          13.88 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.331
Area averaged RI index number =  76.7
```

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
        Rational Hydrology Study       Date: 11/30/21  File:PP100E.out
------------------------------------------------------------------------
PILOT PERRIS
EXIST 100-YR
XO 11/30/21

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 6443

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 3

Standard intensity-duration curves data (Plate D-4.1)
For the [ Perris Valley ] area used.
10 year storm 10 minute intensity =  1.880(In/Hr)
10 year storm 60 minute intensity =  0.780(In/Hr)
100 year storm 10 minute intensity =  2.690(In/Hr)
100 year storm 60 minute intensity =  1.120(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.120(In/Hr)
Slope of intensity duration curve = 0.4900




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station      11.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   565.000(Ft.)
Top (of initial area) elevation =    26.400(Ft.)
Bottom (of initial area) elevation =    23.000(Ft.)
Difference in elevation =     3.400(Ft.)
Slope =    0.00602  s(percent)=       0.60
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   18.587 min.
Rainfall intensity =      1.989(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.873
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  95.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      7.345(CFS)
Total initial stream area =        4.230(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station      12.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
```

```
____________________________________________________________________
Top of natural channel elevation =     23.000(Ft.)
End of natural channel elevation =     22.300(Ft.)
Length of natural channel  =   670.000(Ft.)
Estimated mean flow rate at midpoint of channel =     15.801(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   0.91(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0010
Corrected/adjusted channel slope =  0.0010
Travel time =   12.28 min.     TC =   30.87  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.866
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  95.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.551(In/Hr) for a   100.0 year storm
Subarea runoff =     13.080(CFS) for      9.740(Ac.)
Total runoff =     20.425(CFS)  Total area =      13.970(Ac.)
End of computations, total study area =          13.97 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  89.0
```

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                    Riverside County Rational Hydrology Program

        CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
                Rational Hydrology Study       Date: 03/15/22
File:PP100P.out

------------------------------------------------------------------------
        PILOT PERRIS
        PROP 100-YR
        XO 3/15/22



------------------------------------------------------------------------
         *********   Hydrology Study Control Information **********

         English (in-lb) Units used in input data file


------------------------------------------------------------------------


        Program License Serial Number 6523


------------------------------------------------------------------------
        Rational Method Hydrology Program based on
        Riverside County Flood Control & Water Conservation District
        1978 hydrology manual

        Storm event (year) =  100.00 Antecedent Moisture Condition = 3

        Standard intensity-duration curves data (Plate D-4.1)
        For the [ Perris Valley ] area used.
        10 year storm 10 minute intensity =  1.880(In/Hr)
        10 year storm 60 minute intensity =  0.780(In/Hr)
        100 year storm 10 minute intensity =  2.690(In/Hr)
        100 year storm 60 minute intensity =  1.120(In/Hr)

        Storm event year = 100.0
        Calculated rainfall intensity data:
        1 hour intensity =  1.120(In/Hr)
        Slope of intensity duration curve = 0.4900




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        Process from Point/Station      10.000 to Point/Station      11.000
        **** INITIAL AREA EVALUATION ****
```

```
Initial area flow distance =   180.000(Ft.)
Top (of initial area) elevation =    27.400(Ft.)
Bottom (of initial area) elevation =    25.700(Ft.)
Difference in elevation =     1.700(Ft.)
Slope =    0.00944  s(percent)=      0.94
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.551 min.
Rainfall intensity =      3.315(In/Hr) for a   100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.891
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  88.00
Pervious area fraction =  0.200; Impervious fraction =  0.800
Initial subarea runoff =      0.886(CFS)
Total initial stream area =        0.300(Ac.)
Pervious area fraction = 0.200
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station      12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
```

```
Upstream point/station elevation =    22.700(Ft.)
Downstream point/station elevation =    22.300(Ft.)
Pipe length  =    70.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     0.886(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     0.886(CFS)
Normal flow depth in pipe =    5.31(In.)
Flow top width inside pipe =    8.85(In.)
Critical Depth =    5.17(In.)
Pipe flow velocity =      3.27(Ft/s)
Travel time through pipe =    0.36 min.
Time of concentration (TC) =     6.91 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station      12.000
**** CONFLUENCE OF MINOR STREAMS ****
```

```
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.300(Ac.)
Runoff from this stream =      0.886(CFS)
Time of concentration =    6.91 min.
Rainfall intensity =     3.230(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      20.000 to Point/Station      21.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   228.000(Ft.)
Top (of initial area) elevation =    26.800(Ft.)
Bottom (of initial area) elevation =    25.600(Ft.)
Difference in elevation =     1.200(Ft.)
Slope =    0.00526  s(percent)=      0.53
TC = k(0.336)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.419 min.
Rainfall intensity =      2.932(In/Hr) for a   100.0 year storm
MOBILE HOME PARK subarea type
Runoff Coefficient = 0.887
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  88.00
Pervious area fraction =  0.250; Impervious fraction =  0.750
Initial subarea runoff =      1.508(CFS)
Total initial stream area =       0.580(Ac.)
Pervious area fraction = 0.250
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      21.000 to Point/Station      12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    22.600(Ft.)
Downstream point/station elevation =    22.300(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     1.508(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.508(CFS)
Normal flow depth in pipe =    7.16(In.)
Flow top width inside pipe =    7.26(In.)
Critical Depth =    6.79(In.)
Pipe flow velocity =      4.00(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =     8.59 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      12.000 to Point/Station      12.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.580(Ac.)
Runoff from this stream =      1.508(CFS)
```

```
Time of concentration =    8.59 min.
Rainfall intensity =     2.904(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        0.886      6.91                 3.230
2        1.508      8.59                 2.904
Largest stream flow has longer time of concentration
Qp =      1.508 + sum of
          Qb         Ia/Ib
           0.886 *    0.899 =      0.796
Qp =      2.304

Total of 2 streams to confluence:
Flow rates before confluence point:
       0.886       1.508
Area of streams before confluence:
        0.300       0.580
Results of confluence:
Total flow rate =      2.304(CFS)
Time of concentration =     8.586 min.
Effective stream area after confluence =      0.880(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    22.300(Ft.)
Downstream point/station elevation =    19.900(Ft.)
Pipe length  =   487.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     2.304(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.304(CFS)
Normal flow depth in pipe =    8.51(In.)
Flow top width inside pipe =   10.90(In.)
Critical Depth =    7.79(In.)
Pipe flow velocity =      3.87(Ft/s)
Travel time through pipe =    2.10 min.
Time of concentration (TC) =    10.68 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       13.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.894
```

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  88.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    10.68 min.
Rainfall intensity =      2.609(In/Hr) for a   100.0 year storm
Subarea runoff =      0.373(CFS) for      0.160(Ac.)
Total runoff =      2.678(CFS)  Total area =       1.040(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       13.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.040(Ac.)
Runoff from this stream =      2.678(CFS)
Time of concentration =   10.68 min.
Rainfall intensity =     2.609(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       31.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   360.000(Ft.)
Top (of initial area) elevation =    27.400(Ft.)
Bottom (of initial area) elevation =    24.400(Ft.)
Difference in elevation =     3.000(Ft.)
Slope =    0.00833  s(percent)=       0.83
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.863 min.
Rainfall intensity =      2.859(In/Hr) for a   100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.889
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  88.00
Pervious area fraction =  0.200; Impervious fraction =  0.800
Initial subarea runoff =      2.288(CFS)
Total initial stream area =        0.900(Ac.)
Pervious area fraction = 0.200


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.000 to Point/Station       13.000
```

```
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    21.400(Ft.)
Downstream point/station elevation =    19.900(Ft.)
Pipe length  =    57.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     2.288(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.288(CFS)
Normal flow depth in pipe =    6.02(In.)
Flow top width inside pipe =    8.47(In.)
Critical Depth =    8.09(In.)
Pipe flow velocity =      7.29(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =     8.99 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       13.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.900(Ac.)
Runoff from this stream =      2.288(CFS)
Time of concentration =    8.99 min.
Rainfall intensity =     2.839(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        2.678     10.68                 2.609
2        2.288      8.99                 2.839
Largest stream flow has longer time of concentration
Qp =      2.678 + sum of
          Qb         Ia/Ib
           2.288 *    0.919 =      2.103
Qp =      4.781

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.678       2.288
Area of streams before confluence:
        1.040       0.900
Results of confluence:
Total flow rate =      4.781(CFS)
Time of concentration =    10.681 min.
Effective stream area after confluence =      1.940(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

```
Process from Point/Station      13.000 to Point/Station      14.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
```

```
Upstream point/station elevation =    19.900(Ft.)
Downstream point/station elevation =    19.300(Ft.)
Pipe length  =   112.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     4.781(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.781(CFS)
Normal flow depth in pipe =   11.48(In.)
Flow top width inside pipe =   12.71(In.)
Critical Depth =   10.63(In.)
Pipe flow velocity =      4.74(Ft/s)
Travel time through pipe =    0.39 min.
Time of concentration (TC) =    11.07 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      14.000
**** SUBAREA FLOW ADDITION ****
```

```
COMMERCIAL subarea type
Runoff Coefficient = 0.894
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  88.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    11.07 min.
Rainfall intensity =      2.563(In/Hr) for a   100.0 year storm
Subarea runoff =      0.160(CFS) for      0.070(Ac.)
Total runoff =      4.941(CFS)  Total area =       2.010(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      14.000
**** SUBAREA FLOW ADDITION ****
```

```
COMMERCIAL subarea type
Runoff Coefficient = 0.894
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  88.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    11.07 min.
Rainfall intensity =      2.563(In/Hr) for a   100.0 year storm
Subarea runoff =      0.733(CFS) for      0.320(Ac.)
Total runoff =      5.674(CFS)  Total area =       2.330(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      15.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    19.300(Ft.)
Downstream point/station elevation =    16.400(Ft.)
Pipe length  =   399.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     5.674(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.674(CFS)
Normal flow depth in pipe =   11.68(In.)
Flow top width inside pipe =   12.45(In.)
Critical Depth =   11.58(In.)
Pipe flow velocity =      5.53(Ft/s)
Travel time through pipe =    1.20 min.
Time of concentration (TC) =    12.28 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      15.000 to Point/Station      15.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.330(Ac.)
Runoff from this stream =      5.674(CFS)
Time of concentration =   12.28 min.
Rainfall intensity =     2.437(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      50.000 to Point/Station      51.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   237.000(Ft.)
Top (of initial area) elevation =    26.800(Ft.)
Bottom (of initial area) elevation =    25.000(Ft.)
Difference in elevation =     1.800(Ft.)
Slope =    0.00759  s(percent)=       0.76
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.094 min.
Rainfall intensity =      3.188(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.895
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  88.00
```

```
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.483(CFS)
Total initial stream area =        0.870(Ac.)
Pervious area fraction = 0.100
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       51.000 to Point/Station      52.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =    25.000(Ft.)
Downstream point elevation =    19.500(Ft.)
Channel length thru subarea  =   963.000(Ft.)
Channel base width      =    0.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank = 100.000
Estimated mean flow rate at midpoint of channel =      9.305(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =      9.305(CFS)
Depth of flow =   0.229(Ft.), Average velocity =   1.768(Ft/s)
Channel flow top width =   45.888(Ft.)
Flow Velocity =    1.77(Ft/s)
Travel time  =    9.08 min.
Time of concentration =   16.17 min.

Sub-Channel No. 1 Critical depth =      0.223(Ft.)
  '     '       '     Critical flow top width =     44.531(Ft.)
  '     '       '     Critical flow velocity=    1.877(Ft/s)
  '     '       '     Critical flow area =      4.958(Sq.Ft)

 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.893
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  88.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      2.129(In/Hr) for a   100.0 year storm
Subarea runoff =     13.573(CFS) for      7.140(Ac.)
Total runoff =     16.056(CFS)  Total area =       8.010(Ac.)
Depth of flow =   0.282(Ft.), Average velocity =   2.026(Ft/s)

Sub-Channel No. 1 Critical depth =      0.275(Ft.)
  '     '       '     Critical flow top width =     55.078(Ft.)
  '     '       '     Critical flow velocity=    2.117(Ft/s)
  '     '       '     Critical flow area =      7.584(Sq.Ft)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       52.000 to Point/Station       15.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    16.500(Ft.)
Downstream point/station elevation =    16.400(Ft.)
Pipe length  =    11.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    16.056(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    16.056(CFS)
Normal flow depth in pipe =   16.88(In.)
Flow top width inside pipe =   16.69(In.)
Critical Depth =   17.74(In.)
Pipe flow velocity =      7.76(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    16.20 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       15.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      8.010(Ac.)
Runoff from this stream =     16.056(CFS)
Time of concentration =   16.20 min.
Rainfall intensity =     2.128(In/Hr)
Summary of stream data:

Stream   Flow rate      TC             Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)


1         5.674     12.28                  2.437
2        16.056     16.20                  2.128
Largest stream flow has longer time of concentration
Qp =     16.056 + sum of
          Qb          Ia/Ib
           5.674 *    0.873 =      4.954
Qp =     21.010

Total of 2 streams to confluence:
Flow rates before confluence point:
       5.674      16.056
Area of streams before confluence:
        2.330        8.010
Results of confluence:
Total flow rate =     21.010(CFS)
Time of concentration =    16.198 min.
Effective stream area after confluence =     10.340(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      15.000 to Point/Station      16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    16.400(Ft.)
Downstream point/station elevation =    16.300(Ft.)
Pipe length  =    25.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    21.010(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    21.010(CFS)
Normal flow depth in pipe =   21.89(In.)
Flow top width inside pipe =   21.15(In.)
Critical Depth =   19.26(In.)
Pipe flow velocity =      6.08(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    16.27 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      16.000 to Point/Station      16.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.847
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  91.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    16.27 min.
Rainfall intensity =      2.123(In/Hr) for a   100.0 year storm
Subarea runoff =      4.012(CFS) for      2.230(Ac.)
Total runoff =     25.022(CFS)  Total area =      12.570(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      16.000 to Point/Station     103.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     12.570(Ac.)
Runoff from this stream =     25.022(CFS)
Time of concentration =   16.27 min.
Rainfall intensity =     2.123(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

```
Process from Point/Station      100.000 to Point/Station      101.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   293.000(Ft.)
Top (of initial area) elevation =    24.300(Ft.)
Bottom (of initial area) elevation =    22.800(Ft.)
Difference in elevation =     1.500(Ft.)
Slope =    0.00512  s(percent)=       0.51
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.763 min.
Rainfall intensity =      2.226(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  95.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.722(CFS)
Total initial stream area =        0.370(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    22.800(Ft.)
Downstream point/station elevation =    22.600(Ft.)
Pipe length  =    58.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     0.722(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     0.722(CFS)
Normal flow depth in pipe =    5.47(In.)
Flow top width inside pipe =    8.79(In.)
Critical Depth =    4.64(In.)
Pipe flow velocity =      2.57(Ft/s)
Travel time through pipe =    0.38 min.
Time of concentration (TC) =    15.14 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =    22.600(Ft.)
Downstream point elevation =    17.900(Ft.)
Channel length thru subarea  =   553.000(Ft.)
Channel base width      =    0.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
```

```
Slope or 'Z' of right channel bank =   2.000
Estimated mean flow rate at midpoint of channel =      1.219(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      1.219(CFS)
Depth of flow =   0.669(Ft.), Average velocity =   1.362(Ft/s)
Channel flow top width =    2.676(Ft.)
Flow Velocity =    1.36(Ft/s)
Travel time  =    6.77 min.
Time of concentration =   21.91 min.

Sub-Channel No. 1 Critical depth =      0.469(Ft.)
  '     '       '     Critical flow top width =      1.875(Ft.)
  '     '       '     Critical flow velocity=    2.773(Ft/s)
  '     '       '     Critical flow area =      0.439(Sq.Ft)

 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.871
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  95.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.835(In/Hr) for a   100.0 year storm
Subarea runoff =      0.895(CFS) for      0.560(Ac.)
Total runoff =      1.616(CFS)  Total area =       0.930(Ac.)
Depth of flow =   0.744(Ft.), Average velocity =   1.461(Ft/s)

Sub-Channel No. 1 Critical depth =      0.527(Ft.)
  '     '       '     Critical flow top width =      2.109(Ft.)
  '     '       '     Critical flow velocity=    2.906(Ft/s)
  '     '       '     Critical flow area =      0.556(Sq.Ft)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      16.000 to Point/Station     103.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.930(Ac.)
Runoff from this stream =      1.616(CFS)
Time of concentration =   21.91 min.
Rainfall intensity =     1.835(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)
```

```
1       25.022     16.27                 2.123
2        1.616     21.91                 1.835
Largest stream flow has longer or shorter time of concentration
Qp =     25.022 + sum of
          Qa          Tb/Ta
           1.616 *    0.743 =      1.200
Qp =     26.222

Total of 2 streams to confluence:
Flow rates before confluence point:
      25.022      1.616
Area of streams before confluence:
       12.570       0.930
Results of confluence:
Total flow rate =     26.222(CFS)
Time of concentration =    16.267 min.
Effective stream area after confluence =     13.500(Ac.)



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      103.000
**** SUBAREA FLOW ADDITION ****

SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.865
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 3)  =  88.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    16.27 min.
Rainfall intensity =      2.123(In/Hr) for a   100.0 year storm
Subarea runoff =      0.697(CFS) for      0.380(Ac.)
Total runoff =     26.920(CFS)  Total area =      13.880(Ac.)
End of computations, total study area =          13.88 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.331
Area averaged RI index number =  76.7
```

Appendix J

Synthetic Unit Hydrograph Method Analysis

```
        U n i t   H y d r o g r a p h   A n a l y s i s

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0
                Study date  12/07/21 File: PP1EUH1100.out

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6443

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
PILOT PERRIS
EXIST 100-YR
XO 12/7/21

--------------------------------------------------------------------
Drainage Area =      13.97(Ac.)  =      0.022 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      13.97(Ac.)  =      0.022 Sq. Mi.
USER Entry of lag time in hours
Lag time =    0.412 Hr.
Lag time =    24.70 Min.
25% of lag time =     6.17 Min.
40% of lag time =     9.88 Min.
Unit time =     5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       13.97            0.51                    7.07

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       13.97            1.59                   22.21

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    0.506(In)
Area Averaged 100-Year Rainfall =    1.590(In)

Point rain (area averaged) =    1.590(In)
Areal adjustment factor =   99.99 %
Adjusted average point rain =    1.590(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
    13.970           89.00         0.000
 Total Area Entered =     13.97(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-3     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
89.0  95.6      0.057     0.000        0.057       1.000      0.057
                                                  Sum (F) =   0.057
Area averaged mean soil loss (F) (In/Hr) =  0.057
Minimum soil loss rate ((In/Hr)) =  0.029
```

(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

Slope of intensity-duration curve for a 1 hour storm =0.5000

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	20.246	1.800	0.253
2	0.167	40.492	5.274	0.743
3	0.250	60.739	9.202	1.296
4	0.333	80.985	12.874	1.813
5	0.417	101.231	14.440	2.033
6	0.500	121.477	12.268	1.727
7	0.583	141.723	8.222	1.158
8	0.667	161.970	5.694	0.802
9	0.750	182.216	3.995	0.562
10	0.833	202.462	3.093	0.435
11	0.917	222.708	2.648	0.373
12	1.000	242.954	2.270	0.320
13	1.083	263.201	1.976	0.278
14	1.167	283.447	1.768	0.249
15	1.250	303.693	1.509	0.212
16	1.333	323.939	1.296	0.182
17	1.417	344.185	1.215	0.171
18	1.500	364.431	1.132	0.159
19	1.583	384.678	0.904	0.127
20	1.667	404.924	0.884	0.124
21	1.750	425.170	0.717	0.101
22	1.833	445.416	0.648	0.091
23	1.917	465.662	0.636	0.090
24	2.000	485.909	0.608	0.086
25	2.083	506.155	0.600	0.084
26	2.167	526.401	0.485	0.068
27	2.250	546.647	0.445	0.063
28	2.333	566.893	0.417	0.059
29	2.417	587.140	0.366	0.051
30	2.500	607.386	0.359	0.051
31	2.583	627.632	0.300	0.042
32	2.667	647.878	0.283	0.040
33	2.750	668.124	0.251	0.035
34	2.833	688.371	0.203	0.029
35	2.917	708.617	0.202	0.029
36	3.000	728.863	0.202	0.029
37	3.083	749.109	0.202	0.029
38	3.167	769.355	0.202	0.029
39	3.250	789.602	0.202	0.029
40	3.333	809.848	0.205	0.029
			Sum = 100.000	Sum= 14.079

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	4.20	0.801	0.057	(0.721)	0.744
2	0.17	4.30	0.820	0.057	(0.738)	0.763
3	0.25	5.00	0.954	0.057	(0.858)	0.897
4	0.33	5.00	0.954	0.057	(0.858)	0.897
5	0.42	5.80	1.106	0.057	(0.996)	1.049
6	0.50	6.50	1.240	0.057	(1.116)	1.183
7	0.58	7.40	1.412	0.057	(1.271)	1.355
8	0.67	8.60	1.641	0.057	(1.477)	1.583
9	0.75	12.30	2.347	0.057	(2.112)	2.289
10	0.83	29.10	5.552	0.057	(4.996)	5.494

```
11   0.92     6.80      1.297         0.057    (  1.168)        1.240
12   1.00     5.00      0.954         0.057    (  0.858)        0.897
               (Loss Rate Not Used)
   Sum =     100.0                                  Sum =    18.4
      Flood volume = Effective rainfall      1.53(In)
       times area      14.0(Ac.)/[(In)/(Ft.)] =      1.8(Ac.Ft)
      Total soil loss =      0.06(In)
      Total soil loss =     0.067(Ac.Ft)
      Total rainfall =      1.59(In)
      Flood volume =       77719.8 Cubic Feet
      Total soil loss =       2900.7 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =     23.915(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          1 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        7.5      15.0      22.5      30.0
-----------------------------------------------------------------------
  0+ 5       0.0013      0.19  Q         |         |         |         |
  0+10       0.0064      0.75  Q         |         |         |         |
  0+15       0.0186      1.76  V Q       |         |         |         |
  0+20       0.0408      3.23  V   Q     |         |         |         |
  0+25       0.0752      4.99  |V    Q   |         |         |         |
  0+30       0.1214      6.71  | V     Q |         |         |         |
  0+35       0.1779      8.21  |  V      Q         |         |         |
  0+40       0.2447      9.70  |    V    | Q       |         |         |
  0+45       0.3233     11.41  |      V  |    Q    |         |         |
  0+50       0.4220     14.33  |        V|        Q|         |         |
  0+55       0.5466     18.08  |         | V       |   Q     |         |
  1+ 0       0.6954     21.61  |         |    V    |       Q |         |
  1+ 5       0.8601     23.92  |         |        V|         |Q        |
  1+10       1.0227     23.61  |         |         | V       |Q        |
  1+15       1.1613     20.12  |         |         |     Q   |         |
  1+20       1.2659     15.20  |         |         Q       V |         |
  1+25       1.3432     11.23  |         |   Q     |         V         |
  1+30       1.4007      8.34  |         |Q        |         |V        |
  1+35       1.4461      6.60  |       Q |         |         | V       |
  1+40       1.4842      5.53  |      Q  |         |         |  V      |
  1+45       1.5170      4.75  |     Q   |         |         |   V     |
  1+50       1.5456      4.15  |    Q    |         |         |   V     |
  1+55       1.5709      3.67  |   Q     |         |         |    V    |
  2+ 0       1.5930      3.22  |   Q     |         |         |    V    |
  2+ 5       1.6126      2.85  |  Q      |         |         |     V   |
  2+10       1.6304      2.58  |  Q      |         |         |     V   |
  2+15       1.6465      2.33  |  Q      |         |         |     V   |
  2+20       1.6606      2.04  | Q       |         |         |      V  |
  2+25       1.6734      1.87  | Q       |         |         |      V  |
  2+30       1.6848      1.65  | Q       |         |         |      V  |
  2+35       1.6952      1.51  | Q       |         |         |       V |
  2+40       1.7049      1.41  |Q        |         |         |       V |
  2+45       1.7139      1.31  |Q        |         |         |       V |
  2+50       1.7224      1.22  |Q        |         |         |       V |
  2+55       1.7298      1.08  |Q        |         |         |       V |
  3+ 0       1.7365      0.98  |Q        |         |         |       V |
  3+ 5       1.7427      0.90  |Q        |         |         |        V|
  3+10       1.7483      0.81  |Q        |         |         |        V|
  3+15       1.7536      0.76  |Q        |         |         |        V|
  3+20       1.7583      0.69  Q         |         |         |        V|
  3+25       1.7625      0.62  Q         |         |         |        V|
  3+30       1.7663      0.55  Q         |         |         |        V|
  3+35       1.7696      0.48  Q         |         |         |        V|
  3+40       1.7726      0.44  Q         |         |         |        V|
  3+45       1.7753      0.40  Q         |         |         |        V|
  3+50       1.7779      0.37  Q         |         |         |        V|
  3+55       1.7801      0.33  Q         |         |         |        V|
  4+ 0       1.7821      0.28  Q         |         |         |        V|
  4+ 5       1.7836      0.22  Q         |         |         |        V|
  4+10       1.7840      0.06  Q         |         |         |        V|
```

```
    4+15       1.7842      0.03  Q         |         |         |        V|
-----------------------------------------------------------------------
```

```
        U n i t   H y d r o g r a p h   A n a l y s i s

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                Study date  12/07/21 File: PP1EUH3100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6443

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
PILOT PERRIS
EXIST 100-YR
XO 12/7/21

--------------------------------------------------------------------
Drainage Area =      13.97(Ac.)  =      0.022 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      13.97(Ac.)  =      0.022 Sq. Mi.
USER Entry of lag time in hours
Lag time =    0.412 Hr.
Lag time =    24.70 Min.
25% of lag time =     6.17 Min.
40% of lag time =     9.88 Min.
Unit time =     5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       13.97            0.85                  11.90

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       13.97            2.23                  31.15

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    0.852(In)
Area Averaged 100-Year Rainfall =    2.230(In)

Point rain (area averaged) =    2.230(In)
Areal adjustment factor =   99.99 %
Adjusted average point rain =    2.230(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
    13.970           89.00        0.000
 Total Area Entered =     13.97(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-3     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
89.0  95.6      0.057     0.000        0.057       1.000      0.057
                                                  Sum (F) =   0.057
Area averaged mean soil loss (F) (In/Hr) =  0.057
Minimum soil loss rate ((In/Hr)) =  0.029
```

(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	20.246	1.800	0.253
2	0.167	40.492	5.274	0.743
3	0.250	60.739	9.202	1.296
4	0.333	80.985	12.874	1.813
5	0.417	101.231	14.440	2.033
6	0.500	121.477	12.268	1.727
7	0.583	141.723	8.222	1.158
8	0.667	161.970	5.694	0.802
9	0.750	182.216	3.995	0.562
10	0.833	202.462	3.093	0.435
11	0.917	222.708	2.648	0.373
12	1.000	242.954	2.270	0.320
13	1.083	263.201	1.976	0.278
14	1.167	283.447	1.768	0.249
15	1.250	303.693	1.509	0.212
16	1.333	323.939	1.296	0.182
17	1.417	344.185	1.215	0.171
18	1.500	364.431	1.132	0.159
19	1.583	384.678	0.904	0.127
20	1.667	404.924	0.884	0.124
21	1.750	425.170	0.717	0.101
22	1.833	445.416	0.648	0.091
23	1.917	465.662	0.636	0.090
24	2.000	485.909	0.608	0.086
25	2.083	506.155	0.600	0.084
26	2.167	526.401	0.485	0.068
27	2.250	546.647	0.445	0.063
28	2.333	566.893	0.417	0.059
29	2.417	587.140	0.366	0.051
30	2.500	607.386	0.359	0.051
31	2.583	627.632	0.300	0.042
32	2.667	647.878	0.283	0.040
33	2.750	668.124	0.251	0.035
34	2.833	688.371	0.203	0.029
35	2.917	708.617	0.202	0.029
36	3.000	728.863	0.202	0.029
37	3.083	749.109	0.202	0.029
38	3.167	769.355	0.202	0.029
39	3.250	789.602	0.202	0.029
40	3.333	809.848	0.205	0.029
			Sum = 100.000	Sum= 14.079

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	1.30	0.348	0.057	(0.313)	0.291
2	0.17	1.30	0.348	0.057	(0.313)	0.291
3	0.25	1.10	0.294	0.057	(0.265)	0.237
4	0.33	1.50	0.401	0.057	(0.361)	0.344
5	0.42	1.50	0.401	0.057	(0.361)	0.344
6	0.50	1.80	0.482	0.057	(0.433)	0.424
7	0.58	1.50	0.401	0.057	(0.361)	0.344
8	0.67	1.80	0.482	0.057	(0.433)	0.424
9	0.75	1.80	0.482	0.057	(0.433)	0.424
10	0.83	1.50	0.401	0.057	(0.361)	0.344
11	0.92	1.60	0.428	0.057	(0.385)	0.371
12	1.00	1.80	0.482	0.057	(0.433)	0.424

```
13   1.08     2.20      0.589          0.057    (  0.530)        0.531
14   1.17     2.20      0.589          0.057    (  0.530)        0.531
15   1.25     2.20      0.589          0.057    (  0.530)        0.531
16   1.33     2.00      0.535          0.057    (  0.482)        0.478
17   1.42     2.60      0.696          0.057    (  0.626)        0.639
18   1.50     2.70      0.722          0.057    (  0.650)        0.665
19   1.58     2.40      0.642          0.057    (  0.578)        0.585
20   1.67     2.70      0.722          0.057    (  0.650)        0.665
21   1.75     3.30      0.883          0.057    (  0.795)        0.826
22   1.83     3.10      0.830          0.057    (  0.747)        0.772
23   1.92     2.90      0.776          0.057    (  0.698)        0.719
24   2.00     3.00      0.803          0.057    (  0.722)        0.746
25   2.08     3.10      0.830          0.057    (  0.747)        0.772
26   2.17     4.20      1.124          0.057    (  1.011)        1.067
27   2.25     5.00      1.338          0.057    (  1.204)        1.281
28   2.33     3.50      0.937          0.057    (  0.843)        0.879
29   2.42     6.80      1.820          0.057    (  1.638)        1.762
30   2.50     7.30      1.953          0.057    (  1.758)        1.896
31   2.58     8.20      2.194          0.057    (  1.975)        2.137
32   2.67     5.90      1.579          0.057    (  1.421)        1.522
33   2.75     2.00      0.535          0.057    (  0.482)        0.478
34   2.83     1.80      0.482          0.057    (  0.433)        0.424
35   2.92     1.80      0.482          0.057    (  0.433)        0.424
36   3.00     0.60      0.161          0.057    (  0.144)        0.103
              (Loss Rate Not Used)
   Sum =     100.0                                   Sum =    24.7
      Flood volume = Effective rainfall      2.06(In)
       times area      14.0(Ac.)/[(In)/(Ft.)] =       2.4(Ac.Ft)
      Total soil loss =      0.17(In)
      Total soil loss =     0.200(Ac.Ft)
      Total rainfall =      2.23(In)
      Flood volume =      104376.8 Cubic Feet
      Total soil loss =        8702.0 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =     18.074(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          3 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5       0.0005      0.07  Q         |         |         |         |
  0+10       0.0025      0.29  Q         |         |         |         |
  0+15       0.0070      0.65  VQ        |         |         |         |
  0+20       0.0150      1.17  V Q       |         |         |         |
  0+25       0.0272      1.77  V  Q      |         |         |         |
  0+30       0.0433      2.33  V   Q     |         |         |         |
  0+35       0.0625      2.79  |V   Q    |         |         |         |
  0+40       0.0847      3.22  |V    Q   |         |         |         |
  0+45       0.1095      3.61  |V     Q  |         |         |         |
  0+50       0.1365      3.91  | V    Q  |         |         |         |
  0+55       0.1650      4.15  | V     Q |         |         |         |
  1+ 0       0.1948      4.32  |  V    Q |         |         |         |
  1+ 5       0.2258      4.50  |  V    Q |         |         |         |
  1+10       0.2581      4.70  |   V    Q|         |         |         |
  1+15       0.2925      4.99  |   V    Q|         |         |         |
  1+20       0.3293      5.34  |    V    Q         |         |         |
  1+25       0.3686      5.71  |     V   |Q        |         |         |
  1+30       0.4105      6.08  |     V   | Q       |         |         |
  1+35       0.4546      6.41  |      V  | Q       |         |         |
  1+40       0.5011      6.75  |       V |  Q      |         |         |
  1+45       0.5503      7.15  |        V|   Q     |         |         |
  1+50       0.6026      7.59  |         V    Q    |         |         |
  1+55       0.6577      8.01  |         V     Q   |         |         |
  2+ 0       0.7158      8.43  |         |V    Q   |         |         |
  2+ 5       0.7766      8.83  |         | V    Q  |         |         |
  2+10       0.8398      9.18  |         |   V   Q |         |         |
  2+15       0.9063      9.66  |         |    V   Q|         |         |
  2+20       0.9771     10.28  |         |     V   Q         |         |
```

```
    2+25       1.0542     11.20 |         |      V  | Q       |         |
    2+30       1.1404     12.51 |         |        V|    Q    |         |
    2+35       1.2379     14.16 |         |         V       Q |         |
    2+40       1.3479     15.96 |         |         | V       |Q        |
    2+45       1.4682     17.47 |         |         |   V     |   Q     |
    2+50       1.5927     18.07 |         |         |     V   |     Q   |
    2+55       1.7119     17.31 |         |         |       V |   Q     |
    3+ 0       1.8174     15.33 |         |         |         Q         |
    3+ 5       1.9051     12.73 |         |         |    Q    |V        |
    3+10       1.9761     10.31 |         |         Q         | V       |
    3+15       2.0338      8.38 |         |     Q   |         |  V      |
    3+20       2.0805      6.78 |         |  Q      |         |   V     |
    3+25       2.1186      5.53 |         |Q        |         |    V    |
    3+30       2.1505      4.63 |        Q|         |         |    V    |
    3+35       2.1778      3.97 |      Q  |         |         |     V   |
    3+40       2.2017      3.46 |     Q   |         |         |     V   |
    3+45       2.2227      3.06 |     Q   |         |         |      V  |
    3+50       2.2414      2.71 |    Q    |         |         |      V  |
    3+55       2.2581      2.42 |   Q     |         |         |      V  |
    4+ 0       2.2731      2.18 |   Q     |         |         |      V  |
    4+ 5       2.2864      1.94 |  Q      |         |         |       V |
    4+10       2.2984      1.74 |  Q      |         |         |       V |
    4+15       2.3092      1.57 |  Q      |         |         |       V |
    4+20       2.3190      1.42 | Q       |         |         |       V |
    4+25       2.3280      1.30 | Q       |         |         |       V |
    4+30       2.3362      1.19 | Q       |         |         |       V |
    4+35       2.3436      1.08 | Q       |         |         |        V|
    4+40       2.3503      0.98 |Q        |         |         |        V|
    4+45       2.3564      0.88 |Q        |         |         |        V|
    4+50       2.3618      0.79 |Q        |         |         |        V|
    4+55       2.3667      0.71 |Q        |         |         |        V|
    5+ 0       2.3711      0.64 |Q        |         |         |        V|
    5+ 5       2.3750      0.57 |Q        |         |         |        V|
    5+10       2.3785      0.50 |Q        |         |         |        V|
    5+15       2.3815      0.45 Q         |         |         |        V|
    5+20       2.3843      0.40 Q         |         |         |        V|
    5+25       2.3867      0.36 Q         |         |         |        V|
    5+30       2.3890      0.32 Q         |         |         |        V|
    5+35       2.3909      0.28 Q         |         |         |        V|
    5+40       2.3926      0.25 Q         |         |         |        V|
    5+45       2.3940      0.20 Q         |         |         |        V|
    5+50       2.3950      0.15 Q         |         |         |        V|
    5+55       2.3956      0.08 Q         |         |         |        V|
    6+ 0       2.3958      0.04 Q         |         |         |        V|
    6+ 5       2.3960      0.03 Q         |         |         |        V|
    6+10       2.3961      0.02 Q         |         |         |        V|
    6+15       2.3962      0.00 Q         |         |         |         V
-----------------------------------------------------------------------
```

```
        U n i t   H y d r o g r a p h   A n a l y s i s

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                Study date  12/07/21 File: PP1EUH6100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6443

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
PILOT PERRIS
EXIST 100-YR
XO 12/7/21

--------------------------------------------------------------------
Drainage Area =      13.97(Ac.)  =      0.022 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      13.97(Ac.)  =      0.022 Sq. Mi.
USER Entry of lag time in hours
Lag time =    0.412 Hr.
Lag time =    24.70 Min.
25% of lag time =     6.17 Min.
40% of lag time =     9.88 Min.
Unit time =     5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       13.97            1.18                  16.48

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       13.97            2.94                  41.07

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    1.180(In)
Area Averaged 100-Year Rainfall =    2.940(In)

Point rain (area averaged) =    2.940(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    2.940(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
    13.970           89.00         0.000
 Total Area Entered =     13.97(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-3     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
89.0  95.6      0.057     0.000        0.057       1.000      0.057
                                                Sum (F) =   0.057
Area averaged mean soil loss (F) (In/Hr) =  0.057
Minimum soil loss rate ((In/Hr)) =  0.029
```

(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	20.246	1.800	0.253
2	0.167	40.492	5.274	0.743
3	0.250	60.739	9.202	1.296
4	0.333	80.985	12.874	1.813
5	0.417	101.231	14.440	2.033
6	0.500	121.477	12.268	1.727
7	0.583	141.723	8.222	1.158
8	0.667	161.970	5.694	0.802
9	0.750	182.216	3.995	0.562
10	0.833	202.462	3.093	0.435
11	0.917	222.708	2.648	0.373
12	1.000	242.954	2.270	0.320
13	1.083	263.201	1.976	0.278
14	1.167	283.447	1.768	0.249
15	1.250	303.693	1.509	0.212
16	1.333	323.939	1.296	0.182
17	1.417	344.185	1.215	0.171
18	1.500	364.431	1.132	0.159
19	1.583	384.678	0.904	0.127
20	1.667	404.924	0.884	0.124
21	1.750	425.170	0.717	0.101
22	1.833	445.416	0.648	0.091
23	1.917	465.662	0.636	0.090
24	2.000	485.909	0.608	0.086
25	2.083	506.155	0.600	0.084
26	2.167	526.401	0.485	0.068
27	2.250	546.647	0.445	0.063
28	2.333	566.893	0.417	0.059
29	2.417	587.140	0.366	0.051
30	2.500	607.386	0.359	0.051
31	2.583	627.632	0.300	0.042
32	2.667	647.878	0.283	0.040
33	2.750	668.124	0.251	0.035
34	2.833	688.371	0.203	0.029
35	2.917	708.617	0.202	0.029
36	3.000	728.863	0.202	0.029
37	3.083	749.109	0.202	0.029
38	3.167	769.355	0.202	0.029
39	3.250	789.602	0.202	0.029
40	3.333	809.848	0.205	0.029
			Sum = 100.000	Sum= 14.079

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.50	0.176	0.057	(0.159)	0.119
2	0.17	0.60	0.212	0.057	(0.191)	0.154
3	0.25	0.60	0.212	0.057	(0.191)	0.154
4	0.33	0.60	0.212	0.057	(0.191)	0.154
5	0.42	0.60	0.212	0.057	(0.191)	0.154
6	0.50	0.70	0.247	0.057	(0.222)	0.190
7	0.58	0.70	0.247	0.057	(0.222)	0.190
8	0.67	0.70	0.247	0.057	(0.222)	0.190
9	0.75	0.70	0.247	0.057	(0.222)	0.190
10	0.83	0.70	0.247	0.057	(0.222)	0.190
11	0.92	0.70	0.247	0.057	(0.222)	0.190
12	1.00	0.80	0.282	0.057	(0.254)	0.225

13	1.08	0.80	0.282	0.057	(0.254)	0.225
14	1.17	0.80	0.282	0.057	(0.254)	0.225
15	1.25	0.80	0.282	0.057	(0.254)	0.225
16	1.33	0.80	0.282	0.057	(0.254)	0.225
17	1.42	0.80	0.282	0.057	(0.254)	0.225
18	1.50	0.80	0.282	0.057	(0.254)	0.225
19	1.58	0.80	0.282	0.057	(0.254)	0.225
20	1.67	0.80	0.282	0.057	(0.254)	0.225
21	1.75	0.80	0.282	0.057	(0.254)	0.225
22	1.83	0.80	0.282	0.057	(0.254)	0.225
23	1.92	0.80	0.282	0.057	(0.254)	0.225
24	2.00	0.90	0.318	0.057	(0.286)	0.260
25	2.08	0.80	0.282	0.057	(0.254)	0.225
26	2.17	0.90	0.318	0.057	(0.286)	0.260
27	2.25	0.90	0.318	0.057	(0.286)	0.260
28	2.33	0.90	0.318	0.057	(0.286)	0.260
29	2.42	0.90	0.318	0.057	(0.286)	0.260
30	2.50	0.90	0.318	0.057	(0.286)	0.260
31	2.58	0.90	0.318	0.057	(0.286)	0.260
32	2.67	0.90	0.318	0.057	(0.286)	0.260
33	2.75	1.00	0.353	0.057	(0.318)	0.296
34	2.83	1.00	0.353	0.057	(0.318)	0.296
35	2.92	1.00	0.353	0.057	(0.318)	0.296
36	3.00	1.00	0.353	0.057	(0.318)	0.296
37	3.08	1.00	0.353	0.057	(0.318)	0.296
38	3.17	1.10	0.388	0.057	(0.349)	0.331
39	3.25	1.10	0.388	0.057	(0.349)	0.331
40	3.33	1.10	0.388	0.057	(0.349)	0.331
41	3.42	1.20	0.423	0.057	(0.381)	0.366
42	3.50	1.30	0.459	0.057	(0.413)	0.401
43	3.58	1.40	0.494	0.057	(0.445)	0.437
44	3.67	1.40	0.494	0.057	(0.445)	0.437
45	3.75	1.50	0.529	0.057	(0.476)	0.472
46	3.83	1.50	0.529	0.057	(0.476)	0.472
47	3.92	1.60	0.564	0.057	(0.508)	0.507
48	4.00	1.60	0.564	0.057	(0.508)	0.507
49	4.08	1.70	0.600	0.057	(0.540)	0.543
50	4.17	1.80	0.635	0.057	(0.572)	0.578
51	4.25	1.90	0.670	0.057	(0.603)	0.613
52	4.33	2.00	0.706	0.057	(0.635)	0.648
53	4.42	2.10	0.741	0.057	(0.667)	0.684
54	4.50	2.10	0.741	0.057	(0.667)	0.684
55	4.58	2.20	0.776	0.057	(0.699)	0.719
56	4.67	2.30	0.811	0.057	(0.730)	0.754
57	4.75	2.40	0.847	0.057	(0.762)	0.789
58	4.83	2.40	0.847	0.057	(0.762)	0.789
59	4.92	2.50	0.882	0.057	(0.794)	0.825
60	5.00	2.60	0.917	0.057	(0.826)	0.860
61	5.08	3.10	1.094	0.057	(0.984)	1.036
62	5.17	3.60	1.270	0.057	(1.143)	1.213
63	5.25	3.90	1.376	0.057	(1.238)	1.319
64	5.33	4.20	1.482	0.057	(1.334)	1.424
65	5.42	4.70	1.658	0.057	(1.492)	1.601
66	5.50	5.60	1.976	0.057	(1.778)	1.918
67	5.58	1.90	0.670	0.057	(0.603)	0.613
68	5.67	0.90	0.318	0.057	(0.286)	0.260
69	5.75	0.60	0.212	0.057	(0.191)	0.154
70	5.83	0.50	0.176	0.057	(0.159)	0.119
71	5.92	0.30	0.106	0.057	(0.095)	0.049
72	6.00	0.20	0.071	0.057	(0.064)	0.013

(Loss Rate Not Used)

Sum = 100.0 Sum = 31.2

Flood volume = Effective rainfall 2.60(In)
times area 14.0(Ac.)/[(In)/(Ft.)] = 3.0(Ac.Ft)
Total soil loss = 0.34(In)
Total soil loss = 0.400(Ac.Ft)
Total rainfall = 2.94(In)
Flood volume = 131679.4 Cubic Feet
Total soil loss = 17404.0 Cubic Feet

Peak flow rate of this hydrograph = 16.142(CFS)

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                          6 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      -------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      -------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0         5.0       10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5       0.0002      0.03  Q         |         |         |         |
  0+10       0.0011      0.13  Q         |         |         |         |
  0+15       0.0032      0.31  Q         |         |         |         |
  0+20       0.0071      0.57  VQ        |         |         |         |
  0+25       0.0132      0.88  VQ        |         |         |         |
  0+30       0.0212      1.16  V Q       |         |         |         |
  0+35       0.0308      1.39  V Q       |         |         |         |
  0+40       0.0416      1.57  V  Q      |         |         |         |
  0+45       0.0535      1.73  V  Q      |         |         |         |
  0+50       0.0664      1.87  V  Q      |         |         |         |
  0+55       0.0801      1.99  |V Q      |         |         |         |
  1+ 0       0.0946      2.10  |V  Q     |         |         |         |
  1+ 5       0.1097      2.19  |V  Q     |         |         |         |
  1+10       0.1255      2.30  |V  Q     |         |         |         |
  1+15       0.1421      2.41  |V  Q     |         |         |         |
  1+20       0.1595      2.53  | V  Q    |         |         |         |
  1+25       0.1776      2.63  | V  Q    |         |         |         |
  1+30       0.1962      2.70  | V  Q    |         |         |         |
  1+35       0.2152      2.76  | V  Q    |         |         |         |
  1+40       0.2346      2.81  |  V Q    |         |         |         |
  1+45       0.2542      2.84  |  V Q    |         |         |         |
  1+50       0.2740      2.88  |  V Q    |         |         |         |
  1+55       0.2940      2.91  |  V Q    |         |         |         |
  2+ 0       0.3143      2.95  |   VQ    |         |         |         |
  2+ 5       0.3349      2.99  |   VQ    |         |         |         |
  2+10       0.3558      3.04  |   V Q   |         |         |         |
  2+15       0.3772      3.10  |   V Q   |         |         |         |
  2+20       0.3991      3.18  |    VQ   |         |         |         |
  2+25       0.4215      3.25  |    VQ   |         |         |         |
  2+30       0.4443      3.31  |    VQ   |         |         |         |
  2+35       0.4675      3.38  |     Q   |         |         |         |
  2+40       0.4911      3.42  |     Q   |         |         |         |
  2+45       0.5149      3.46  |     Q   |         |         |         |
  2+50       0.5391      3.52  |      Q  |         |         |         |
  2+55       0.5638      3.59  |      Q  |         |         |         |
  3+ 0       0.5891      3.67  |      Q  |         |         |         |
  3+ 5       0.6150      3.76  |      QV |         |         |         |
  3+10       0.6415      3.85  |      QV |         |         |         |
  3+15       0.6685      3.93  |      QV |         |         |         |
  3+20       0.6962      4.02  |       QV|         |         |         |
  3+25       0.7246      4.12  |       QV|         |         |         |
  3+30       0.7538      4.25  |       QV|         |         |         |
  3+35       0.7842      4.41  |       Q V         |         |         |
  3+40       0.8160      4.61  |        QV         |         |         |
  3+45       0.8493      4.84  |        Q|V        |         |         |
  3+50       0.8844      5.10  |         QV        |         |         |
  3+55       0.9213      5.35  |         Q V       |         |         |
  4+ 0       0.9598      5.60  |         |QV       |         |         |
  4+ 5       1.0000      5.83  |         |Q V      |         |         |
  4+10       1.0418      6.08  |         | QV      |         |         |
  4+15       1.0854      6.33  |         | Q V     |         |         |
  4+20       1.1310      6.62  |         |  QV     |         |         |
  4+25       1.1789      6.95  |         |  Q V    |         |         |
  4+30       1.2291      7.30  |         |   Q V   |         |         |
  4+35       1.2819      7.66  |         |    QV   |         |         |
  4+40       1.3371      8.02  |         |     QV  |         |         |
  4+45       1.3948      8.37  |         |     Q V |         |         |
  4+50       1.4548      8.72  |         |      Q V|         |         |
  4+55       1.5173      9.07  |         |       Q V         |         |
  5+ 0       1.5822      9.42  |         |       Q V         |         |
  5+ 5       1.6498      9.82  |         |        Q|V        |         |
  5+10       1.7208     10.32  |         |         Q V       |         |
  5+15       1.7966     11.01  |         |         | QV      |         |
  5+20       1.8787     11.92  |         |         |  QV     |         |
  5+25       1.9688     13.07  |         |         |     Q   |         |
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    5+30       2.0682     14.44  |         |         |      VQ |         |
    5+35       2.1758     15.62  |         |         |       V |Q        |
    5+40       2.2869     16.14  |         |         |         V Q       |
    5+45       2.3953     15.73  |         |         |         |Q        |
    5+50       2.4934     14.24  |         |         |       Q | V       |
    5+55       2.5751     11.88  |         |         |  Q      |   V     |
    6+ 0       2.6399      9.41  |         |       Q |         |   V     |
    6+ 5       2.6915      7.49  |         |   Q     |         |    V    |
    6+10       2.7332      6.07  |         | Q       |         |     V   |
    6+15       2.7679      5.04  |         Q         |         |     V   |
    6+20       2.7973      4.27  |       Q |         |         |      V  |
    6+25       2.8226      3.67  |      Q  |         |         |      V  |
    6+30       2.8446      3.20  |     Q   |         |         |      V  |
    6+35       2.8641      2.82  |    Q    |         |         |      V  |
    6+40       2.8813      2.50  |   Q     |         |         |       V |
    6+45       2.8966      2.23  |   Q     |         |         |       V |
    6+50       2.9104      2.00  |   Q     |         |         |       V |
    6+55       2.9228      1.80  |  Q      |         |         |       V |
    7+ 0       2.9338      1.60  |  Q      |         |         |       V |
    7+ 5       2.9438      1.45  | Q       |         |         |       V |
    7+10       2.9528      1.30  | Q       |         |         |        V|
    7+15       2.9609      1.19  | Q       |         |         |        V|
    7+20       2.9684      1.09  | Q       |         |         |        V|
    7+25       2.9753      0.99  |Q        |         |         |        V|
    7+30       2.9815      0.90  |Q        |         |         |        V|
    7+35       2.9870      0.80  |Q        |         |         |        V|
    7+40       2.9920      0.72  |Q        |         |         |        V|
    7+45       2.9964      0.65  |Q        |         |         |        V|
    7+50       3.0004      0.58  |Q        |         |         |        V|
    7+55       3.0040      0.52  |Q        |         |         |        V|
    8+ 0       3.0071      0.46  Q         |         |         |        V|
    8+ 5       3.0099      0.40  Q         |         |         |        V|
    8+10       3.0124      0.36  Q         |         |         |        V|
    8+15       3.0145      0.32  Q         |         |         |        V|
    8+20       3.0165      0.28  Q         |         |         |        V|
    8+25       3.0182      0.25  Q         |         |         |        V|
    8+30       3.0197      0.22  Q         |         |         |        V|
    8+35       3.0209      0.18  Q         |         |         |        V|
    8+40       3.0219      0.14  Q         |         |         |        V|
    8+45       3.0225      0.09  Q         |         |         |        V|
    8+50       3.0227      0.03  Q         |         |         |        V|
    8+55       3.0228      0.02  Q         |         |         |        V|
    9+ 0       3.0229      0.01  Q         |         |         |        V|
    9+ 5       3.0229      0.01  Q         |         |         |        V|
    9+10       3.0229      0.00  Q         |         |         |        V|
    9+15       3.0229      0.00  Q         |         |         |         V
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U n i t   H y d r o g r a p h   A n a l y s i s

Study date 12/07/21 File: PP1EUH24100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6443

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

PILOT PERRIS
EXIST 100-YR
XO 12/7/21

Drainage Area = 13.97(Ac.) = 0.022 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 13.97(Ac.) = 0.022 Sq. Mi.
USER Entry of lag time in hours
Lag time = 0.412 Hr.
Lag time = 24.70 Min.
25% of lag time = 6.17 Min.
40% of lag time = 9.88 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.97	2.05	28.64

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.97	5.33	74.46

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 2.050(In)
Area Averaged 100-Year Rainfall = 5.330(In)

Point rain (area averaged) = 5.330(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 5.330(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
13.970	89.00	0.000

Total Area Entered = 13.97(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
89.0	95.6	0.057	0.000	0.057	1.000	0.057
					Sum (F) =	0.057

Area averaged mean soil loss (F) (In/Hr) = 0.057
Minimum soil loss rate ((In/Hr)) = 0.029

(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	20.246	1.800	0.253
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34	2.833	688.371	0.203	0.029
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37	3.083	749.109	0.202	0.029
38	3.167	769.355	0.202	0.029
39	3.250	789.602	0.202	0.029
40	3.333	809.848	0.205	0.029
			Sum = 100.000	Sum= 14.079

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.08	0.07	0.043	(0.101)	0.038	0.004
2	0.17	0.07	0.043	(0.101)	0.038	0.004
3	0.25	0.07	0.043	(0.101)	0.038	0.004
4	0.33	0.10	0.064	(0.100)	0.058	0.006
5	0.42	0.10	0.064	(0.100)	0.058	0.006
6	0.50	0.10	0.064	(0.099)	0.058	0.006
7	0.58	0.10	0.064	(0.099)	0.058	0.006
8	0.67	0.10	0.064	(0.099)	0.058	0.006
9	0.75	0.10	0.064	(0.098)	0.058	0.006
10	0.83	0.13	0.085	(0.098)	0.077	0.009
11	0.92	0.13	0.085	(0.098)	0.077	0.009
12	1.00	0.13	0.085	(0.097)	0.077	0.009

13	1.08	0.10	0.064	(0.097)	0.058	0.006
14	1.17	0.10	0.064	(0.096)	0.058	0.006
15	1.25	0.10	0.064	(0.096)	0.058	0.006
16	1.33	0.10	0.064	(0.096)	0.058	0.006
17	1.42	0.10	0.064	(0.095)	0.058	0.006
18	1.50	0.10	0.064	(0.095)	0.058	0.006
19	1.58	0.10	0.064	(0.094)	0.058	0.006
20	1.67	0.10	0.064	(0.094)	0.058	0.006
21	1.75	0.10	0.064	(0.094)	0.058	0.006
22	1.83	0.13	0.085	(0.093)	0.077	0.009
23	1.92	0.13	0.085	(0.093)	0.077	0.009
24	2.00	0.13	0.085	(0.093)	0.077	0.009
25	2.08	0.13	0.085	(0.092)	0.077	0.009
26	2.17	0.13	0.085	(0.092)	0.077	0.009
27	2.25	0.13	0.085	(0.091)	0.077	0.009
28	2.33	0.13	0.085	(0.091)	0.077	0.009
29	2.42	0.13	0.085	(0.091)	0.077	0.009
30	2.50	0.13	0.085	(0.090)	0.077	0.009
31	2.58	0.17	0.107	0.090	(0.096)	0.017
32	2.67	0.17	0.107	0.090	(0.096)	0.017
33	2.75	0.17	0.107	0.089	(0.096)	0.017
34	2.83	0.17	0.107	0.089	(0.096)	0.018
35	2.92	0.17	0.107	0.088	(0.096)	0.018
36	3.00	0.17	0.107	0.088	(0.096)	0.018
37	3.08	0.17	0.107	0.088	(0.096)	0.019
38	3.17	0.17	0.107	0.087	(0.096)	0.019
39	3.25	0.17	0.107	0.087	(0.096)	0.020
40	3.33	0.17	0.107	0.087	(0.096)	0.020
41	3.42	0.17	0.107	0.086	(0.096)	0.020
42	3.50	0.17	0.107	0.086	(0.096)	0.021
43	3.58	0.17	0.107	0.086	(0.096)	0.021
44	3.67	0.17	0.107	0.085	(0.096)	0.021
45	3.75	0.17	0.107	0.085	(0.096)	0.022
46	3.83	0.20	0.128	0.085	(0.115)	0.043
47	3.92	0.20	0.128	0.084	(0.115)	0.044
48	4.00	0.20	0.128	0.084	(0.115)	0.044
49	4.08	0.20	0.128	0.083	(0.115)	0.044
50	4.17	0.20	0.128	0.083	(0.115)	0.045
51	4.25	0.20	0.128	0.083	(0.115)	0.045
52	4.33	0.23	0.149	0.082	(0.134)	0.067
53	4.42	0.23	0.149	0.082	(0.134)	0.067
54	4.50	0.23	0.149	0.082	(0.134)	0.068
55	4.58	0.23	0.149	0.081	(0.134)	0.068
56	4.67	0.23	0.149	0.081	(0.134)	0.068
57	4.75	0.23	0.149	0.081	(0.134)	0.069
58	4.83	0.27	0.171	0.080	(0.153)	0.090
59	4.92	0.27	0.171	0.080	(0.153)	0.091
60	5.00	0.27	0.171	0.080	(0.153)	0.091
61	5.08	0.20	0.128	0.079	(0.115)	0.049
62	5.17	0.20	0.128	0.079	(0.115)	0.049
63	5.25	0.20	0.128	0.079	(0.115)	0.049
64	5.33	0.23	0.149	0.078	(0.134)	0.071
65	5.42	0.23	0.149	0.078	(0.134)	0.071
66	5.50	0.23	0.149	0.078	(0.134)	0.072
67	5.58	0.27	0.171	0.077	(0.153)	0.093
68	5.67	0.27	0.171	0.077	(0.153)	0.094
69	5.75	0.27	0.171	0.077	(0.153)	0.094
70	5.83	0.27	0.171	0.076	(0.153)	0.094
71	5.92	0.27	0.171	0.076	(0.153)	0.095
72	6.00	0.27	0.171	0.076	(0.153)	0.095
73	6.08	0.30	0.192	0.075	(0.173)	0.117
74	6.17	0.30	0.192	0.075	(0.173)	0.117
75	6.25	0.30	0.192	0.074	(0.173)	0.117
76	6.33	0.30	0.192	0.074	(0.173)	0.118
77	6.42	0.30	0.192	0.074	(0.173)	0.118
78	6.50	0.30	0.192	0.074	(0.173)	0.118
79	6.58	0.33	0.213	0.073	(0.192)	0.140
80	6.67	0.33	0.213	0.073	(0.192)	0.140
81	6.75	0.33	0.213	0.073	(0.192)	0.141
82	6.83	0.33	0.213	0.072	(0.192)	0.141
83	6.92	0.33	0.213	0.072	(0.192)	0.141
84	7.00	0.33	0.213	0.072	(0.192)	0.142
85	7.08	0.33	0.213	0.071	(0.192)	0.142

86	7.17	0.33	0.213	0.071	(0.192)	0.142
87	7.25	0.33	0.213	0.071	(0.192)	0.143
88	7.33	0.37	0.235	0.070	(0.211)	0.164
89	7.42	0.37	0.235	0.070	(0.211)	0.165
90	7.50	0.37	0.235	0.070	(0.211)	0.165
91	7.58	0.40	0.256	0.069	(0.230)	0.187
92	7.67	0.40	0.256	0.069	(0.230)	0.187
93	7.75	0.40	0.256	0.069	(0.230)	0.187
94	7.83	0.43	0.277	0.068	(0.249)	0.209
95	7.92	0.43	0.277	0.068	(0.249)	0.209
96	8.00	0.43	0.277	0.068	(0.249)	0.209
97	8.08	0.50	0.320	0.067	(0.288)	0.252
98	8.17	0.50	0.320	0.067	(0.288)	0.253
99	8.25	0.50	0.320	0.067	(0.288)	0.253
100	8.33	0.50	0.320	0.066	(0.288)	0.253
101	8.42	0.50	0.320	0.066	(0.288)	0.254
102	8.50	0.50	0.320	0.066	(0.288)	0.254
103	8.58	0.53	0.341	0.066	(0.307)	0.276
104	8.67	0.53	0.341	0.065	(0.307)	0.276
105	8.75	0.53	0.341	0.065	(0.307)	0.276
106	8.83	0.57	0.362	0.065	(0.326)	0.298
107	8.92	0.57	0.362	0.064	(0.326)	0.298
108	9.00	0.57	0.362	0.064	(0.326)	0.298
109	9.08	0.63	0.405	0.064	(0.365)	0.341
110	9.17	0.63	0.405	0.063	(0.365)	0.342
111	9.25	0.63	0.405	0.063	(0.365)	0.342
112	9.33	0.67	0.426	0.063	(0.384)	0.364
113	9.42	0.67	0.426	0.062	(0.384)	0.364
114	9.50	0.67	0.426	0.062	(0.384)	0.364
115	9.58	0.70	0.448	0.062	(0.403)	0.386
116	9.67	0.70	0.448	0.062	(0.403)	0.386
117	9.75	0.70	0.448	0.061	(0.403)	0.386
118	9.83	0.73	0.469	0.061	(0.422)	0.408
119	9.92	0.73	0.469	0.061	(0.422)	0.408
120	10.00	0.73	0.469	0.060	(0.422)	0.409
121	10.08	0.50	0.320	0.060	(0.288)	0.260
122	10.17	0.50	0.320	0.060	(0.288)	0.260
123	10.25	0.50	0.320	0.060	(0.288)	0.260
124	10.33	0.50	0.320	0.059	(0.288)	0.261
125	10.42	0.50	0.320	0.059	(0.288)	0.261
126	10.50	0.50	0.320	0.059	(0.288)	0.261
127	10.58	0.67	0.426	0.058	(0.384)	0.368
128	10.67	0.67	0.426	0.058	(0.384)	0.368
129	10.75	0.67	0.426	0.058	(0.384)	0.369
130	10.83	0.67	0.426	0.058	(0.384)	0.369
131	10.92	0.67	0.426	0.057	(0.384)	0.369
132	11.00	0.67	0.426	0.057	(0.384)	0.369
133	11.08	0.63	0.405	0.057	(0.365)	0.348
134	11.17	0.63	0.405	0.056	(0.365)	0.349
135	11.25	0.63	0.405	0.056	(0.365)	0.349
136	11.33	0.63	0.405	0.056	(0.365)	0.349
137	11.42	0.63	0.405	0.056	(0.365)	0.349
138	11.50	0.63	0.405	0.055	(0.365)	0.350
139	11.58	0.57	0.362	0.055	(0.326)	0.307
140	11.67	0.57	0.362	0.055	(0.326)	0.308
141	11.75	0.57	0.362	0.054	(0.326)	0.308
142	11.83	0.60	0.384	0.054	(0.345)	0.330
143	11.92	0.60	0.384	0.054	(0.345)	0.330
144	12.00	0.60	0.384	0.054	(0.345)	0.330
145	12.08	0.83	0.533	0.053	(0.480)	0.480
146	12.17	0.83	0.533	0.053	(0.480)	0.480
147	12.25	0.83	0.533	0.053	(0.480)	0.480
148	12.33	0.87	0.554	0.053	(0.499)	0.502
149	12.42	0.87	0.554	0.052	(0.499)	0.502
150	12.50	0.87	0.554	0.052	(0.499)	0.502
151	12.58	0.93	0.597	0.052	(0.537)	0.545
152	12.67	0.93	0.597	0.052	(0.537)	0.545
153	12.75	0.93	0.597	0.051	(0.537)	0.546
154	12.83	0.97	0.618	0.051	(0.556)	0.567
155	12.92	0.97	0.618	0.051	(0.556)	0.567
156	13.00	0.97	0.618	0.051	(0.556)	0.568
157	13.08	1.13	0.725	0.050	(0.652)	0.675
158	13.17	1.13	0.725	0.050	(0.652)	0.675

159	13.25	1.13	0.725	0.050	(0.652)	0.675
160	13.33	1.13	0.725	0.049	(0.652)	0.675
161	13.42	1.13	0.725	0.049	(0.652)	0.676
162	13.50	1.13	0.725	0.049	(0.652)	0.676
163	13.58	0.77	0.490	0.049	(0.441)	0.442
164	13.67	0.77	0.490	0.048	(0.441)	0.442
165	13.75	0.77	0.490	0.048	(0.441)	0.442
166	13.83	0.77	0.490	0.048	(0.441)	0.442
167	13.92	0.77	0.490	0.048	(0.441)	0.443
168	14.00	0.77	0.490	0.048	(0.441)	0.443
169	14.08	0.90	0.576	0.047	(0.518)	0.528
170	14.17	0.90	0.576	0.047	(0.518)	0.529
171	14.25	0.90	0.576	0.047	(0.518)	0.529
172	14.33	0.87	0.554	0.047	(0.499)	0.508
173	14.42	0.87	0.554	0.046	(0.499)	0.508
174	14.50	0.87	0.554	0.046	(0.499)	0.508
175	14.58	0.87	0.554	0.046	(0.499)	0.508
176	14.67	0.87	0.554	0.046	(0.499)	0.509
177	14.75	0.87	0.554	0.045	(0.499)	0.509
178	14.83	0.83	0.533	0.045	(0.480)	0.488
179	14.92	0.83	0.533	0.045	(0.480)	0.488
180	15.00	0.83	0.533	0.045	(0.480)	0.488
181	15.08	0.80	0.512	0.044	(0.460)	0.467
182	15.17	0.80	0.512	0.044	(0.460)	0.467
183	15.25	0.80	0.512	0.044	(0.460)	0.468
184	15.33	0.77	0.490	0.044	(0.441)	0.447
185	15.42	0.77	0.490	0.044	(0.441)	0.447
186	15.50	0.77	0.490	0.043	(0.441)	0.447
187	15.58	0.63	0.405	0.043	(0.365)	0.362
188	15.67	0.63	0.405	0.043	(0.365)	0.362
189	15.75	0.63	0.405	0.043	(0.365)	0.362
190	15.83	0.63	0.405	0.042	(0.365)	0.363
191	15.92	0.63	0.405	0.042	(0.365)	0.363
192	16.00	0.63	0.405	0.042	(0.365)	0.363
193	16.08	0.13	0.085	0.042	(0.077)	0.043
194	16.17	0.13	0.085	0.042	(0.077)	0.044
195	16.25	0.13	0.085	0.041	(0.077)	0.044
196	16.33	0.13	0.085	0.041	(0.077)	0.044
197	16.42	0.13	0.085	0.041	(0.077)	0.044
198	16.50	0.13	0.085	0.041	(0.077)	0.045
199	16.58	0.10	0.064	0.041	(0.058)	0.023
200	16.67	0.10	0.064	0.040	(0.058)	0.024
201	16.75	0.10	0.064	0.040	(0.058)	0.024
202	16.83	0.10	0.064	0.040	(0.058)	0.024
203	16.92	0.10	0.064	0.040	(0.058)	0.024
204	17.00	0.10	0.064	0.040	(0.058)	0.024
205	17.08	0.17	0.107	0.039	(0.096)	0.067
206	17.17	0.17	0.107	0.039	(0.096)	0.067
207	17.25	0.17	0.107	0.039	(0.096)	0.068
208	17.33	0.17	0.107	0.039	(0.096)	0.068
209	17.42	0.17	0.107	0.039	(0.096)	0.068
210	17.50	0.17	0.107	0.038	(0.096)	0.068
211	17.58	0.17	0.107	0.038	(0.096)	0.068
212	17.67	0.17	0.107	0.038	(0.096)	0.069
213	17.75	0.17	0.107	0.038	(0.096)	0.069
214	17.83	0.13	0.085	0.038	(0.077)	0.048
215	17.92	0.13	0.085	0.037	(0.077)	0.048
216	18.00	0.13	0.085	0.037	(0.077)	0.048
217	18.08	0.13	0.085	0.037	(0.077)	0.048
218	18.17	0.13	0.085	0.037	(0.077)	0.048
219	18.25	0.13	0.085	0.037	(0.077)	0.049
220	18.33	0.13	0.085	0.036	(0.077)	0.049
221	18.42	0.13	0.085	0.036	(0.077)	0.049
222	18.50	0.13	0.085	0.036	(0.077)	0.049
223	18.58	0.10	0.064	0.036	(0.058)	0.028
224	18.67	0.10	0.064	0.036	(0.058)	0.028
225	18.75	0.10	0.064	0.036	(0.058)	0.028
226	18.83	0.07	0.043	0.035	(0.038)	0.007
227	18.92	0.07	0.043	0.035	(0.038)	0.007
228	19.00	0.07	0.043	0.035	(0.038)	0.008
229	19.08	0.10	0.064	0.035	(0.058)	0.029
230	19.17	0.10	0.064	0.035	(0.058)	0.029
231	19.25	0.10	0.064	0.035	(0.058)	0.029

232	19.33	0.13	0.085	0.034	(0.077)	0.051
233	19.42	0.13	0.085	0.034	(0.077)	0.051
234	19.50	0.13	0.085	0.034	(0.077)	0.051
235	19.58	0.10	0.064	0.034	(0.058)	0.030
236	19.67	0.10	0.064	0.034	(0.058)	0.030
237	19.75	0.10	0.064	0.034	(0.058)	0.030
238	19.83	0.07	0.043	0.034	(0.038)	0.009
239	19.92	0.07	0.043	0.033	(0.038)	0.009
240	20.00	0.07	0.043	0.033	(0.038)	0.009
241	20.08	0.10	0.064	0.033	(0.058)	0.031
242	20.17	0.10	0.064	0.033	(0.058)	0.031
243	20.25	0.10	0.064	0.033	(0.058)	0.031
244	20.33	0.10	0.064	0.033	(0.058)	0.031
245	20.42	0.10	0.064	0.032	(0.058)	0.031
246	20.50	0.10	0.064	0.032	(0.058)	0.032
247	20.58	0.10	0.064	0.032	(0.058)	0.032
248	20.67	0.10	0.064	0.032	(0.058)	0.032
249	20.75	0.10	0.064	0.032	(0.058)	0.032
250	20.83	0.07	0.043	0.032	(0.038)	0.011
251	20.92	0.07	0.043	0.032	(0.038)	0.011
252	21.00	0.07	0.043	0.032	(0.038)	0.011
253	21.08	0.10	0.064	0.031	(0.058)	0.033
254	21.17	0.10	0.064	0.031	(0.058)	0.033
255	21.25	0.10	0.064	0.031	(0.058)	0.033
256	21.33	0.07	0.043	0.031	(0.038)	0.012
257	21.42	0.07	0.043	0.031	(0.038)	0.012
258	21.50	0.07	0.043	0.031	(0.038)	0.012
259	21.58	0.10	0.064	0.031	(0.058)	0.033
260	21.67	0.10	0.064	0.031	(0.058)	0.033
261	21.75	0.10	0.064	0.031	(0.058)	0.033
262	21.83	0.07	0.043	0.030	(0.038)	0.012
263	21.92	0.07	0.043	0.030	(0.038)	0.012
264	22.00	0.07	0.043	0.030	(0.038)	0.012
265	22.08	0.10	0.064	0.030	(0.058)	0.034
266	22.17	0.10	0.064	0.030	(0.058)	0.034
267	22.25	0.10	0.064	0.030	(0.058)	0.034
268	22.33	0.07	0.043	0.030	(0.038)	0.013
269	22.42	0.07	0.043	0.030	(0.038)	0.013
270	22.50	0.07	0.043	0.030	(0.038)	0.013
271	22.58	0.07	0.043	0.030	(0.038)	0.013
272	22.67	0.07	0.043	0.029	(0.038)	0.013
273	22.75	0.07	0.043	0.029	(0.038)	0.013
274	22.83	0.07	0.043	0.029	(0.038)	0.013
275	22.92	0.07	0.043	0.029	(0.038)	0.013
276	23.00	0.07	0.043	0.029	(0.038)	0.013
277	23.08	0.07	0.043	0.029	(0.038)	0.014
278	23.17	0.07	0.043	0.029	(0.038)	0.014
279	23.25	0.07	0.043	0.029	(0.038)	0.014
280	23.33	0.07	0.043	0.029	(0.038)	0.014
281	23.42	0.07	0.043	0.029	(0.038)	0.014
282	23.50	0.07	0.043	0.029	(0.038)	0.014
283	23.58	0.07	0.043	0.029	(0.038)	0.014
284	23.67	0.07	0.043	0.029	(0.038)	0.014
285	23.75	0.07	0.043	0.029	(0.038)	0.014
286	23.83	0.07	0.043	0.029	(0.038)	0.014
287	23.92	0.07	0.043	0.029	(0.038)	0.014
288	24.00	0.07	0.043	0.029	(0.038)	0.014

(Loss Rate Not Used)

Sum = 100.0 Sum = 48.5

Flood volume = Effective rainfall 4.04(In)
times area 14.0(Ac.)/[(In)/(Ft.)] = 4.7(Ac.Ft)
Total soil loss = 1.29(In)
Total soil loss = 1.504(Ac.Ft)
Total rainfall = 5.33(In)
Flood volume = 204755.2 Cubic Feet
Total soil loss = 65527.6 Cubic Feet

Peak flow rate of this hydrograph = 8.523(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

```
                 Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
  0+ 5       0.0000      0.00  Q         |         |         |         |
  0+10       0.0000      0.00  Q         |         |         |         |
  0+15       0.0001      0.01  Q         |         |         |         |
  0+20       0.0002      0.02  Q         |         |         |         |
  0+25       0.0004      0.03  Q         |         |         |         |
  0+30       0.0007      0.04  Q         |         |         |         |
  0+35       0.0010      0.05  Q         |         |         |         |
  0+40       0.0014      0.05  Q         |         |         |         |
  0+45       0.0018      0.06  Q         |         |         |         |
  0+50       0.0023      0.07  Q         |         |         |         |
  0+55       0.0028      0.07  Q         |         |         |         |
  1+ 0       0.0033      0.08  Q         |         |         |         |
  1+ 5       0.0038      0.08  Q         |         |         |         |
  1+10       0.0044      0.09  Q         |         |         |         |
  1+15       0.0050      0.09  Q         |         |         |         |
  1+20       0.0057      0.09  Q         |         |         |         |
  1+25       0.0063      0.09  Q         |         |         |         |
  1+30       0.0069      0.09  Q         |         |         |         |
  1+35       0.0074      0.09  Q         |         |         |         |
  1+40       0.0080      0.09  Q         |         |         |         |
  1+45       0.0086      0.09  Q         |         |         |         |
  1+50       0.0092      0.09  Q         |         |         |         |
  1+55       0.0098      0.09  Q         |         |         |         |
  2+ 0       0.0105      0.09  Q         |         |         |         |
  2+ 5       0.0111      0.10  Q         |         |         |         |
  2+10       0.0118      0.10  Q         |         |         |         |
  2+15       0.0125      0.10  Q         |         |         |         |
  2+20       0.0133      0.11  Q         |         |         |         |
  2+25       0.0140      0.11  Q         |         |         |         |
  2+30       0.0148      0.11  Q         |         |         |         |
  2+35       0.0156      0.11  Q         |         |         |         |
  2+40       0.0164      0.12  Q         |         |         |         |
  2+45       0.0173      0.13  Q         |         |         |         |
  2+50       0.0183      0.15  Q         |         |         |         |
  2+55       0.0195      0.17  Q         |         |         |         |
  3+ 0       0.0208      0.18  Q         |         |         |         |
  3+ 5       0.0221      0.20  Q         |         |         |         |
  3+10       0.0235      0.21  Q         |         |         |         |
  3+15       0.0250      0.22  Q         |         |         |         |
  3+20       0.0266      0.22  Q         |         |         |         |
  3+25       0.0282      0.23  Q         |         |         |         |
  3+30       0.0298      0.24  Q         |         |         |         |
  3+35       0.0315      0.24  Q         |         |         |         |
  3+40       0.0332      0.25  VQ        |         |         |         |
  3+45       0.0350      0.26  VQ        |         |         |         |
  3+50       0.0369      0.27  VQ        |         |         |         |
  3+55       0.0389      0.29  VQ        |         |         |         |
  4+ 0       0.0411      0.32  VQ        |         |         |         |
  4+ 5       0.0436      0.37  VQ        |         |         |         |
  4+10       0.0465      0.42  VQ        |         |         |         |
  4+15       0.0497      0.46  VQ        |         |         |         |
  4+20       0.0531      0.50  VQ        |         |         |         |
  4+25       0.0568      0.53  V Q       |         |         |         |
  4+30       0.0608      0.58  V Q       |         |         |         |
  4+35       0.0652      0.63  V Q       |         |         |         |
  4+40       0.0699      0.69  V Q       |         |         |         |
  4+45       0.0750      0.74  V Q       |         |         |         |
  4+50       0.0804      0.78  V  Q      |         |         |         |
  4+55       0.0860      0.82  V  Q      |         |         |         |
  5+ 0       0.0921      0.87  V  Q      |         |         |         |
  5+ 5       0.0984      0.92  V  Q      |         |         |         |
  5+10       0.1049      0.95  V  Q      |         |         |         |
  5+15       0.1114      0.94  V  Q      |         |         |         |
  5+20       0.1177      0.91   |V Q     |         |         |         |
  5+25       0.1237      0.87   |V Q     |         |         |         |
  5+30       0.1295      0.85   |V Q     |         |         |         |
  5+35       0.1355      0.86   |V Q     |         |         |         |
  5+40       0.1417      0.91   |V Q     |         |         |         |
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  5+45        0.1484       0.96  |V Q      |         |         |         |
  5+50        0.1554       1.02  |V  Q     |         |         |         |
  5+55        0.1629       1.08  |V  Q     |         |         |         |
  6+ 0        0.1707       1.13  |V  Q     |         |         |         |
  6+ 5        0.1788       1.17  |V  Q     |         |         |         |
  6+10        0.1871       1.21  |V  Q     |         |         |         |
  6+15        0.1958       1.26  |V   Q    |         |         |         |
  6+20        0.2049       1.32  |V   Q    |         |         |         |
  6+25        0.2143       1.38  |V   Q    |         |         |         |
  6+30        0.2242       1.43  |V   Q    |         |         |         |
  6+35        0.2343       1.47  |V   Q    |         |         |         |
  6+40        0.2447       1.51  | V   Q   |         |         |         |
  6+45        0.2555       1.57  | V   Q   |         |         |         |
  6+50        0.2667       1.63  | V   Q   |         |         |         |
  6+55        0.2783       1.69  | V   Q   |         |         |         |
  7+ 0        0.2903       1.74  | V   Q   |         |         |         |
  7+ 5        0.3026       1.78  | V    Q  |         |         |         |
  7+10        0.3150       1.81  | V    Q  |         |         |         |
  7+15        0.3276       1.83  | V    Q  |         |         |         |
  7+20        0.3404       1.86  | V    Q  |         |         |         |
  7+25        0.3535       1.89  |  V   Q  |         |         |         |
  7+30        0.3668       1.94  |  V   Q  |         |         |         |
  7+35        0.3806       2.00  |  V   Q  |         |         |         |
  7+40        0.3949       2.07  |  V    Q |         |         |         |
  7+45        0.4097       2.15  |  V    Q |         |         |         |
  7+50        0.4250       2.23  |  V    Q |         |         |         |
  7+55        0.4410       2.32  |  V     Q|         |         |         |
  8+ 0        0.4575       2.40  |  V     Q|         |         |         |
  8+ 5        0.4747       2.50  |   V    Q|         |         |         |
  8+10        0.4927       2.61  |   V     Q         |         |         |
  8+15        0.5115       2.73  |   V     Q         |         |         |
  8+20        0.5311       2.85  |   V     |Q        |         |         |
  8+25        0.5516       2.98  |   V     |Q        |         |         |
  8+30        0.5728       3.08  |   V     | Q       |         |         |
  8+35        0.5946       3.16  |    V    | Q       |         |         |
  8+40        0.6169       3.24  |    V    | Q       |         |         |
  8+45        0.6397       3.31  |    V    |  Q      |         |         |
  8+50        0.6631       3.39  |    V    |  Q      |         |         |
  8+55        0.6871       3.49  |    V    |  Q      |         |         |
  9+ 0        0.7118       3.58  |     V   |   Q     |         |         |
  9+ 5        0.7372       3.68  |     V   |   Q     |         |         |
  9+10        0.7633       3.80  |     V   |    Q    |         |         |
  9+15        0.7903       3.93  |     V   |    Q    |         |         |
  9+20        0.8183       4.06  |     V   |     Q   |         |         |
  9+25        0.8473       4.21  |      V  |     Q   |         |         |
  9+30        0.8772       4.34  |      V  |      Q  |         |         |
  9+35        0.9080       4.47  |      V  |      Q  |         |         |
  9+40        0.9396       4.59  |      V  |       Q |         |         |
  9+45        0.9720       4.70  |       V |       Q |         |         |
  9+50        1.0051       4.81  |       V |        Q|         |         |
  9+55        1.0391       4.93  |       V |        Q|         |         |
 10+ 0        1.0737       5.03  |        V|         Q         |         |
 10+ 5        1.1089       5.10  |        V|         Q         |         |
 10+10        1.1439       5.08  |        V|         Q         |         |
 10+15        1.1781       4.97  |         V        Q|         |         |
 10+20        1.2109       4.76  |         V        Q|         |         |
 10+25        1.2419       4.51  |         V       Q |         |         |
 10+30        1.2714       4.29  |         V      Q  |         |         |
 10+35        1.3002       4.18  |         |V    Q   |         |         |
 10+40        1.3290       4.17  |         |V    Q   |         |         |
 10+45        1.3583       4.26  |         |V     Q  |         |         |
 10+50        1.3887       4.41  |         |V     Q  |         |         |
 10+55        1.4203       4.60  |         | V     Q |         |         |
 11+ 0        1.4531       4.75  |         | V      Q|         |         |
 11+ 5        1.4865       4.85  |         | V      Q|         |         |
 11+10        1.5202       4.90  |         | V      Q|         |         |
 11+15        1.5541       4.92  |         |  V     Q|         |         |
 11+20        1.5880       4.92  |         |  V     Q|         |         |
 11+25        1.6217       4.90  |         |  V     Q|         |         |
 11+30        1.6554       4.89  |         |   V    Q|         |         |
 11+35        1.6890       4.87  |         |   V    Q|         |         |
 11+40        1.7223       4.84  |         |   V    Q|         |         |
 11+45        1.7553       4.80  |         |   V    Q|         |         |
```

```
11+50       1.7879      4.73  |         |    V  Q |         |         |
11+55       1.8201      4.67  |         |    V  Q |         |         |
12+ 0       1.8519      4.63  |         |    V  Q |         |         |
12+ 5       1.8840      4.66  |         |     V Q |         |         |
12+10       1.9169      4.78  |         |     V  Q|         |         |
12+15       1.9513      4.99  |         |     V  Q|         |         |
12+20       1.9877      5.28  |         |     V   |Q        |         |
12+25       2.0263      5.60  |         |      V  | Q       |         |
12+30       2.0668      5.89  |         |      V  |  Q      |         |
12+35       2.1090      6.12  |         |      V  |   Q     |         |
12+40       2.1525      6.31  |         |       V |    Q    |         |
12+45       2.1972      6.49  |         |       V |    Q    |         |
12+50       2.2431      6.67  |         |        V|     Q   |         |
12+55       2.2902      6.84  |         |        V|      Q  |         |
13+ 0       2.3385      7.01  |         |        V|       Q |         |
13+ 5       2.3879      7.17  |         |         V       Q |         |
13+10       2.4387      7.38  |         |         V        Q|         |
13+15       2.4911      7.61  |         |         |V        Q         |
13+20       2.5454      7.88  |         |         |V        |Q        |
13+25       2.6016      8.17  |         |         | V       | Q       |
13+30       2.6596      8.41  |         |         | V       |  Q      |
13+35       2.7183      8.52  |         |         |  V      |   Q     |
13+40       2.7767      8.48  |         |         |  V      |  Q      |
13+45       2.8337      8.28  |         |         |   V     |  Q      |
13+50       2.8883      7.93  |         |         |   V     |Q        |
13+55       2.9401      7.53  |         |         |    V    Q         |
14+ 0       2.9896      7.18  |         |         |    V  Q |         |
14+ 5       3.0377      6.99  |         |         |    V Q  |         |
14+10       3.0854      6.91  |         |         |     VQ  |         |
14+15       3.1331      6.94  |         |         |     VQ  |         |
14+20       3.1815      7.02  |         |         |      VQ |         |
14+25       3.2306      7.13  |         |         |      VQ |         |
14+30       3.2803      7.21  |         |         |      VQ |         |
14+35       3.3301      7.23  |         |         |       Q |         |
14+40       3.3799      7.23  |         |         |       Q |         |
14+45       3.4295      7.21  |         |         |       QV|         |
14+50       3.4791      7.20  |         |         |       QV|         |
14+55       3.5286      7.18  |         |         |       Q V         |
15+ 0       3.5779      7.15  |         |         |       Q V         |
15+ 5       3.6269      7.11  |         |         |       Q V         |
15+10       3.6755      7.06  |         |         |       Q |V        |
15+15       3.7237      7.00  |         |         |      Q  |V        |
15+20       3.7714      6.93  |         |         |      Q  | V       |
15+25       3.8187      6.86  |         |         |      Q  | V       |
15+30       3.8654      6.78  |         |         |      Q  | V       |
15+35       3.9114      6.68  |         |         |     Q   |  V      |
15+40       3.9565      6.55  |         |         |     Q   |  V      |
15+45       4.0005      6.39  |         |         |    Q    |   V     |
15+50       4.0432      6.19  |         |         |   Q     |   V     |
15+55       4.0844      5.99  |         |         |  Q      |   V     |
16+ 0       4.1244      5.82  |         |         |  Q      |    V    |
16+ 5       4.1632      5.62  |         |         | Q       |    V    |
16+10       4.1996      5.30  |         |         |Q        |    V    |
16+15       4.2328      4.82  |         |        Q|         |     V   |
16+20       4.2617      4.19  |         |     Q   |         |     V   |
16+25       4.2858      3.50  |         |   Q     |         |     V   |
16+30       4.3059      2.91  |         |Q        |         |     V   |
16+35       4.3231      2.50  |         Q         |         |     V   |
16+40       4.3382      2.20  |       Q |         |         |     V   |
16+45       4.3517      1.96  |      Q  |         |         |      V  |
16+50       4.3639      1.76  |      Q  |         |         |      V  |
16+55       4.3747      1.58  |     Q   |         |         |      V  |
17+ 0       4.3846      1.43  |    Q    |         |         |      V  |
17+ 5       4.3936      1.31  |    Q    |         |         |      V  |
17+10       4.4022      1.24  |   Q     |         |         |      V  |
17+15       4.4105      1.21  |   Q     |         |         |      V  |
17+20       4.4188      1.21  |   Q     |         |         |      V  |
17+25       4.4272      1.22  |   Q     |         |         |      V  |
17+30       4.4357      1.23  |   Q     |         |         |      V  |
17+35       4.4441      1.23  |   Q     |         |         |      V  |
17+40       4.4525      1.21  |   Q     |         |         |      V  |
17+45       4.4607      1.19  |   Q     |         |         |      V  |
17+50       4.4687      1.17  |   Q     |         |         |       V |
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17+55       4.4765      1.13  |   Q     |         |         |       V |
18+ 0       4.4840      1.08  |   Q     |         |         |       V |
18+ 5       4.4910      1.02  |   Q     |         |         |       V |
18+10       4.4977      0.96  |  Q      |         |         |       V |
18+15       4.5040      0.91  |  Q      |         |         |       V |
18+20       4.5100      0.87  |  Q      |         |         |       V |
18+25       4.5158      0.85  |  Q      |         |         |       V |
18+30       4.5215      0.82  |  Q      |         |         |       V |
18+35       4.5270      0.80  |  Q      |         |         |       V |
18+40       4.5322      0.76  |  Q      |         |         |       V |
18+45       4.5372      0.72  | Q       |         |         |       V |
18+50       4.5418      0.67  | Q       |         |         |       V |
18+55       4.5459      0.60  | Q       |         |         |       V |
19+ 0       4.5495      0.52  | Q       |         |         |       V |
19+ 5       4.5527      0.46  |Q        |         |         |       V |
19+10       4.5555      0.41  |Q        |         |         |       V |
19+15       4.5581      0.38  |Q        |         |         |       V |
19+20       4.5607      0.38  |Q        |         |         |       V |
19+25       4.5635      0.41  |Q        |         |         |       V |
19+30       4.5667      0.46  |Q        |         |         |       V |
19+35       4.5702      0.51  | Q       |         |         |       V |
19+40       4.5739      0.54  | Q       |         |         |       V |
19+45       4.5777      0.55  | Q       |         |         |       V |
19+50       4.5813      0.53  | Q       |         |         |       V |
19+55       4.5847      0.49  |Q        |         |         |        V|
20+ 0       4.5877      0.44  |Q        |         |         |        V|
20+ 5       4.5904      0.39  |Q        |         |         |        V|
20+10       4.5929      0.36  |Q        |         |         |        V|
20+15       4.5953      0.34  |Q        |         |         |        V|
20+20       4.5977      0.36  |Q        |         |         |        V|
20+25       4.6003      0.38  |Q        |         |         |        V|
20+30       4.6031      0.40  |Q        |         |         |        V|
20+35       4.6060      0.42  |Q        |         |         |        V|
20+40       4.6089      0.43  |Q        |         |         |        V|
20+45       4.6119      0.43  |Q        |         |         |        V|
20+50       4.6148      0.43  |Q        |         |         |        V|
20+55       4.6176      0.41  |Q        |         |         |        V|
21+ 0       4.6203      0.39  |Q        |         |         |        V|
21+ 5       4.6228      0.36  |Q        |         |         |        V|
21+10       4.6250      0.33  |Q        |         |         |        V|
21+15       4.6273      0.32  |Q        |         |         |        V|
21+20       4.6296      0.34  |Q        |         |         |        V|
21+25       4.6320      0.35  |Q        |         |         |        V|
21+30       4.6344      0.35  |Q        |         |         |        V|
21+35       4.6367      0.33  |Q        |         |         |        V|
21+40       4.6388      0.31  |Q        |         |         |        V|
21+45       4.6410      0.31  |Q        |         |         |        V|
21+50       4.6432      0.32  |Q        |         |         |        V|
21+55       4.6456      0.34  |Q        |         |         |        V|
22+ 0       4.6479      0.34  |Q        |         |         |        V|
22+ 5       4.6502      0.33  |Q        |         |         |        V|
22+10       4.6523      0.31  |Q        |         |         |        V|
22+15       4.6545      0.31  |Q        |         |         |        V|
22+20       4.6567      0.33  |Q        |         |         |        V|
22+25       4.6591      0.34  |Q        |         |         |        V|
22+30       4.6615      0.35  |Q        |         |         |        V|
22+35       4.6637      0.33  |Q        |         |         |        V|
22+40       4.6658      0.30  |Q        |         |         |        V|
22+45       4.6676      0.27  |Q        |         |         |        V|
22+50       4.6693      0.25  Q         |         |         |        V|
22+55       4.6709      0.24  Q         |         |         |        V|
23+ 0       4.6725      0.23  Q         |         |         |        V|
23+ 5       4.6741      0.22  Q         |         |         |        V|
23+10       4.6756      0.22  Q         |         |         |        V|
23+15       4.6771      0.22  Q         |         |         |        V|
23+20       4.6786      0.22  Q         |         |         |        V|
23+25       4.6801      0.21  Q         |         |         |        V|
23+30       4.6815      0.21  Q         |         |         |        V|
23+35       4.6830      0.21  Q         |         |         |        V|
23+40       4.6844      0.21  Q         |         |         |        V|
23+45       4.6858      0.21  Q         |         |         |        V|
23+50       4.6872      0.21  Q         |         |         |        V|
23+55       4.6887      0.20  Q         |         |         |        V|
```

```
   24+ 0       4.6901      0.20  Q         |         |         |        V|
   24+ 5       4.6914      0.20  Q         |         |         |        V|
   24+10       4.6927      0.19  Q         |         |         |        V|
   24+15       4.6939      0.17  Q         |         |         |        V|
   24+20       4.6949      0.15  Q         |         |         |        V|
   24+25       4.6957      0.12  Q         |         |         |        V|
   24+30       4.6964      0.09  Q         |         |         |        V|
   24+35       4.6969      0.07  Q         |         |         |        V|
   24+40       4.6973      0.06  Q         |         |         |        V|
   24+45       4.6977      0.05  Q         |         |         |        V|
   24+50       4.6980      0.05  Q         |         |         |        V|
   24+55       4.6983      0.04  Q         |         |         |        V|
   25+ 0       4.6986      0.04  Q         |         |         |        V|
   25+ 5       4.6988      0.03  Q         |         |         |        V|
   25+10       4.6990      0.03  Q         |         |         |        V|
   25+15       4.6992      0.03  Q         |         |         |        V|
   25+20       4.6993      0.02  Q         |         |         |        V|
   25+25       4.6995      0.02  Q         |         |         |        V|
   25+30       4.6996      0.02  Q         |         |         |        V|
   25+35       4.6997      0.02  Q         |         |         |        V|
   25+40       4.6998      0.01  Q         |         |         |        V|
   25+45       4.6999      0.01  Q         |         |         |        V|
   25+50       4.7000      0.01  Q         |         |         |        V|
   25+55       4.7001      0.01  Q         |         |         |        V|
   26+ 0       4.7001      0.01  Q         |         |         |        V|
   26+ 5       4.7002      0.01  Q         |         |         |        V|
   26+10       4.7003      0.01  Q         |         |         |        V|
   26+15       4.7003      0.01  Q         |         |         |        V|
   26+20       4.7003      0.01  Q         |         |         |        V|
   26+25       4.7004      0.01  Q         |         |         |        V|
   26+30       4.7004      0.00  Q         |         |         |        V|
   26+35       4.7004      0.00  Q         |         |         |        V|
   26+40       4.7005      0.00  Q         |         |         |        V|
   26+45       4.7005      0.00  Q         |         |         |        V|
   26+50       4.7005      0.00  Q         |         |         |        V|
   26+55       4.7005      0.00  Q         |         |         |        V|
   27+ 0       4.7005      0.00  Q         |         |         |        V|
   27+ 5       4.7005      0.00  Q         |         |         |        V|
   27+10       4.7005      0.00  Q         |         |         |        V|
   27+15       4.7005      0.00  Q         |         |         |        V|
-----------------------------------------------------------------------
```

U n i t   H y d r o g r a p h   A n a l y s i s

Study date 03/22/22 File: PP1PUH1100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6443

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

PILOT PERRIS
PROP 100-YR
XO 3/22/22

Drainage Area = 13.97(Ac.) = 0.022 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 13.97(Ac.) = 0.022 Sq. Mi.
USER Entry of lag time in hours
Lag time = 0.217 Hr.
Lag time = 13.02 Min.
25% of lag time = 3.25 Min.
40% of lag time = 5.21 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.97	0.51	7.07

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.97	1.59	22.21

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.506(In)
Area Averaged 100-Year Rainfall = 1.590(In)

Point rain (area averaged) = 1.590(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.590(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
10.190	75.00	0.900
3.780	87.00	0.000

Total Area Entered = 13.97(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
75.0	88.0	0.153	0.900	0.029	0.729	0.021
87.0	94.8	0.068	0.000	0.068	0.271	0.018
					Sum (F) =	0.039

Area averaged mean soil loss (F) (In/Hr) = 0.039
Minimum soil loss rate ((In/Hr)) = 0.020
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.364

Slope of intensity-duration curve for a 1 hour storm =0.5000

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	38.402	4.099	0.577
2	0.167	76.805	16.642	2.343
3	0.250	115.207	25.801	3.633
4	0.333	153.610	18.225	2.566
5	0.417	192.012	9.016	1.269
6	0.500	230.415	5.532	0.779
7	0.583	268.817	4.092	0.576
8	0.667	307.220	3.215	0.453
9	0.750	345.622	2.464	0.347
10	0.833	384.025	2.063	0.290
11	0.917	422.427	1.615	0.227
12	1.000	460.829	1.266	0.178
13	1.083	499.232	1.172	0.165
14	1.167	537.634	1.005	0.141

15	1.250	576.037	0.810	0.114
16	1.333	614.439	0.688	0.097
17	1.417	652.842	0.567	0.080
18	1.500	691.244	0.450	0.063
19	1.583	729.647	0.384	0.054
20	1.667	768.049	0.384	0.054
21	1.750	806.452	0.512	0.072
			Sum = 100.000	Sum= 14.079

The following loss rate calculations reflect use of the minimum calculated loss
rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	4.20	0.801	0.039	(0.292)	0.762
2	0.17	4.30	0.820	0.039	(0.299)	0.781
3	0.25	5.00	0.954	0.039	(0.347)	0.914
4	0.33	5.00	0.954	0.039	(0.347)	0.914
5	0.42	5.80	1.106	0.039	(0.403)	1.067
6	0.50	6.50	1.240	0.039	(0.451)	1.201
7	0.58	7.40	1.412	0.039	(0.514)	1.372
8	0.67	8.60	1.641	0.039	(0.597)	1.601
9	0.75	12.30	2.347	0.039	(0.854)	2.307
10	0.83	29.10	5.552	0.039	(2.021)	5.512
11	0.92	6.80	1.297	0.039	(0.472)	1.258
12	1.00	5.00	0.954	0.039	(0.347)	0.914
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	18.6

```
   Flood volume = Effective rainfall      1.55(In)
    times area      14.0(Ac.)/[(In)/(Ft.)] =      1.8(Ac.Ft)
   Total soil loss =      0.04(In)
   Total soil loss =     0.046(Ac.Ft)
   Total rainfall =      1.59(In)
   Flood volume =       78619.0 Cubic Feet
   Total soil loss =       2001.5 Cubic Feet
   --------------------------------------------------------------------
    Peak flow rate of this hydrograph =     34.608(CFS)
   --------------------------------------------------------------------
   ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                       1 - H O U R    S T O R M
                  R u n o f f      H y d r o g r a p h
   --------------------------------------------------------------------
               Hydrograph in   5   Minute intervals ((CFS))

   --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft    Q(CFS)  0       10.0      20.0      30.0      40.0
-----------------------------------------------------------------------
  0+ 5       0.0030      0.44  Q          |         |         |         |
  0+10       0.0184      2.24  V Q        |         |         |         |
```

```
    0+15       0.0537      5.13  |V  Q     |         |         |         |
    0+20       0.1052      7.47  | V    Q  |         |         |         |
    0+25       0.1675      9.06  |  V     Q|         |         |         |
    0+30       0.2395     10.45  |    V    Q         |         |         |
    0+35       0.3224     12.04  |      V  | Q       |         |         |
    0+40       0.4182     13.91  |        V|  Q      |         |         |
    0+45       0.5310     16.37  |         |V    Q   |         |         |
    0+50       0.6806     21.72  |         |    V    |Q        |         |
    0+55       0.8911     30.57  |         |        V|         Q         |
    1+ 0       1.1295     34.61  |         |         |    V    |   Q     |
    1+ 5       1.3188     27.49  |         |         |      Q V|         |
    1+10       1.4443     18.23  |         |       Q |         | V       |
    1+15       1.5261     11.87  |         |Q        |         |  V      |
    1+20       1.5827      8.22  |       Q |         |         |    V    |
    1+25       1.6259      6.27  |     Q   |         |         |     V   |
    1+30       1.6600      4.94  |   Q     |         |         |     V   |
    1+35         6877      4.03  |   Q     |         |         |      V  |
    1+40       1.7102      3.26  |  Q      |         |         |      V  |
    1+45       1.7288      2.70  | Q       |         |         |       V |
    1+50       1.7447      2.30  | Q       |         |         |       V |
    1+55       1.7580      1.93  |Q        |         |         |       V |
    2+ 0       1.7689      1.58  |Q        |         |         |        V|
    2+ 5       1.7779      1.31  |Q        |         |         |        V|
    2+10       1.7852      1.06  |Q        |         |         |        V|
    2+15       1.7911      0.85  Q         |         |         |        V|
    2+20       1.7958      0.69  Q         |         |         |        V|
    2+25       1.7999      0.59  Q         |         |         |        V|
    2+30       1.8034      0.51  Q         |         |         |        V|
    2+35       1.8044      0.14  Q         |         |         |        V|
    2+40       1.8048      0.07  Q         |         |         |         V
-----------------------------------------------------------------------
```

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               U n i t   H y d r o g r a p h   A n a l y s i s

               Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0
                       Study date  03/22/22 File: PP1PUH3100.out


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        Riverside County Synthetic Unit Hydrology Method
        RCFC & WCD Manual date - April 1978


        Program License Serial Number 6443

        ----------------------------------------------------------------------
         English (in-lb) Input Units Used
         English Rainfall Data (Inches) Input Values Used

         English Units used in output format



        ----------------------------------------------------------------------
        PILOT PERRIS
        PROP 100-YR
        XO 3/22/22

        ---------------------------------------------------------------------
        Drainage Area =      13.97(Ac.)  =      0.022 Sq. Mi.
        Drainage Area for Depth-Area Areal Adjustment =      13.97(Ac.)  =
 0.022 Sq. Mi.
        USER Entry of lag time in hours
        Lag time =    0.217 Hr.
        Lag time =    13.02 Min.
        25% of lag time =     3.25 Min.
        40% of lag time =     5.21 Min.
        Unit time =     5.00 Min.
        Duration of storm = 3 Hour(s)
        User Entered Base Flow =     0.00(CFS)

        2 YEAR Area rainfall data:


        Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
               13.97            0.85                   11.90

        100 YEAR Area rainfall data:
```

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.97	2.23	31.15

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.852(In)
Area Averaged 100-Year Rainfall = 2.230(In)

Point rain (area averaged) = 2.230(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 2.230(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
10.190	75.00	0.900
3.780	87.00	0.000

Total Area Entered = 13.97(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
75.0	88.0	0.153	0.900	0.029	0.729	0.021
87.0	94.8	0.068	0.000	0.068	0.271	0.018
					Sum (F) =	0.039

Area averaged mean soil loss (F) (In/Hr) = 0.039
Minimum soil loss rate ((In/Hr)) = 0.020
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.364

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	38.402	4.099	0.577
2	0.167	76.805	16.642	2.343
3	0.250	115.207	25.801	3.633
4	0.333	153.610	18.225	2.566
5	0.417	192.012	9.016	1.269
6	0.500	230.415	5.532	0.779
7	0.583	268.817	4.092	0.576
8	0.667	307.220	3.215	0.453
9	0.750	345.622	2.464	0.347
10	0.833	384.025	2.063	0.290
11	0.917	422.427	1.615	0.227
12	1.000	460.829	1.266	0.178
13	1.083	499.232	1.172	0.165
14	1.167	537.634	1.005	0.141
15	1.250	576.037	0.810	0.114
16	1.333	614.439	0.688	0.097

17	1.417	652.842	0.567	0.080
18	1.500	691.244	0.450	0.063
19	1.583	729.647	0.384	0.054
20	1.667	768.049	0.384	0.054
21	1.750	806.452	0.512	0.072
			Sum = 100.000	Sum= 14.079

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	1.30	0.348	0.039	(0.127)	0.308
2	0.17	1.30	0.348	0.039	(0.127)	0.308
3	0.25	1.10	0.294	0.039	(0.107)	0.255
4	0.33	1.50	0.401	0.039	(0.146)	0.362
5	0.42	1.50	0.401	0.039	(0.146)	0.362
6	0.50	1.80	0.482	0.039	(0.175)	0.442
7	0.58	1.50	0.401	0.039	(0.146)	0.362
8	0.67	1.80	0.482	0.039	(0.175)	0.442
9	0.75	1.80	0.482	0.039	(0.175)	0.442
10	0.83	1.50	0.401	0.039	(0.146)	0.362
11	0.92	1.60	0.428	0.039	(0.156)	0.389
12	1.00	1.80	0.482	0.039	(0.175)	0.442
13	1.08	2.20	0.589	0.039	(0.214)	0.549
14	1.17	2.20	0.589	0.039	(0.214)	0.549
15	1.25	2.20	0.589	0.039	(0.214)	0.549
16	1.33	2.00	0.535	0.039	(0.195)	0.496
17	1.42	2.60	0.696	0.039	(0.253)	0.656
18	1.50	2.70	0.722	0.039	(0.263)	0.683
19	1.58	2.40	0.642	0.039	(0.234)	0.603
20	1.67	2.70	0.722	0.039	(0.263)	0.683
21	1.75	3.30	0.883	0.039	(0.321)	0.844
22	1.83	3.10	0.830	0.039	(0.302)	0.790
23	1.92	2.90	0.776	0.039	(0.282)	0.737
24	2.00	3.00	0.803	0.039	(0.292)	0.763
25	2.08	3.10	0.830	0.039	(0.302)	0.790
26	2.17	4.20	1.124	0.039	(0.409)	1.084
27	2.25	5.00	1.338	0.039	(0.487)	1.298
28	2.33	3.50	0.937	0.039	(0.341)	0.897
29	2.42	6.80	1.820	0.039	(0.662)	1.780
30	2.50	7.30	1.953	0.039	(0.711)	1.914
31	2.58	8.20	2.194	0.039	(0.799)	2.155
32	2.67	5.90	1.579	0.039	(0.575)	1.539
33	2.75	2.00	0.535	0.039	(0.195)	0.496
34	2.83	1.80	0.482	0.039	(0.175)	0.442
35	2.92	1.80	0.482	0.039	(0.175)	0.442
36	3.00	0.60	0.161	0.039	(0.058)	0.121

(Loss Rate Not Used)

```
     Sum =     100.0                                  Sum =    25.3
        Flood volume = Effective rainfall      2.11(In)
         times area      14.0(Ac.)/[(In)/(Ft.)] =       2.5(Ac.Ft)
        Total soil loss =      0.12(In)
        Total soil loss =     0.138(Ac.Ft)
        Total rainfall =      2.23(In)
        Flood volume =      107074.5 Cubic Feet
        Total soil loss =       6004.4 Cubic Feet
        --------------------------------------------------------------------
         Peak flow rate of this hydrograph =     22.197(CFS)
        --------------------------------------------------------------------
        ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                            3 - H O U R    S T O R M
                       R u n o f f      H y d r o g r a p h
        --------------------------------------------------------------------
                    Hydrograph in   5   Minute intervals ((CFS))

        --------------------------------------------------------------------
  Time(h+m) Volume Ac.Ft   Q(CFS)  0        7.5      15.0      22.5      30.0
  -----------------------------------------------------------------------
    0+ 5       0.0012      0.18  Q         |         |         |         |
    0+10       0.0074      0.90  VQ        |         |         |         |
    0+15       0.0211      1.99  V Q       |         |         |         |
    0+20       0.0399      2.72  V  Q      |         |         |         |
    0+25       0.0617      3.17  |V  Q     |         |         |         |
    0+30       0.0872      3.71  |V  Q     |         |         |         |
    0+35       0.1163      4.23  |V   Q    |         |         |         |
    0+40       0.1481      4.62  | V   Q   |         |         |         |
    0+45       0.1817      4.88  | V   Q   |         |         |         |
    0+50       0.2172      5.15  |  V  Q   |         |         |         |
    0+55       0.2533      5.24  |   V Q   |         |         |         |
    1+ 0       0.2891      5.20  |   V Q   |         |         |         |
    1+ 5       0.3263      5.41  |    V Q  |         |         |         |
    1+10       0.3670      5.91  |    V Q  |         |         |         |
    1+15       0.4117      6.49  |     V Q |         |         |         |
    1+20       0.4588      6.84  |      V Q|         |         |         |
    1+25       0.5071      7.01  |       VQ|         |         |         |
    1+30       0.5578      7.35  |        Q|         |         |         |
    1+35       0.6124      7.92  |        VQ         |         |         |
    1+40       0.6696      8.31  |         VQ        |         |         |
    1+45       0.7289      8.61  |         |Q        |         |         |
    1+50       0.7924      9.22  |         | Q       |         |         |
    1+55       0.8604      9.87  |         |  QV     |         |         |
    2+ 0       0.9302     10.13  |         |  Q V    |         |         |
    2+ 5       1.0002     10.17  |         |  Q  V   |         |         |
    2+10       1.0725     10.50  |         |  Q   V  |         |         |
    2+15       1.1518     11.52  |         |    Q  V |         |         |
    2+20       1.2414     13.01  |         |      Q  V         |         |
    2+25       1.3392     14.20  |         |       Q |V        |         |
    2+30       1.4486     15.89  |         |         |Q V      |         |
    2+35       1.5800     19.08  |         |         |    Q    |         |
    2+40       1.7309     21.91  |         |         |       VQ|         |
    2+45       1.8838     22.20  |         |         |        QV         |
```

```
    2+50       2.0144     18.96  |         |         |    Q    | V       |
    2+55       2.1134     14.38  |         |        Q|         |   V     |
    3+ 0       2.1906     11.21  |         |   Q     |         |    V    |
    3+ 5       2.2523      8.96  |         |Q        |         |     V   |
    3+10       2.2983      6.69  |       Q |         |         |      V  |
    3+15       2.3316      4.84  |     Q   |         |         |      V  |
    3+20       2.3569      3.67  |   Q     |         |         |       V |
    3+25       2.3771      2.93  |  Q      |         |         |       V |
    3+30       2.3934      2.37  |  Q      |         |         |       V |
    3+35       2.4068      1.95  | Q       |         |         |        V|
    3+40       2.4180      1.62  | Q       |         |         |        V|
    3+45       2.4271      1.33  |Q        |         |         |        V|
    3+50       2.4347      1.10  |Q        |         |         |        V|
    3+55       2.4409      0.89  |Q        |         |         |        V|
    4+ 0       2.4457      0.71  Q         |         |         |        V|
    4+ 5       2.4498      0.60  Q         |         |         |        V|
    4+10       2.4530      0.46  Q         |         |         |        V|
    4+15       2.4553      0.34  Q         |         |      .20|        V|
    4+20       2.4567      0.20  Q         |         |         |        V|
    4+25       2.4573      0.09  Q         |         |         |        V|
    4+30       2.4578      0.06  Q         |         |         |        V|
    4+35       2.4580      0.04  Q         |         |         |        V|
    4+40       2.4581      0.01  Q         |         |         |         V
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U n i t   H y d r o g r a p h   A n a l y s i s

Study date 03/22/22 File: PP1PUH6100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6443

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

PILOT PERRIS
PROP 100-YR
XO 3/22/22

Drainage Area =   13.97(Ac.) =   0.022 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =   13.97(Ac.) =
0.022 Sq. Mi.
USER Entry of lag time in hours
Lag time =   0.217 Hr.
Lag time =   13.02 Min.
25% of lag time =   3.25 Min.
40% of lag time =   5.21 Min.
Unit time =   5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow =   0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.97	1.18	16.48

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.97	2.94	41.07

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.180(In)
Area Averaged 100-Year Rainfall = 2.940(In)

Point rain (area averaged) = 2.940(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.940(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
10.190	75.00	0.900
3.780	87.00	0.000

Total Area Entered = 13.97(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
75.0	88.0	0.153	0.900	0.029	0.729	0.021
87.0	94.8	0.068	0.000	0.068	0.271	0.018
					Sum (F) =	0.039

Area averaged mean soil loss (F) (In/Hr) = 0.039
Minimum soil loss rate ((In/Hr)) = 0.020
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.364

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	38.402	4.099	0.577
2	0.167	76.805	16.642	2.343
3	0.250	115.207	25.801	3.633
4	0.333	153.610	18.225	2.566
5	0.417	192.012	9.016	1.269
6	0.500	230.415	5.532	0.779
7	0.583	268.817	4.092	0.576
8	0.667	307.220	3.215	0.453
9	0.750	345.622	2.464	0.347
10	0.833	384.025	2.063	0.290
11	0.917	422.427	1.615	0.227
12	1.000	460.829	1.266	0.178
13	1.083	499.232	1.172	0.165
14	1.167	537.634	1.005	0.141
15	1.250	576.037	0.810	0.114
16	1.333	614.439	0.688	0.097

17	1.417	652.842	0.567	0.080
18	1.500	691.244	0.450	0.063
19	1.583	729.647	0.384	0.054
20	1.667	768.049	0.384	0.054
21	1.750	806.452	0.512	0.072
			Sum = 100.000	Sum= 14.079

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.50	0.176	0.039	(0.064)	0.137
2	0.17	0.60	0.212	0.039	(0.077)	0.172
3	0.25	0.60	0.212	0.039	(0.077)	0.172
4	0.33	0.60	0.212	0.039	(0.077)	0.172
5	0.42	0.60	0.212	0.039	(0.077)	0.172
6	0.50	0.70	0.247	0.039	(0.090)	0.207
7	0.58	0.70	0.247	0.039	(0.090)	0.207
8	0.67	0.70	0.247	0.039	(0.090)	0.207
9	0.75	0.70	0.247	0.039	(0.090)	0.207
10	0.83	0.70	0.247	0.039	(0.090)	0.207
11	0.92	0.70	0.247	0.039	(0.090)	0.207
12	1.00	0.80	0.282	0.039	(0.103)	0.243
13	1.08	0.80	0.282	0.039	(0.103)	0.243
14	1.17	0.80	0.282	0.039	(0.103)	0.243
15	1.25	0.80	0.282	0.039	(0.103)	0.243
16	1.33	0.80	0.282	0.039	(0.103)	0.243
17	1.42	0.80	0.282	0.039	(0.103)	0.243
18	1.50	0.80	0.282	0.039	(0.103)	0.243
19	1.58	0.80	0.282	0.039	(0.103)	0.243
20	1.67	0.80	0.282	0.039	(0.103)	0.243
21	1.75	0.80	0.282	0.039	(0.103)	0.243
22	1.83	0.80	0.282	0.039	(0.103)	0.243
23	1.92	0.80	0.282	0.039	(0.103)	0.243
24	2.00	0.90	0.318	0.039	(0.116)	0.278
25	2.08	0.80	0.282	0.039	(0.103)	0.243
26	2.17	0.90	0.318	0.039	(0.116)	0.278
27	2.25	0.90	0.318	0.039	(0.116)	0.278
28	2.33	0.90	0.318	0.039	(0.116)	0.278
29	2.42	0.90	0.318	0.039	(0.116)	0.278
30	2.50	0.90	0.318	0.039	(0.116)	0.278
31	2.58	0.90	0.318	0.039	(0.116)	0.278
32	2.67	0.90	0.318	0.039	(0.116)	0.278
33	2.75	1.00	0.353	0.039	(0.128)	0.313
34	2.83	1.00	0.353	0.039	(0.128)	0.313
35	2.92	1.00	0.353	0.039	(0.128)	0.313
36	3.00	1.00	0.353	0.039	(0.128)	0.313
37	3.08	1.00	0.353	0.039	(0.128)	0.313

38	3.17	1.10	0.388	0.039	(0.141)	0.349
39	3.25	1.10	0.388	0.039	(0.141)	0.349
40	3.33	1.10	0.388	0.039	(0.141)	0.349
41	3.42	1.20	0.423	0.039	(0.154)	0.384
42	3.50	1.30	0.459	0.039	(0.167)	0.419
43	3.58	1.40	0.494	0.039	(0.180)	0.454
44	3.67	1.40	0.494	0.039	(0.180)	0.454
45	3.75	1.50	0.529	0.039	(0.193)	0.490
46	3.83	1.50	0.529	0.039	(0.193)	0.490
47	3.92	1.60	0.564	0.039	(0.205)	0.525
48	4.00	1.60	0.564	0.039	(0.205)	0.525
49	4.08	1.70	0.600	0.039	(0.218)	0.560
50	4.17	1.80	0.635	0.039	(0.231)	0.596
51	4.25	1.90	0.670	0.039	(0.244)	0.631
52	4.33	2.00	0.706	0.039	(0.257)	0.666
53	4.42	2.10	0.741	0.039	(0.270)	0.701
54	4.50	2.10	0.741	0.039	(0.270)	0.701
55	4.58	2.20	0.776	0.039	(0.283)	0.737
56	4.67	2.30	0.811	0.039	(0.295)	0.772
57	4.75	2.40	0.847	0.039	(0.308)	0.807
58	4.83	2.40	0.847	0.039	(0.308)	0.807
59	4.92	2.50	0.882	0.039	(0.321)	0.842
60	5.00	2.60	0.917	0.039	(0.334)	0.878
61	5.08	3.10	1.094	0.039	(0.398)	1.054
62	5.17	3.60	1.270	0.039	(0.462)	1.231
63	5.25	3.90	1.376	0.039	(0.501)	1.336
64	5.33	4.20	1.482	0.039	(0.539)	1.442
65	5.42	4.70	1.658	0.039	(0.604)	1.619
66	5.50	5.60	1.976	0.039	(0.719)	1.936
67	5.58	1.90	0.670	0.039	(0.244)	0.631
68	5.67	0.90	0.318	0.039	(0.116)	0.278
69	5.75	0.60	0.212	0.039	(0.077)	0.172
70	5.83	0.50	0.176	0.039	(0.064)	0.137
71	5.92	0.30	0.106	(0.039)	0.039	0.067
72	6.00	0.20	0.071	(0.039)	0.026	0.045

(Loss Rate Not Used)

Sum = 100.0 Sum = 32.5

Flood volume = Effective rainfall 2.70(In)
times area 14.0(Ac.)/[(In)/(Ft.)] = 3.1(Ac.Ft)
Total soil loss = 0.24(In)
Total soil loss = 0.274(Ac.Ft)
Total rainfall = 2.94(In)
Flood volume = 137137.0 Cubic Feet
Total soil loss = 11946.5 Cubic Feet

Peak flow rate of this hydrograph = 19.548(CFS)

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6 - H O U R S T O R M

R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

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      -------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0       10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5       0.0005      0.08  Q         |         |         |         |
  0+10       0.0034      0.42  Q         |         |         |         |
  0+15       0.0103      1.00  V Q       |         |         |         |
  0+20       0.0205      1.48  V Q       |         |         |         |
  0+25       0.0325      1.74  V  Q      |         |         |         |
  0+30       0.0457      1.92  V  Q      |         |         |         |
  0+35       0.0603      2.11  V   Q     |         |         |         |
  0+40       0.0762      2.32  V   Q     |         |         |         |
  0+45       0.0932      2.47  |V  Q     |         |         |         |
  0+50       0.1109      2.57  |V   Q    |         |         |         |
  0+55       0.1291      2.64  |V   Q    |         |         |         |
  1+ 0       0.1477      2.71  |V   Q    |         |         |         |
  1+ 5       0.1673      2.84  | V  Q    |         |         |         |
  1+10       0.1879      3.00  | V   Q   |         |         |         |
  1+15       0.2095      3.12  | V   Q   |         |         |         |
  1+20       0.2315      3.19  | V   Q   |         |         |         |
  1+25       0.2538      3.24  |  V  Q   |         |         |         |
  1+30       0.2764      3.28  |  V  Q   |         |         |         |
  1+35       0.2992      3.31  |  V  Q   |         |         |         |
  1+40       0.3221      3.34  |   V Q   |         |         |         |
  1+45       0.3453      3.36  |   V Q   |         |         |         |
  1+50       0.3685      3.38  |   V Q   |         |         |         |
  1+55       0.3918      3.38  |   V Q   |         |         |         |
  2+ 0       0.4153      3.41  |    VQ   |         |         |         |
  2+ 5       0.4393      3.48  |    VQ   |         |         |         |
  2+10       0.4638      3.55  |    V Q  |         |         |         |
  2+15       0.4886      3.60  |     VQ  |         |         |         |
  2+20       0.5140      3.69  |     VQ  |         |         |         |
  2+25       0.5399      3.76  |     VQ  |         |         |         |
  2+30       0.5661      3.80  |      Q  |         |         |         |
  2+35       0.5924      3.83  |      Q  |         |         |         |
  2+40       0.6189      3.85  |      Q  |         |         |         |
  2+45       0.6457      3.88  |      QV |         |         |         |
  2+50       0.6730      3.97  |      QV |         |         |         |
  2+55       0.7013      4.11  |       Q |         |         |         |
  3+ 0       0.7303      4.21  |       QV|         |         |         |
  3+ 5       0.7596      4.26  |       QV|         |         |         |
  3+10       0.7893      4.31  |       Q V         |         |         |
  3+15       0.8198      4.42  |       Q V         |         |         |
  3+20       0.8512      4.57  |        QV         |         |         |
  3+25       0.8835      4.69  |        Q|V        |         |         |
  3+30       0.9170      4.85  |        Q|V        |         |         |
  3+35       0.9522      5.12  |         Q V       |         |         |
  3+40       0.9898      5.45  |         Q V       |         |         |
  3+45       1.0294      5.76  |         |Q V      |         |         |
  3+50       1.0709      6.02  |         | QV      |         |         |
  3+55       1.1142      6.28  |         | Q V     |         |         |
  4+ 0       1.1591      6.53  |         |  QV     |         |         |
  4+ 5       1.2058      6.78  |         |  Q V    |         |         |
  4+10       1.2543      7.05  |         |   QV    |         |         |
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    4+15       1.3051       7.38  |         |   Q V   |         |         |
    4+20       1.3587       7.78  |         |    Q V  |         |         |
    4+25       1.4152       8.20  |         |     QV  |         |         |
    4+30       1.4745       8.62  |         |      QV |         |         |
    4+35       1.5365       8.99  |         |      Q V|         |         |
    4+40       1.6007       9.32  |         |       Q V         |         |
    4+45       1.6675       9.70  |         |        Q|V        |         |
    4+50       1.7371      10.11  |         |         Q V       |         |
    4+55       1.8093      10.48  |         |         Q V       |         |
    5+ 0       1.8837      10.81  |         |         |Q V      |         |
    5+ 5       1.9614      11.27  |         |         | Q V     |         |
    5+10       2.0448      12.12  |         |         |   QV    |         |
    5+15       2.1375      13.45  |         |         |     QV  |         |
    5+20       2.2408      15.00  |         |         |       VQ|         |
    5+25       2.3545      16.51  |         |         |        V|   Q     |
    5+30       2.4798      18.21  |         |         |         |V    Q   |
    5+35       2.6145      19.55  |         |         |         |  V     Q|
    5+40       2.7408      18.34  |         |         |         |   V Q   |
    5+45       2.8377      14.08  |         |         |       Q |     V   |
    5+50       2.9064       9.97  |         |        Q|         |     V   |
    5+5 |      2.9578       7.46  |         |   Q     |         |      V  |
    6+ 0       2.9980       5.84  |         |Q        |         |       V |
    6+ 5       3.0297       4.60  |        Q|         |         |       V |
    6+10       3.0543       3.58  |      Q  |         |         |       V |
    6+15       3.0736       2.80  |    Q    |         |         |        V|
    6+20       3.0888       2.21  |   Q     |         |         |        V|
    6+25       3.1012       1.80  |  Q      |         |         |        V|
    6+30       3.1114       1.49  | Q       |         |         |        V|
    6+35       3.1199       1.22  | Q       |         |         |        V|
    6+40       3.1267       1.00  |Q        |         |         |        V|
    6+45       3.1323       0.82  |Q        |         |         |        V|
    6+50       3.1369       0.66  |Q        |         |         |        V|
    6+55       3.1405       0.52  |Q        |         |         |        V|
    7+ 0       3.1433       0.41  Q         |         |         |        V|
    7+ 5       3.1454       0.31  Q         |         |         |        V|
    7+10       3.1470       0.22  Q         |         |         |        V|
    7+15       3.1476       0.09  Q         |         |         |        V|
    7+20       3.1479       0.04  Q         |         |         |        V|
    7+25       3.1481       0.03  Q         |         |         |        V|
    7+30       3.1482       0.02  Q         |         |         |        V|
    7+35       3.1482       0.01  Q         |         |         |        V|
    7+40       3.1482       0.00  Q         |         |         |         V
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U n i t   H y d r o g r a p h   A n a l y s i s

Study date 03/22/22 File: PP1PUH24100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6443

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

PILOT PERRIS
PROP 100-YR
XO 3/22/22

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Drainage Area for Depth-Area Areal Adjustment = 13.97(Ac.) = 0.022 Sq. Mi.
USER Entry of lag time in hours
Lag time = 0.217 Hr.
Lag time = 13.02 Min.
25% of lag time = 3.25 Min.
40% of lag time = 5.21 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.97	2.05	28.64

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.97	5.33	74.46

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 2.050(In)
Area Averaged 100-Year Rainfall = 5.330(In)

Point rain (area averaged) = 5.330(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 5.330(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
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Total Area Entered = 13.97(Ac.)

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87.0	94.8	0.068	0.000	0.068	0.271	0.018
					Sum (F) =	0.039

Area averaged mean soil loss (F) (In/Hr) = 0.039
Minimum soil loss rate ((In/Hr)) = 0.020
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.364

U n i t H y d r o g r a p h
VALLEY S-Curve

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7	0.583	268.817	4.092	0.576
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18	1.500	691.244	0.450	0.063
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20	1.667	768.049	0.384	0.054
21	1.750	806.452	0.512	0.072
			Sum = 100.000	Sum= 14.079

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.043	(0.070)	0.016	0.027
2	0.17	0.07	0.043	(0.070)	0.016	0.027
3	0.25	0.07	0.043	(0.069)	0.016	0.027
4	0.33	0.10	0.064	(0.069)	0.023	0.041
5	0.42	0.10	0.064	(0.069)	0.023	0.041
6	0.50	0.10	0.064	(0.069)	0.023	0.041
7	0.58	0.10	0.064	(0.068)	0.023	0.041
8	0.67	0.10	0.064	(0.068)	0.023	0.041
9	0.75	0.10	0.064	(0.068)	0.023	0.041
10	0.83	0.13	0.085	(0.068)	0.031	0.054
11	0.92	0.13	0.085	(0.067)	0.031	0.054
12	1.00	0.13	0.085	(0.067)	0.031	0.054
13	1.08	0.10	0.064	(0.067)	0.023	0.041
14	1.17	0.10	0.064	(0.066)	0.023	0.041
15	1.25	0.10	0.064	(0.066)	0.023	0.041
16	1.33	0.10	0.064	(0.066)	0.023	0.041
17	1.42	0.10	0.064	(0.066)	0.023	0.041
18	1.50	0.10	0.064	(0.065)	0.023	0.041
19	1.58	0.10	0.064	(0.065)	0.023	0.041
20	1.67	0.10	0.064	(0.065)	0.023	0.041
21	1.75	0.10	0.064	(0.065)	0.023	0.041
22	1.83	0.13	0.085	(0.064)	0.031	0.054
23	1.92	0.13	0.085	(0.064)	0.031	0.054
24	2.00	0.13	0.085	(0.064)	0.031	0.054
25	2.08	0.13	0.085	(0.064)	0.031	0.054
26	2.17	0.13	0.085	(0.063)	0.031	0.054
27	2.25	0.13	0.085	(0.063)	0.031	0.054
28	2.33	0.13	0.085	(0.063)	0.031	0.054
29	2.42	0.13	0.085	(0.063)	0.031	0.054
30	2.50	0.13	0.085	(0.062)	0.031	0.054
31	2.58	0.17	0.107	(0.062)	0.039	0.068
32	2.67	0.17	0.107	(0.062)	0.039	0.068
33	2.75	0.17	0.107	(0.062)	0.039	0.068
34	2.83	0.17	0.107	(0.061)	0.039	0.068
35	2.92	0.17	0.107	(0.061)	0.039	0.068
36	3.00	0.17	0.107	(0.061)	0.039	0.068
37	3.08	0.17	0.107	(0.061)	0.039	0.068

38	3.17	0.17	0.107	(0.060)	0.039	0.068
39	3.25	0.17	0.107	(0.060)	0.039	0.068
40	3.33	0.17	0.107	(0.060)	0.039	0.068
41	3.42	0.17	0.107	(0.060)	0.039	0.068
42	3.50	0.17	0.107	(0.059)	0.039	0.068
43	3.58	0.17	0.107	(0.059)	0.039	0.068
44	3.67	0.17	0.107	(0.059)	0.039	0.068
45	3.75	0.17	0.107	(0.059)	0.039	0.068
46	3.83	0.20	0.128	(0.058)	0.047	0.081
47	3.92	0.20	0.128	(0.058)	0.047	0.081
48	4.00	0.20	0.128	(0.058)	0.047	0.081
49	4.08	0.20	0.128	(0.058)	0.047	0.081
50	4.17	0.20	0.128	(0.057)	0.047	0.081
51	4.25	0.20	0.128	(0.057)	0.047	0.081
52	4.33	0.23	0.149	(0.057)	0.054	0.095
53	4.42	0.23	0.149	(0.057)	0.054	0.095
54	4.50	0.23	0.149	(0.056)	0.054	0.095
55	4.58	0.23	0.149	(0.056)	0.054	0.095
56	4.67	0.23	0.149	(0.056)	0.054	0.095
57	4.75	0.23	0.149	(0.056)	0.054	0.095
58	4.83	0.27	0.171	0.055	(0.062)	0.115
59	4.92	0.27	0.171	0.055	(0.062)	0.115
60	5.00	0.27	0.171	0.055	(0.062)	0.116
61	5.08	0.20	0.128	(0.055)	0.047	0.081
62	5.17	0.20	0.128	(0.054)	0.047	0.081
63	5.25	0.20	0.128	(0.054)	0.047	0.081
64	5.33	0.23	0.149	0.054	(0.054)	0.095
65	5.42	0.23	0.149	0.054	(0.054)	0.096
66	5.50	0.23	0.149	0.053	(0.054)	0.096
67	5.58	0.27	0.171	0.053	(0.062)	0.117
68	5.67	0.27	0.171	0.053	(0.062)	0.118
69	5.75	0.27	0.171	0.053	(0.062)	0.118
70	5.83	0.27	0.171	0.053	(0.062)	0.118
71	5.92	0.27	0.171	0.052	(0.062)	0.118
72	6.00	0.27	0.171	0.052	(0.062)	0.118
73	6.08	0.30	0.192	0.052	(0.070)	0.140
74	6.17	0.30	0.192	0.052	(0.070)	0.140
75	6.25	0.30	0.192	0.051	(0.070)	0.140
76	6.33	0.30	0.192	0.051	(0.070)	0.141
77	6.42	0.30	0.192	0.051	(0.070)	0.141
78	6.50	0.30	0.192	0.051	(0.070)	0.141
79	6.58	0.33	0.213	0.050	(0.078)	0.163
80	6.67	0.33	0.213	0.050	(0.078)	0.163
81	6.75	0.33	0.213	0.050	(0.078)	0.163
82	6.83	0.33	0.213	0.050	(0.078)	0.163
83	6.92	0.33	0.213	0.050	(0.078)	0.164
84	7.00	0.33	0.213	0.049	(0.078)	0.164
85	7.08	0.33	0.213	0.049	(0.078)	0.164
86	7.17	0.33	0.213	0.049	(0.078)	0.164
87	7.25	0.33	0.213	0.049	(0.078)	0.165
88	7.33	0.37	0.235	0.048	(0.085)	0.186
89	7.42	0.37	0.235	0.048	(0.085)	0.186
90	7.50	0.37	0.235	0.048	(0.085)	0.186

91	7.58	0.40	0.256	0.048	(0.093)	0.208
92	7.67	0.40	0.256	0.048	(0.093)	0.208
93	7.75	0.40	0.256	0.047	(0.093)	0.208
94	7.83	0.43	0.277	0.047	(0.101)	0.230
95	7.92	0.43	0.277	0.047	(0.101)	0.230
96	8.00	0.43	0.277	0.047	(0.101)	0.230
97	8.08	0.50	0.320	0.046	(0.116)	0.273
98	8.17	0.50	0.320	0.046	(0.116)	0.274
99	8.25	0.50	0.320	0.046	(0.116)	0.274
100	8.33	0.50	0.320	0.046	(0.116)	0.274
101	8.42	0.50	0.320	0.046	(0.116)	0.274
102	8.50	0.50	0.320	0.045	(0.116)	0.274
103	8.58	0.53	0.341	0.045	(0.124)	0.296
104	8.67	0.53	0.341	0.045	(0.124)	0.296
105	8.75	0.53	0.341	0.045	(0.124)	0.296
106	8.83	0.57	0.362	0.045	(0.132)	0.318
107	8.92	0.57	0.362	0.044	(0.132)	0.318
108	9.00	0.57	0.362	0.044	(0.132)	0.318
109	9.08	0.63	0.405	0.044	(0.147)	0.361
110	9.17	0.63	0.405	0.044	(0.147)	0.361
111	9.25	0.63	0.405	0.044	(0.147)	0.362
112	9.33	0.67	0.426	0.043	(0.155)	0.383
113	9.42	0.67	0.426	0.043	(0.155)	0.383
114	9.50	0.67	0.426	0.043	(0.155)	0.383
115	9.58	0.70	0.448	0.043	(0.163)	0.405
116	9.67	0.70	0.448	0.042	(0.163)	0.405
117	9.75	0.70	0.448	0.042	(0.163)	0.405
118	9.83	0.73	0.469	0.042	(0.171)	0.427
119	9.92	0.73	0.469	0.042	(0.171)	0.427
120	10.00	0.73	0.469	0.042	(0.171)	0.427
121	10.08	0.50	0.320	0.041	(0.116)	0.278
122	10.17	0.50	0.320	0.041	(0.116)	0.279
123	10.25	0.50	0.320	0.041	(0.116)	0.279
124	10.33	0.50	0.320	0.041	(0.116)	0.279
125	10.42	0.50	0.320	0.041	(0.116)	0.279
126	10.50	0.50	0.320	0.040	(0.116)	0.279
127	10.58	0.67	0.426	0.040	(0.155)	0.386
128	10.67	0.67	0.426	0.040	(0.155)	0.386
129	10.75	0.67	0.426	0.040	(0.155)	0.387
130	10.83	0.67	0.426	0.040	(0.155)	0.387
131	10.92	0.67	0.426	0.039	(0.155)	0.387
132	11.00	0.67	0.426	0.039	(0.155)	0.387
133	11.08	0.63	0.405	0.039	(0.147)	0.366
134	11.17	0.63	0.405	0.039	(0.147)	0.366
135	11.25	0.63	0.405	0.039	(0.147)	0.366
136	11.33	0.63	0.405	0.039	(0.147)	0.367
137	11.42	0.63	0.405	0.038	(0.147)	0.367
138	11.50	0.63	0.405	0.038	(0.147)	0.367
139	11.58	0.57	0.362	0.038	(0.132)	0.324
140	11.67	0.57	0.362	0.038	(0.132)	0.325
141	11.75	0.57	0.362	0.038	(0.132)	0.325
142	11.83	0.60	0.384	0.037	(0.140)	0.346
143	11.92	0.60	0.384	0.037	(0.140)	0.347

144	12.00	0.60	0.384	0.037	(0.140)	0.347
145	12.08	0.83	0.533	0.037	(0.194)	0.496
146	12.17	0.83	0.533	0.037	(0.194)	0.496
147	12.25	0.83	0.533	0.036	(0.194)	0.497
148	12.33	0.87	0.554	0.036	(0.202)	0.518
149	12.42	0.87	0.554	0.036	(0.202)	0.518
150	12.50	0.87	0.554	0.036	(0.202)	0.518
151	12.58	0.93	0.597	0.036	(0.217)	0.561
152	12.67	0.93	0.597	0.036	(0.217)	0.561
153	12.75	0.93	0.597	0.035	(0.217)	0.562
154	12.83	0.97	0.618	0.035	(0.225)	0.583
155	12.92	0.97	0.618	0.035	(0.225)	0.583
156	13.00	0.97	0.618	0.035	(0.225)	0.583
157	13.08	1.13	0.725	0.035	(0.264)	0.690
158	13.17	1.13	0.725	0.035	(0.264)	0.690
159	13.25	1.13	0.725	0.034	(0.264)	0.691
160	13.33	1.13	0.725	0.034	(0.264)	0.691
161	13.42	1.13	0.725	0.034	(0.264)	0.691
162	13.50	1.13	0.725	0.034	(0.264)	0.691
163	13.58	0.77	0.490	0.034	(0.178)	0.457
164	13.67	0.77	0.490	0.033	(0.178)	0.457
165	13.75	0.77	0.490	0.033	(0.178)	0.457
166	13.83	0.77	0.490	0.033	(0.178)	0.457
167	13.92	0.77	0.490	0.033	(0.178)	0.457
168	14.00	0.77	0.490	0.033	(0.178)	0.458
169	14.08	0.90	0.576	0.033	(0.210)	0.543
170	14.17	0.90	0.576	0.032	(0.210)	0.543
171	14.25	0.90	0.576	0.032	(0.210)	0.543
172	14.33	0.87	0.554	0.032	(0.202)	0.522
173	14.42	0.87	0.554	0.032	(0.202)	0.522
174	14.50	0.87	0.554	0.032	(0.202)	0.523
175	14.58	0.87	0.554	0.032	(0.202)	0.523
176	14.67	0.87	0.554	0.031	(0.202)	0.523
177	14.75	0.87	0.554	0.031	(0.202)	0.523
178	14.83	0.83	0.533	0.031	(0.194)	0.502
179	14.92	0.83	0.533	0.031	(0.194)	0.502
180	15.00	0.83	0.533	0.031	(0.194)	0.502
181	15.08	0.80	0.512	0.031	(0.186)	0.481
182	15.17	0.80	0.512	0.031	(0.186)	0.481
183	15.25	0.80	0.512	0.030	(0.186)	0.481
184	15.33	0.77	0.490	0.030	(0.178)	0.460
185	15.42	0.77	0.490	0.030	(0.178)	0.460
186	15.50	0.77	0.490	0.030	(0.178)	0.460
187	15.58	0.63	0.405	0.030	(0.147)	0.375
188	15.67	0.63	0.405	0.030	(0.147)	0.375
189	15.75	0.63	0.405	0.029	(0.147)	0.376
190	15.83	0.63	0.405	0.029	(0.147)	0.376
191	15.92	0.63	0.405	0.029	(0.147)	0.376
192	16.00	0.63	0.405	0.029	(0.147)	0.376
193	16.08	0.13	0.085	0.029	(0.031)	0.056
194	16.17	0.13	0.085	0.029	(0.031)	0.057
195	16.25	0.13	0.085	0.029	(0.031)	0.057
196	16.33	0.13	0.085	0.028	(0.031)	0.057

197	16.42	0.13	0.085	0.028	(0.031)	0.057
198	16.50	0.13	0.085	0.028	(0.031)	0.057
199	16.58	0.10	0.064	(0.028)	0.023	0.041
200	16.67	0.10	0.064	(0.028)	0.023	0.041
201	16.75	0.10	0.064	(0.028)	0.023	0.041
202	16.83	0.10	0.064	(0.028)	0.023	0.041
203	16.92	0.10	0.064	(0.027)	0.023	0.041
204	17.00	0.10	0.064	(0.027)	0.023	0.041
205	17.08	0.17	0.107	0.027	(0.039)	0.079
206	17.17	0.17	0.107	0.027	(0.039)	0.080
207	17.25	0.17	0.107	0.027	(0.039)	0.080
208	17.33	0.17	0.107	0.027	(0.039)	0.080
209	17.42	0.17	0.107	0.027	(0.039)	0.080
210	17.50	0.17	0.107	0.026	(0.039)	0.080
211	17.58	0.17	0.107	0.026	(0.039)	0.080
212	17.67	0.17	0.107	0.026	(0.039)	0.080
213	17.75	0.17	0.107	0.026	(0.039)	0.081
214	17.83	0.13	0.085	0.026	(0.031)	0.059
215	17.92	0.13	0.085	0.026	(0.031)	0.059
216	18.00	0.13	0.085	0.026	(0.031)	0.060
217	18.08	0.13	0.085	0.026	(0.031)	0.060
218	18.17	0.13	0.085	0.025	(0.031)	0.060
219	18.25	0.13	0.085	0.025	(0.031)	0.060
220	18.33	0.13	0.085	0.025	(0.031)	0.060
221	18.42	0.13	0.085	0.025	(0.031)	0.060
222	18.50	0.13	0.085	0.025	(0.031)	0.060
223	18.58	0.10	0.064	(0.025)	0.023	0.041
224	18.67	0.10	0.064	(0.025)	0.023	0.041
225	18.75	0.10	0.064	(0.025)	0.023	0.041
226	18.83	0.07	0.043	(0.024)	0.016	0.027
227	18.92	0.07	0.043	(0.024)	0.016	0.027
228	19.00	0.07	0.043	(0.024)	0.016	0.027
229	19.08	0.10	0.064	(0.024)	0.023	0.041
230	19.17	0.10	0.064	(0.024)	0.023	0.041
231	19.25	0.10	0.064	(0.024)	0.023	0.041
232	19.33	0.13	0.085	0.024	(0.031)	0.062
233	19.42	0.13	0.085	0.024	(0.031)	0.062
234	19.50	0.13	0.085	0.024	(0.031)	0.062
235	19.58	0.10	0.064	(0.023)	0.023	0.041
236	19.67	0.10	0.064	(0.023)	0.023	0.041
237	19.75	0.10	0.064	0.023	(0.023)	0.041
238	19.83	0.07	0.043	(0.023)	0.016	0.027
239	19.92	0.07	0.043	(0.023)	0.016	0.027
240	20.00	0.07	0.043	(0.023)	0.016	0.027
241	20.08	0.10	0.064	0.023	(0.023)	0.041
242	20.17	0.10	0.064	0.023	(0.023)	0.041
243	20.25	0.10	0.064	0.023	(0.023)	0.041
244	20.33	0.10	0.064	0.023	(0.023)	0.041
245	20.42	0.10	0.064	0.022	(0.023)	0.042
246	20.50	0.10	0.064	0.022	(0.023)	0.042
247	20.58	0.10	0.064	0.022	(0.023)	0.042
248	20.67	0.10	0.064	0.022	(0.023)	0.042
249	20.75	0.10	0.064	0.022	(0.023)	0.042

250	20.83	0.07	0.043	(0.022)	0.016	0.027
251	20.92	0.07	0.043	(0.022)	0.016	0.027
252	21.00	0.07	0.043	(0.022)	0.016	0.027
253	21.08	0.10	0.064	0.022	(0.023)	0.042
254	21.17	0.10	0.064	0.022	(0.023)	0.042
255	21.25	0.10	0.064	0.022	(0.023)	0.042
256	21.33	0.07	0.043	(0.021)	0.016	0.027
257	21.42	0.07	0.043	(0.021)	0.016	0.027
258	21.50	0.07	0.043	(0.021)	0.016	0.027
259	21.58	0.10	0.064	0.021	(0.023)	0.043
260	21.67	0.10	0.064	0.021	(0.023)	0.043
261	21.75	0.10	0.064	0.021	(0.023)	0.043
262	21.83	0.07	0.043	(0.021)	0.016	0.027
263	21.92	0.07	0.043	(0.021)	0.016	0.027
264	22.00	0.07	0.043	(0.021)	0.016	0.027
265	22.08	0.10	0.064	0.021	(0.023)	0.043
266	22.17	0.10	0.064	0.021	(0.023)	0.043
267	22.25	0.10	0.064	0.021	(0.023)	0.043
268	22.33	0.07	0.043	(0.021)	0.016	0.027
269	22.42	0.07	0.043	(0.021)	0.016	0.027
270	22.50	0.07	0.043	(0.020)	0.016	0.027
271	22.58	0.07	0.043	(0.020)	0.016	0.027
272	22.67	0.07	0.043	(0.020)	0.016	0.027
273	22.75	0.07	0.043	(0.020)	0.016	0.027
274	22.83	0.07	0.043	(0.020)	0.016	0.027
275	22.92	0.07	0.043	(0.020)	0.016	0.027
276	23.00	0.07	0.043	(0.020)	0.016	0.027
277	23.08	0.07	0.043	(0.020)	0.016	0.027
278	23.17	0.07	0.043	(0.020)	0.016	0.027
279	23.25	0.07	0.043	(0.020)	0.016	0.027
280	23.33	0.07	0.043	(0.020)	0.016	0.027
281	23.42	0.07	0.043	(0.020)	0.016	0.027
282	23.50	0.07	0.043	(0.020)	0.016	0.027
283	23.58	0.07	0.043	(0.020)	0.016	0.027
284	23.67	0.07	0.043	(0.020)	0.016	0.027
285	23.75	0.07	0.043	(0.020)	0.016	0.027
286	23.83	0.07	0.043	(0.020)	0.016	0.027
287	23.92	0.07	0.043	(0.020)	0.016	0.027
288	24.00	0.07	0.043	(0.020)	0.016	0.027

(Loss Rate Not Used)

Sum = 100.0 Sum = 54.5

Flood volume = Effective rainfall 4.54(In)
times area 14.0(Ac.)/[(In)/(Ft.)] = 5.3(Ac.Ft)
Total soil loss = 0.79(In)
Total soil loss = 0.922(Ac.Ft)
Total rainfall = 5.33(In)
Flood volume = 230127.4 Cubic Feet
Total soil loss = 40155.4 Cubic Feet

Peak flow rate of this hydrograph = 9.310(CFS)

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24 - H O U R S T O R M

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                    R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
  0+ 5       0.0001      0.02  Q         |         |         |         |
  0+10       0.0007      0.08  Q         |         |         |         |
  0+15       0.0019      0.18  Q         |         |         |         |
  0+20       0.0036      0.26  VQ        |         |         |         |
  0+25       0.0058      0.32  VQ        |         |         |         |
  0+30       0.0085      0.39  VQ        |         |         |         |
  0+35       0.0116      0.44  VQ        |         |         |         |
  0+40       0.0148      0.47  VQ        |         |         |         |
  0+45       0.0182      0.49  VQ        |         |         |         |
  0+50       0.0218      0.52  V Q       |         |         |         |
  0+55       0.0256      0.56  V Q       |         |         |         |
  1+ 0       0.0299      0.62  V Q       |         |         |         |
  1+ 5       0.0344      0.65  V Q       |         |         |         |
  1+10       0.0388      0.65  V Q       |         |         |         |
  1+15       0.0431      0.61  V Q       |         |         |         |
  1+20       0.0471      0.59  V Q       |         |         |         |
  1+25       0.0511      0.58  V Q       |         |         |         |
  1+30       0.0552      0.58  V Q       |         |         |         |
  1+35       0.0591      0.58  V Q       |         |         |         |
  1+40       0.0631      0.58  V Q       |         |         |         |
  1+45       0.0671      0.58  V Q       |         |         |         |
  1+50       0.0712      0.59  V Q       |         |         |         |
  1+55       0.0754      0.62  V Q       |         |         |         |
  2+ 0       0.0800      0.67  V Q       |         |         |         |
  2+ 5       0.0849      0.70  V Q       |         |         |         |
  2+10       0.0898      0.72  V Q       |         |         |         |
  2+15       0.0948      0.73  V Q       |         |         |         |
  2+20       0.0999      0.73  V Q       |         |         |         |
  2+25       0.1050      0.74  V Q       |         |         |         |
  2+30       0.1101      0.75  V Q       |         |         |         |
  2+35       0.1153      0.76  V  Q      |         |         |         |
  2+40       0.1208      0.79  V  Q      |         |         |         |
  2+45       0.1266      0.84  V  Q      |         |         |         |
  2+50       0.1326      0.88  |V Q      |         |         |         |
  2+55       0.1388      0.90  |V Q      |         |         |         |
  3+ 0       0.1451      0.91  |V Q      |         |         |         |
  3+ 5       0.1514      0.92  |V Q      |         |         |         |
  3+10       0.1578      0.93  |V Q      |         |         |         |
  3+15       0.1642      0.93  |V Q      |         |         |         |
  3+20       0.1706      0.94  |V Q      |         |         |         |
  3+25       0.1771      0.94  |V Q      |         |         |         |
  3+30       0.1836      0.94  |V Q      |         |         |         |
  3+35       0.1901      0.95  |V Q      |         |         |         |
  3+40       0.1967      0.95  |V Q      |         |         |         |
  3+45       0.2032      0.95  |V Q      |         |         |         |
  3+50       0.2098      0.96  |V Q      |         |         |         |
```

```
3+55       0.2166      0.99  |V Q      |         |         |         |
4+ 0       0.2238      1.04  |V  Q     |         |         |         |
4+ 5       0.2312      1.08  |V  Q     |         |         |         |
4+10       0.2387      1.09  |V  Q     |         |         |         |
4+15       0.2464      1.11  |V  Q     |         |         |         |
4+20       0.2541      1.12  |V  Q     |         |         |         |
4+25       0.2621      1.16  |V  Q     |         |         |         |
4+30       0.2704      1.21  | V Q     |         |         |         |
4+35       0.2791      1.25  | V  Q    |         |         |         |
4+40       0.2878      1.27  | V  Q    |         |         |         |
4+45       0.2967      1.29  | V  Q    |         |         |         |
4+50       0.3057      1.31  | V  Q    |         |         |         |
4+55       0.3151      1.36  | V  Q    |         |         |         |
5+ 0       0.3250      1.44  | V  Q    |         |         |         |
5+ 5       0.3353      1.48  | V  Q    |         |         |         |
5+10       0.3451      1.43  | V  Q    |         |         |         |
5+15       0.3543      1.33  | V  Q    |         |         |         |
5+20       0.3630      1.26  | V  Q    |         |         |         |
5+25       0.3717      1.27  | V  Q    |         |         |         |
5+30       0.3807      1.30  | V  Q    |         |         |         |
5+35       0.3899      1.34  | V  Q    |         |         |         |
5+40       0.3995      1.40  |  V Q    |         |         |         |
5+45       0.4097      1.48  |  V Q    |         |         |         |
5+50       0.4203      1.54  |  V  Q   |         |         |         |
5+55       0.4311      1.57  |  V  Q   |         |         |         |
6+ 0       0.4421      1.59  |  V  Q   |         |         |         |
6+ 5       0.4533      1.62  |  V  Q   |         |         |         |
6+10       0.4649      1.68  |  V  Q   |         |         |         |
6+15       0.4771      1.77  |  V   Q  |         |         |         |
6+20       0.4897      1.84  |  V   Q  |         |         |         |
6+25       0.5026      1.87  |  V   Q  |         |         |         |
6+30       0.5157      1.90  |  V   Q  |         |         |         |
6+35       0.5290      1.93  |   V  Q  |         |         |         |
6+40       0.5427      1.99  |   V  Q  |         |         |         |
6+45       0.5570      2.08  |   V   Q |         |         |         |
6+50       0.5718      2.15  |   V   Q |         |         |         |
6+55       0.5869      2.19  |   V   Q |         |         |         |
7+ 0       0.6021      2.21  |   V   Q |         |         |         |
7+ 5       0.6175      2.23  |   V   Q |         |         |         |
7+10       0.6329      2.25  |   V   Q |         |         |         |
7+15       0.6485      2.26  |   V    Q|         |         |         |
7+20       0.6643      2.29  |    V   Q|         |         |         |
7+25       0.6804      2.35  |    V   Q|         |         |         |
7+30       0.6972      2.43  |    V   Q|         |         |         |
7+35       0.7145      2.51  |    V    Q         |         |         |
7+40       0.7323      2.59  |    V    Q         |         |         |
7+45       0.7509      2.69  |    V    Q         |         |         |
7+50       0.7700      2.78  |    V    |Q        |         |         |
7+55       0.7897      2.87  |    V    |Q        |         |         |
8+ 0       0.8102      2.97  |     V   |Q        |         |         |
8+ 5       0.8314      3.08  |     V   | Q       |         |         |
8+10       0.8536      3.22  |     V   | Q       |         |         |
8+15       0.8771      3.41  |     V   |  Q      |         |         |
```

```
 8+20       0.9015      3.54  |     V   |   Q     |         |         |
 8+25       0.9264      3.62  |      V  |   Q     |         |         |
 8+30       0.9517      3.67  |      V  |   Q     |         |         |
 8+35       0.9773      3.72  |      V  |   Q     |         |         |
 8+40       1.0035      3.80  |      V  |    Q    |         |         |
 8+45       1.0304      3.91  |      V  |    Q    |         |         |
 8+50       1.0579      3.99  |       V |    Q    |         |         |
 8+55       1.0861      4.09  |       V |     Q   |         |         |
 9+ 0       1.1150      4.20  |       V |     Q   |         |         |
 9+ 5       1.1447      4.31  |       V |      Q  |         |         |
 9+10       1.1754      4.45  |       V |      Q  |         |         |
 9+15       1.2073      4.64  |        V|       Q |         |         |
 9+20       1.2403      4.79  |        V|        Q|         |         |
 9+25       1.2742      4.92  |        V|        Q|         |         |
 9+30       1.3090      5.05  |        V|         Q         |         |
 9+35       1.3445      5.15  |         V         Q         |         |
 9+40       1.3807      5.26  |         V         |Q        |         |
 9+45       1.4178      5.38  |         V         |Q        |         |
 9+50       1.4556      5.48  |         |V        |Q        |         |
 9+55       1.4941      5.59  |         |V        | Q       |         |
10+ 0       1.5333      5.70  |         |V        | Q       |         |
10+ 5       1.5726      5.70  |         |V        | Q       |         |
10+10       1.6099      5.41  |         | V       |Q        |         |
10+15       1.6437      4.90  |         | V      Q|         |         |
10+20       1.6750      4.55  |         | V     Q |         |         |
10+25       1.7052      4.39  |         | V    Q  |         |         |
10+30       1.7348      4.29  |         |  V   Q  |         |         |
10+35       1.7643      4.28  |         |  V   Q  |         |         |
10+40       1.7951      4.48  |         |  V   Q  |         |         |
10+45       1.8284      4.83  |         |  V     Q|         |         |
10+50       1.8633      5.07  |         |   V     Q         |         |
10+55       1.8990      5.18  |         |   V     Q         |         |
11+ 0       1.9351      5.24  |         |   V     Q         |         |
11+ 5       1.9714      5.27  |         |   V     |Q        |         |
11+10       2.0076      5.26  |         |    V    |Q        |         |
11+15       2.0435      5.21  |         |    V    Q         |         |
11+20       2.0791      5.17  |         |    V    Q         |         |
11+25       2.1146      5.16  |         |     V   Q         |         |
11+30       2.1501      5.16  |         |     V   Q         |         |
11+35       2.1855      5.13  |         |     V   Q         |         |
11+40       2.2201      5.03  |         |     V   Q         |         |
11+45       2.2537      4.87  |         |      V Q|         |         |
11+50       2.2866      4.78  |         |      V Q|         |         |
11+55       2.3196      4.79  |         |      V Q|         |         |
12+ 0       2.3529      4.84  |         |      V Q|         |         |
12+ 5       2.3871      4.96  |         |       VQ|         |         |
12+10       2.4237      5.32  |         |       V |Q        |         |
12+15       2.4641      5.87  |         |       V |  Q      |         |
12+20       2.5073      6.27  |         |       V |    Q    |         |
12+25       2.5521      6.51  |         |        V|     Q   |         |
12+30       2.5983      6.70  |         |        V|     Q   |         |
12+35       2.6456      6.87  |         |         V      Q  |         |
12+40       2.6943      7.06  |         |         V       Q |         |
```

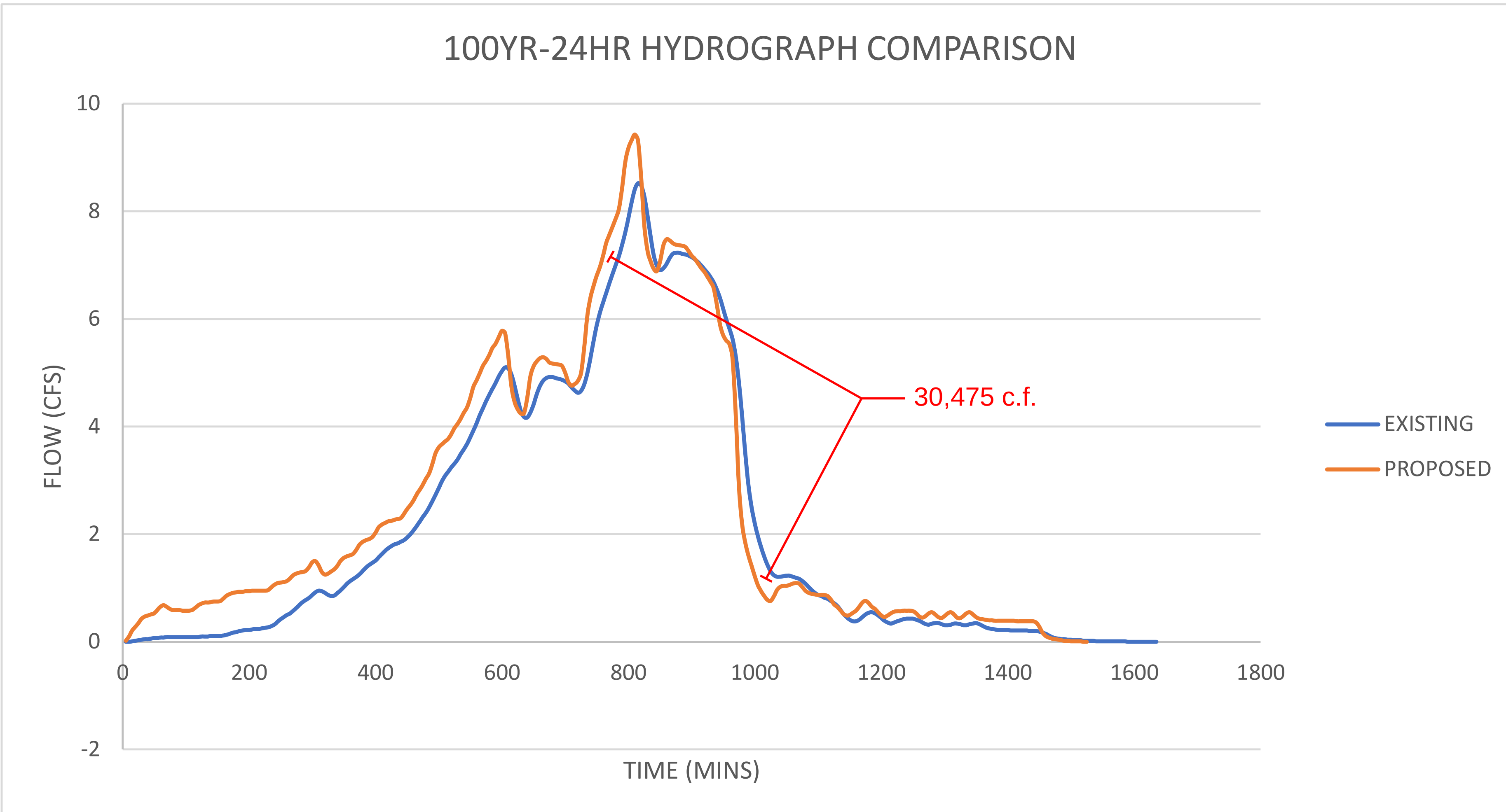
```
12+45       2.7445      7.29  |         |         V        Q|         |
12+50       2.7959      7.47  |         |         |V       Q|         |
12+55       2.8483      7.62  |         |         |V        Q         |
13+ 0       2.9018      7.76  |         |         |V        |Q        |
13+ 5       2.9565      7.94  |         |         | V       |Q        |
13+10       3.0134      8.26  |         |         | V       |  Q      |
13+15       3.0733      8.70  |         |         |  V      |   Q     |
13+20       3.1355      9.02  |         |         |  V      |     Q   |
13+25       3.1988      9.20  |         |         |   V     |     Q   |
13+30       3.2629      9.31  |         |         |   V     |      Q  |
13+35       3.3267      9.26  |         |         |    V    |      Q  |
13+40       3.3872      8.78  |         |         |    V    |    Q    |
13+45       3.4422      7.99  |         |         |     V   |Q        |
13+50       3.4934      7.43  |         |         |     V  Q|         |
13+55       3.5428      7.17  |         |         |     V Q |         |
14+ 0       3.5911      7.01  |         |         |      VQ |         |
14+ 5       3.6389      6.95  |         |         |      Q  |         |
14+10       3.6876      7.07  |         |         |      VQ |         |
14+15       3.7380      7.31  |         |         |       VQ|         |
14+20       3.7894      7.47  |         |         |       VQ|         |
14+25       3.8409      7.48  |         |         |        Q|         |
14+30       3.8922      7.44  |         |         |        Q|         |
14+35       3.9432      7.41  |         |         |        Q|         |
14+40       3.9941      7.39  |         |         |        QV         |
14+45       4.0450      7.39  |         |         |        QV         |
14+50       4.0957      7.37  |         |         |        Q|V        |
14+55       4.1461      7.31  |         |         |        Q|V        |
15+ 0       4.1958      7.23  |         |         |       Q |V        |
15+ 5       4.2451      7.16  |         |         |       Q | V       |
15+10       4.2939      7.08  |         |         |       Q | V       |
15+15       4.3419      6.98  |         |         |      Q  | V       |
15+20       4.3895      6.90  |         |         |      Q  |  V      |
15+25       4.4365      6.82  |         |         |      Q  |  V      |
15+30       4.4828      6.73  |         |         |     Q   |  V      |
15+35       4.5283      6.61  |         |         |     Q   |   V     |
15+40       4.5722      6.37  |         |         |    Q    |   V     |
15+45       4.6138      6.04  |         |         |   Q     |   V     |
15+50       4.6538      5.80  |         |         |  Q      |    V    |
15+55       4.6929      5.68  |         |         | Q       |    V    |
16+ 0       4.7314      5.60  |         |         | Q       |    V    |
16+ 5       4.7683      5.35  |         |         |Q        |     V   |
16+10       4.7997      4.56  |         |       Q |         |     V   |
16+15       4.8228      3.36  |         |  Q      |         |     V   |
16+20       4.8401      2.51  |         Q         |         |     V   |
16+25       4.8545      2.08  |       Q |         |         |     V   |
16+30       4.8669      1.81  |      Q  |         |         |     V   |
16+35       4.8780      1.60  |     Q   |         |         |     V   |
16+40       4.8877      1.41  |    Q    |         |         |      V  |
16+45       4.8961      1.23  |   Q     |         |         |      V  |
16+50       4.9036      1.08  |   Q     |         |         |      V  |
16+55       4.9103      0.98  |  Q      |         |         |      V  |
17+ 0       4.9166      0.90  |  Q      |         |         |      V  |
17+ 5       4.9225      0.86  |  Q      |         |         |      V  |
```

```
17+10       4.9286       0.89 |  Q       |          |          |       V  |
17+15       4.9354       0.99 |  Q       |          |          |       V  |
17+20       4.9427       1.05 |   Q      |          |          |       V  |
17+25       4.9501       1.07 |   Q      |          |          |       V  |
17+30       4.9575       1.08 |   Q      |          |          |       V  |
17+35       4.9650       1.09 |   Q      |          |          |       V  |
17+40       4.9725       1.09 |   Q      |          |          |       V  |
17+45       4.9799       1.08 |   Q      |          |          |       V  |
17+50       4.9873       1.07 |   Q      |          |          |       V  |
17+55       4.9944       1.03 |   Q      |          |          |       V  |
18+ 0       5.0010       0.96 |  Q       |          |          |       V  |
18+ 5       5.0073       0.92 |  Q       |          |          |       V  |
18+10       5.0135       0.90 |  Q       |          |          |       V  |
18+15       5.0196       0.88 |  Q       |          |          |        V |
18+20       5.0256       0.88 |  Q       |          |          |        V |
18+25       5.0316       0.87 |  Q       |          |          |        V |
18+30       5.0376       0.87 |  Q       |          |          |        V |
18+35       5.0435       0.86 |  Q       |          |          |        V |
18+40       5.0491       0.81 |  Q       |          |          |        V |
18+45       5.0541       0.74 | Q        |          |          |        V |
18+50       5.0588       0.67 | Q        |          |          |        V |
18+55       5.0630       0.62 | Q        |          |          |        V |
19+ 0       5.0668       0.55 | Q        |          |          |        V |
19+ 5       5.0703       0.51 | Q        |          |          |        V |
19+10       5.0738       0.51 | Q        |          |          |        V |
19+15       5.0776       0.54 | Q        |          |          |        V |
19+20       5.0816       0.58 | Q        |          |          |        V |
19+25       5.0859       0.63 | Q        |          |          |        V |
19+30       5.0908       0.71 | Q        |          |          |        V |
19+35       5.0959       0.75 |  Q       |          |          |        V |
19+40       5.1010       0.73 | Q        |          |          |        V |
19+45       5.1056       0.67 | Q        |          |          |        V |
19+50       5.1098       0.62 | Q        |          |          |        V |
19+55       5.1137       0.57 | Q        |          |          |        V |
20+ 0       5.1173       0.51 | Q        |          |          |        V |
20+ 5       5.1206       0.48 |Q         |          |          |        V |
20+10       5.1239       0.49 |Q         |          |          |        V |
20+15       5.1275       0.53 | Q        |          |          |        V |
20+20       5.1313       0.55 | Q        |          |          |        V |
20+25       5.1352       0.56 | Q        |          |          |        V |
20+30       5.1391       0.57 | Q        |          |          |        V |
20+35       5.1431       0.57 | Q        |          |          |        V |
20+40       5.1471       0.58 | Q        |          |          |        V |
20+45       5.1511       0.58 | Q        |          |          |         V|
20+50       5.1550       0.57 | Q        |          |          |         V|
20+55       5.1587       0.54 | Q        |          |          |         V|
21+ 0       5.1621       0.49 |Q         |          |          |         V|
21+ 5       5.1653       0.46 |Q         |          |          |         V|
21+10       5.1686       0.48 |Q         |          |          |         V|
21+15       5.1721       0.52 | Q        |          |          |         V|
21+20       5.1759       0.54 | Q        |          |          |         V|
21+25       5.1795       0.52 | Q        |          |          |         V|
21+30       5.1827       0.47 |Q         |          |          |         V|
```

```
   21+35      5.1858      0.45  |Q         |         |         |        V|
   21+40      5.1890      0.47  |Q         |         |         |        V|
   21+45      5.1926      0.52  | Q        |         |         |        V|
   21+50      5.1963      0.54  | Q        |         |         |        V|
   21+55      5.1999      0.52  | Q        |         |         |        V|
   22+ 0      5.2032      0.47  |Q         |         |         |        V|
   22+ 5      5.2062      0.45  |Q         |         |         |        V|
   22+10      5.2095      0.47  |Q         |         |         |        V|
   22+15      5.2130      0.52  | Q        |         |         |        V|
   22+20      5.2168      0.54  | Q        |         |         |        V|
   22+25      5.2204      0.52  | Q        |         |         |        V|
   22+30      5.2236      0.47  |Q         |         |         |        V|
   22+35      5.2266      0.44  |Q         |         |         |        V|
   22+40      5.2295      0.42  |Q         |         |         |        V|
   22+45      5.2324      0.41  |Q         |         |         |        V|
   22+50      5.2352      0.41  |Q         |         |         |        V|
   22+55      5.2380      0.40  |Q         |         |         |        V|
   23+ 0      5.2407      0.40  |Q         |         |         |        V|
   23+ 5      5.2434      0.39  |Q         |         |         |        V|
   23+10      5.2461      0.39  |Q         |         |         |        V|
   23+15      5.2488      0.39  |Q         |         |         |        V|
   23+20      5.2515      0.39  |Q         |         |         |        V|
   23+25      5.2542      0.39  |Q         |         |         |        V|
   23+30      5.2568      0.39  |Q         |         |         |        V|
   23+35      5.2595      0.39  |Q         |         |         |        V|
   23+40      5.2621      0.38  |Q         |         |         |        V|
   23+45      5.2648      0.38  |Q         |         |         |        V|
   23+50      5.2674      0.38  |Q         |         |         |        V|
   23+55      5.2701      0.38  |Q         |         |         |        V|
   24+ 0      5.2727      0.38  |Q         |         |         |        V|
   24+ 5      5.2752      0.37  |Q         |         |         |        V|
   24+10      5.2773      0.30  |Q         |         |         |        V|
   24+15      5.2787      0.20  Q          |         |         |        V|
   24+20      5.2796      0.13  Q          |         |         |        V|
   24+25      5.2803      0.10  Q          |         |         |        V|
   24+30      5.2809      0.08  Q          |         |         |        V|
   24+35      5.2813      0.06  Q          |         |         |        V|
   24+40      5.2817      0.05  Q          |         |         |        V|
   24+45      5.2819      0.04  Q          |         |         |        V|
   24+50      5.2822      0.03  Q          |         |         |        V|
   24+55      5.2824      0.03  Q          |         |         |        V|
   25+ 0      5.2825      0.02  Q          |         |         |        V|
   25+ 5      5.2826      0.02  Q          |         |         |        V|
   25+10      5.2827      0.01  Q          |         |         |        V|
   25+15      5.2828      0.01  Q          |         |         |        V|
   25+20      5.2829      0.01  Q          |         |         |        V|
   25+25      5.2829      0.01  Q          |         |         |        V|
   25+30      5.2830      0.00  Q          |         |         |        V|
   25+35      5.2830      0.00  Q          |         |         |        V|
   25+40      5.2830      0.00  Q          |         |         |        V|
-----------------------------------------------------------------------
```

Appendix K

Retention Volume Calculations



100YR-24HR HYDROGRAPH COMPARISON
FLOW (CFS)
TIME (MINS)
10
8
6
4
2
0
-2
0
200
400
600
800
1000
1200
1400
1600
1800
30,475 c.f.
EXISTING
PROPOSED

Prelim Basin Volume
Project: Pilot Perris
Basin Description: BMP-1

Contour Elevation	Contour Area (sq. ft)	Depth (ft)	Incremental Volume Avg. End (cu. ft)	Cumulative Volume Avg. End (cu. ft)	Incremental Volume Conic (cu. ft)	Cumulative Volume Conic (cu. ft)
1,416.300	36,306.67	N/A	N/A	0.00	N/A	0.00
1,416.500	37,040.35	0.200	7334.70	7334.70	7334.58	7334.58
1,417.000	40,050.26	0.500	19272.65	26607.35	19267.75	26602.33
1,417.500	44,986.52	0.500	21259.19	47866.55	21247.24	47849.58
1,418.000	50,208.87	0.500	23798.85	71665.39	23786.90	71636.48
1,418.500	55,728.50	0.500	26484.34	98149.73	26472.35	98108.83
1,419.000	61,542.39	0.500	29317.72	127467.45	29305.70	127414.53
1,419.500	67,647.94	0.500	32297.58	159765.04	32285.55	159700.08
1,420.000	74,043.99	0.500	35422.98	195188.02	35410.95	195111.03
1,420.400	79,369.27	0.400	30682.65	225870.67	30676.49	225787.52

Appendix L

Sizing Calculations

Worksheet for Triangular Channel - OFF

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.045
Channel Slope	0.005 ft/ft
Left Side Slope	3.000 H:V
Right Side Slope	2.000 H:V
Discharge	32.00 cfs

Results

Normal Depth	27.5 in
Flow Area	13.2 ft²
Wetted Perimeter	12.4 ft
Hydraulic Radius	12.8 in
Top Width	11.47 ft
Critical Depth	19.1 in
Critical Slope	0.035 ft/ft
Velocity	2.43 ft/s
Velocity Head	0.09 ft
Specific Energy	2.39 ft
Froude Number	0.400
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	27.5 in
Critical Depth	19.1 in
Channel Slope	0.005 ft/ft
Critical Slope	0.035 ft/ft

Worksheet for Circular Pipe - 1

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013
Channel Slope	0.007 ft/ft
Normal Depth	30.0 in
Diameter	30.0 in

Results

Discharge	34.32 cfs
Flow Area	4.9 ft²
Wetted Perimeter	7.9 ft
Hydraulic Radius	7.5 in
Top Width	0.00 ft
Critical Depth	23.9 in
Percent Full	100.0 %
Critical Slope	0.007 ft/ft
Velocity	6.99 ft/s
Velocity Head	0.76 ft
Specific Energy	3.26 ft
Froude Number	(N/A)
Maximum Discharge	36.91 cfs
Discharge Full	34.32 cfs
Slope Full	0.007 ft/ft
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	30.0 in
Critical Depth	23.9 in
Channel Slope	0.007 ft/ft
Critical Slope	0.007 ft/ft

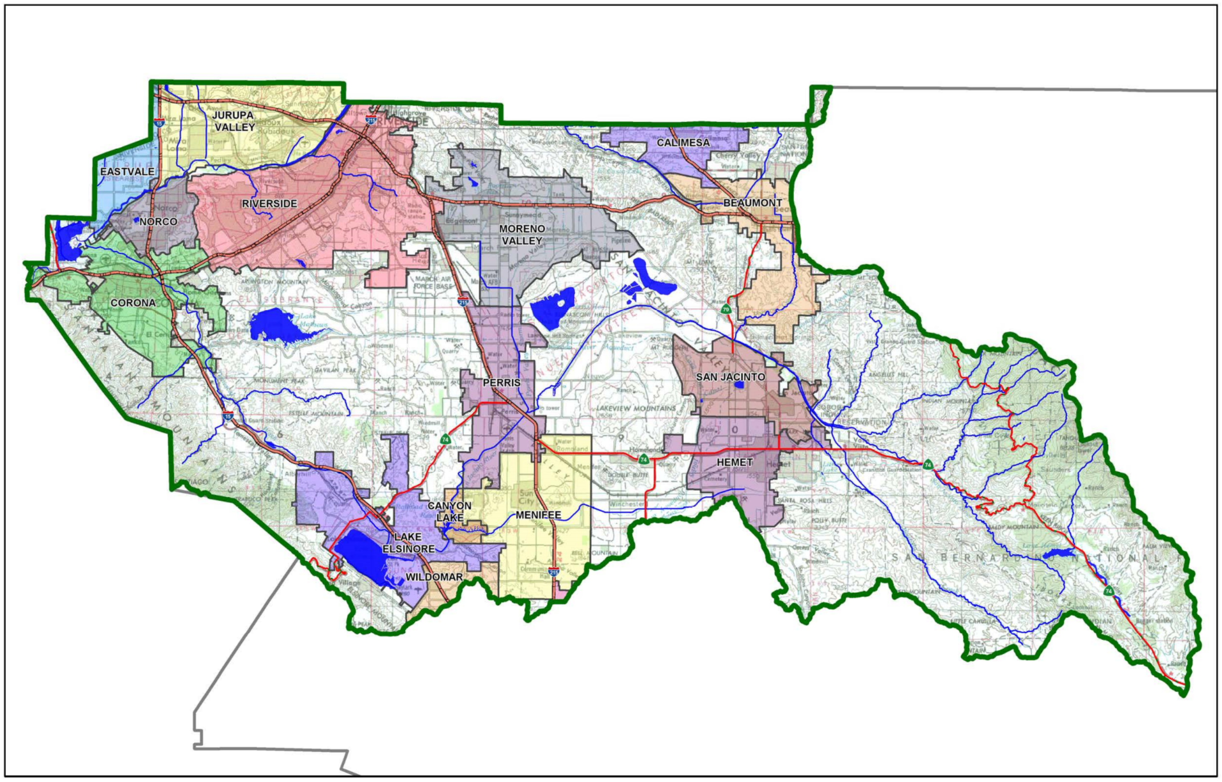
Project Specific Water Quality Management Plan

A Template for Projects located within the ***Santa Ana Watershed*** *Region of Riverside County*

Project Title: Pilot Perris

Development No: Ethanac Road and Trumble Road

Design Review/Case No: CUP22-05002 & CUP22-05003



☒ **Preliminary**
☐ **Final**

Original Date Prepared: December 8, 2021

Revision Date(s): June 8, 2022

Prepared for Compliance with
Regional Board Order No. ***R8-2010-0033***
Template revised June 30, 2016

Contact Information:

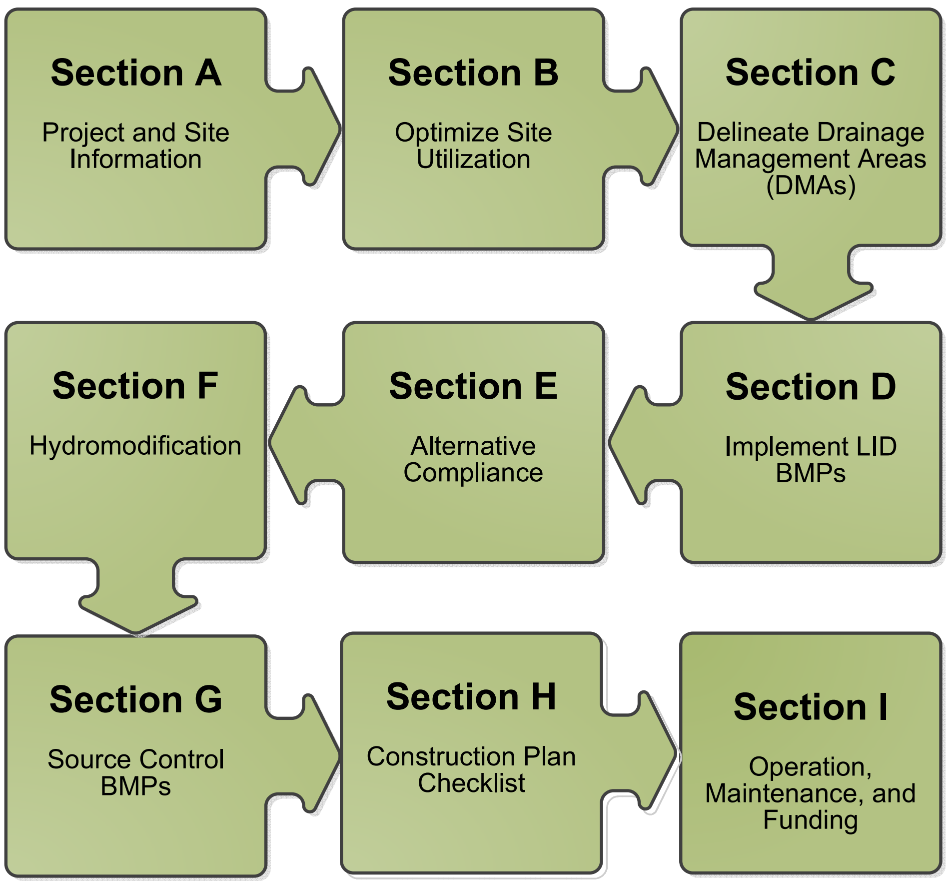
Prepared for:
Pilot Travel Centers, LLC
5508 Lonas Drive
Knoxville, TN 37909
(865) 588-7488

Prepared by:

Shea-Michael Anti, PE
Kimley-Horn and Associates
3880 Lemon Street Suite 420
Riverside, CA 92501
(951) 335-8272

A Brief Introduction

This Project-Specific WQMP Template for the **Santa Ana Region** has been prepared to help guide you in documenting compliance for your project. Because this document has been designed to specifically document compliance, you will need to utilize the WQMP Guidance Document as your "how-to" manual to help guide you through this process. Both the Template and Guidance Document go hand-in-hand, and will help facilitate a well prepared Project-Specific WQMP. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for **Pilot Travel Centers, LLC** by **Kimley-Horn and Associates** for the **Pilot Perris** project.

This WQMP is intended to comply with the requirements of **City of Perris** for **Ordinance 1194** which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under the City of Perris Water Quality Ordinance 1194.

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature	6/2/22 Date
Brad Alsup Owner's Printed Name	Director of Construction Development Owner's Title/Position

ELIZABETH C. PETERSON
STATE OF TENNESSEE NOTARY PUBLIC
KNOX COUNTY

My Commission Expires October 7, 2024

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

Preparer's Signature	06/02/22 Date
Shea-Michael Anti Preparer's Printed Name	Project Engineer Preparer's Title/Position

Preparer's Licensure: CA 78274 (Civil)

REGISTERED PROFESSIONAL ENGINEER
SHEA-MICHAEL ANTI
RCE NO. 78274
CIVIL
STATE OF CALIFORNIA

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Section A: Project and Site Information

Project Information			
Type of Project:	**Community Commercial - (Travel center with drive-thru restaurant and car/truck fueling)**		
Planning Area:	**Community Commercial**		
Community Name:	**Perris**		
Development Name:	**Pilot Perris**		
Project Location			
Latitude & Longitude (DMS): **Lat: 33.744, Long: -117.1866**			
Project Watershed and Sub-Watershed: **Santa Ana Region Watershed, Santa Ana River Subwatershed**			
Gross Acres: **13.97 acres**			
APN(s): **329-250-011 and 329-250-012**			
Map Book and Page No.:			
Project Characteristics			
Proposed or Potential Land Use(s)		**Restaurant/Fueling Station**	
Proposed or Potential SIC Code(s)		**5541, 5812**	
Area of Impervious Project Footprint (SF)		**395,859**	
Total Area of proposed Impervious Surfaces within the Project Footprint (SF)/or Replacement		**395,859**	
Does the project consist of offsite road improvements?		☒ Y	☐ N
Does the project propose to construct unpaved roads?		☐ Y	☒ N
Is the project part of a larger common plan of development (phased project)?		☐ Y	☒ N
Existing Site Characteristics			
Total area of existing Impervious Surfaces within the Project limits Footprint (SF)		**0 sf**	
Is the project located within any MSHCP Criteria Cell?		☐ Y	☒ N
If so, identify the Cell number:		**N/A**	
Are there any natural hydrologic features on the project site?		☐ Y	☒ N
Is a Geotechnical Report attached?		☒ Y	☐ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)		**Type D**	
What is the Water Quality Design Storm Depth for the project?		**0.60**	

A.1 Maps and Site Plans

The proposed Pilot Perris development will include the construction of a truck stop and gas station with associated commercial landscaping, concrete hardscape, and asphalt paving parking. The project site is approximately 14 acres and is located at the northwest corner of Ethanac Road and Trumble Road in the City of Perris. The project will not be phased. The existing site is approximately 0% impervious. Once the site is developed, the site will be approximately 67% impervious and 33% pervious.

Under the existing condition, the project site drains northwest. The existing condition of the project site is vacant and land cover consists mostly of annual grass. Under existing conditions, the project site was subdivided into two drainage areas (A-1 and A-2). Both A-1 and A-2 confluence and sheet flow out along the western boundary into an existing natural swale. The existing natural swale also accepts additional flows from an existing headwall southwest of the project site. The swale flows north and is intercepted by an existing double 6'x5' RCB culvert near Illinois Avenue and Interstate 215. Flows from the existing culvert are conveyed west across Interstate 215 and then continue west through existing drainage facilities until discharging into the San Jacinto River. Under existing conditions, the project site accepts some offsite flows from the adjacent vacant properties on the east. Offsite runoff flows through the site, confluence with the onsite flows, and sheet flow out along the western boundary. Ultimately, existing storm water discharge from offsite and onsite areas are intercepted by the existing double 6'x5' RCB culvert and are tributary to the San Jacinto River.

Similar to existing condition, the post-developed project site will predominantly drain northwest to maintain the existing flow pattern to the maximum extent possible. The proposed development includes the construction of the proposed Pilot Perris Travel Center. The proposed site will encompass one (1) new building with a restaurant, drive thru, and fueling areas. The site will include landscaping, concrete hardscape, asphalt parking, a new concrete channel, a drainage ditch for offsite flows, and a bio-retention basin. Under proposed conditions, the project site will not obstruct conveyance of the existing offsite flows. Under the developed condition, the offsite runoff will be accepted from the existing cross gutter near the intersection of Trumble Road and Ethanac Road. The project is proposing a drainage ditch along the south that flows west and into the proposed channel.

The developed project site includes six (6) drainage management areas (DMA's). DMA A-1 includes most of the proposed development. Runoff from A-1 predominantly drains in a northwest direction and is conveyed by a proposed storm drain system into a proposed bio-retention basin west of the project site. The bio-retention area also contributes to the flows into the basin. Discharge from the basin will be controlled by an outlet structure and, due to the elevations, will be pumped to discharge into the proposed channel. DMA's A-2 and A-3 include the proposed drainage ditch that will convey offsite flows, which is considered self-treating. DMA A-4 includes the proposed channel which is also considered self-treating. DMA's A-5 and A-6 are driveway areas that were unfeasible to capture onsite and will drain toward the adjacent streets which ultimately drain into the proposed channel. DMA A-5 and A-6 are de-minimis areas.

On-site flows will predominately be intercepted by four proposed grated inlets with filter inserts which will screen trash prior to entering the bio-retention basin. The bio-retention basin is proposed

for dual purposes: stormwater quality treatment and mitigation. The volume of storage provided in the basins along with the size of the outflow riser structure is intended to restrict peak flows in the proposed condition to levels equal to or less than the existing flows. The bio-retention basin will be owner owned and maintained.

The project site proposes two trash enclosures, one by the truck stop and one by the shop building. The trash enclosure by the truck stop will include a solid roof over the yard storage area and a chain link over the compactor area for the purposes of debris retention. The trash enclosure by the shop building will include a solid roof over the enclosure.

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling
- BMP Locations (Lat/Long)

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

A.2 Identify Receiving Waters

Using Table A.1 below, list in order of upstream to downstream, the receiving waters that the project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Include a map of the receiving waters in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
San Jacinto River Reach 3	None	MUN, AGR, GWR, REC1, REC2, WARM, WILD	N/A; Not a RARE Water Body
Canyon Lake (San Jacinto River Reach 2)	Nutrients, Pathogens	MUN, AGR, GWR, REC1, REC2, WARM, WILD	N/A; Not a RARE Water Body
Lake Elsinore (San Jacinto River Reach 1)	Nutrients, Organic Enrichment/Low Dissolved Oxygen, PCBs, Sediment Toxicity, Unknown Toxicity	REC1, REC2, WARM, WILD	N/A; Not a RARE Water Body

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☐ Y	☒ N
US Army Corps of Engineers, CWA Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☐ Y	☒ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other *(please list in the space below as required)* **City of Perris Building Permit** **City of Perris Electrical Permit** **City of Perris Mechanical Permit** **City of Perris Site Plan Approval** **City of Perris Landscape Approval** **City of Perris Fire Underground Approval** **Eastern Municipal Water District Water and Sewer Approval** **City of Perris WQMP Approval**	☒ Y	☐ N

If yes is answered to any of the questions above, the Co-Permittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, **constraints** might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. **Opportunities** might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. Therefore, it is important that your narrative identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, you should also note opportunities that exist which will be utilized during project design. Upon completion of identifying Constraints and Opportunities, include these on your WQMP Site plan in Appendix 1.

Consideration of "highest and best use" of the discharge should also be considered. For example, Lake Elsinore is evaporating faster than runoff from natural precipitation can recharge it. Requiring infiltration of 85% of runoff events for projects tributary to Lake Elsinore would only exacerbate current water quality problems associated with Pollutant concentration due to lake water evaporation. In cases where rainfall events have low potential to recharge Lake Elsinore (i.e. no hydraulic connection between groundwater to Lake Elsinore, or other factors), requiring infiltration of Urban Runoff from projects is counterproductive to the overall watershed goals. Project proponents, in these cases, would be allowed to discharge Urban Runoff, provided they used equally effective filtration-based BMPs.

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

Yes. The proposed site grading intends to maintain the existing flow pattern by predominantly draining in the northwest direction.

Did you identify and protect existing vegetation? If so, how? If not, why?

No. The existing site is currently vacant and does not have any existing vegetation, other than annual grass. The proposed development will add landscape throughout the site, making the proposed development approximately 33% pervious.

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

Yes, based on the Geotechnical Investigation and Percolation Test Results Report prepared by Geotechnical Solutions, Inc the proposed site experiences an average percolation rate of 1.14in/hr. The reported average

infiltration rate based on the Porchet Method was determined to be 0.05 in/hr (without a factor of safety applied). Therefore, bio-retention basins are proposed.

Did you identify and minimize impervious area? If so, how? If not, why?

Yes. The site plan was done with the intent of maximizing the pervious area on the site. This was accomplished by using landscape planters throughout the site and perimeter planter areas.

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

Yes. All roof drains and site drainage will be routed to the proposed pervious bioretention basins.

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, this information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1,2]	Area (Sq. Ft.)	DMA Type
A-1	**Concrete/Asphalt/Landscape Areas**	**547,937**	**Type "D"**
A-2	**Landscape Areas**	**16,086**	**Type "A"**
A-3	**Landscape Areas**	**24,391**	**Type "A"**
A-4	**Concrete/Landscape**	**16,688**	**Type "A"**
A-5	**Asphalt/Concrete**	**766**	**(De-Minimis)**
A-6	**Asphalt/Concrete**	**2,470**	**(De-Minimis)**

[1]*Reference Table 2-1 in the WQMP Guidance Document to populate this column*
[2]*If multi-surface provide back-up*

Table C.2 Type 'A', Self-Treating Areas

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
A-2	**16,086**	**Proposed Landscape**	**Drip Irrigation**
A-3	**26,819**	**Proposed Landscape**	**Drip Irrigation**
A-4	**16,688**	**Proposed Landscape**	**Drip Irrigation**

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area				**Type 'C' DMAs that are draining to the Self-Retaining Area**		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]
N/A	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA					Receiving Self-Retaining DMA		
DMA Name/ ID	Area (square feet)	Post-project surface type	Impervious fraction	Product	DMA name /ID	Area (square feet)	Ratio
	[A]		[B]	[C] = [A] x [B]		[D]	[C]/[D]
N/A	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

Table C.5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
A-1	**Bio-retention Basin (BMP-1)**

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? ☐ Y ☒ N

If yes has been checked, Infiltration BMPs shall not be used for the site; proceed to section D.3

If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermittee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? ☐ Y ☒ N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		X
If Yes, list affected DMAs:		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour?	X	
If Yes, list affected DMAs: **All DMA's**		
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?		X
Describe here:		

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

D.2 Harvest and Use Assessment

Please check what applies*:*

☐ Reclaimed water will be used for the non-potable water demands for the project.

☐Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).

☐The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If none of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site:

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape: 4.61

Type of Landscaping (Conservation Design or Active Turf): Conservation Design

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 9.35

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor: 0.79

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

Minimum required irrigated area: 7.39

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	**Available Irrigated Landscape (Step 1)**
7.39	4.61

The project is not feasible for harvesting stormwater runoff for irrigation use.

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: 50

Project Type: Commercial

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 9.35

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-2 in Chapter 2 to determine the minimum number or toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: 132

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users: 1234

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4)	Projected number of toilet users (Step 1)
1234	50

The project is not feasible for harvesting stormwater runoff for toilet use.

Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

N/A

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand: N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-4 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-4: N/A

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: N/A

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the projected average daily use (Step 1) to the minimum required non-potable use (Step 4).

Minimum required non-potable use (Step 4)	**Projected average daily use (Step 1)**
N/A	N/A

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment per Section 3.4.2 of the WQMP Guidance Document.

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

☒ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

D.4 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy: 1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	No LID (Alternative Compliance)
A-1	☐	☐	☒	☐	☐
A-2	☐	☐	☐	☐	☒
A-3	☐	☐	☐	☐	☒
A-4	☐	☐	☐	☐	☒
A-5	☐	☐	☐	☐	☒
A-6	☐	☐	☐	☐	☒

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

A-1 is feasible for a structural LID BMP – Bioretention Basin. A-2, A-3 and A-4 are considered self-treating. A-5 and A-6 are considered de-minimis areas. Refer to Appendix 1 for WQMP Exhibit.

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First, calculate the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second, design the LID BMP to meet the required V_{BMP} using a method approved by the Copermittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Copermittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BMP-1*		
	[A]		[B]	[C]	[A] x [C]	*Design Storm Depth (in)*	*Design Capture Volume,* V_{BMP} *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
1A	**395,859**	**Concrete or Asphalt**	**1**	**0.89**	**353,106**			
1B	**152,078**	**Ornamental Landscaping**	**0.1**	**0.11**	**16,798**			
	A_T = **547,937**				Σ= **369,904**	[E] **0.60**	[F] **18,619**	[G] **48,658**

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

☒ LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.

- *Or* -

☐ The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

N/A

E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
☐ Detached Residential Development	P	N	P	P	N	P	P	P
☐ Attached Residential Development	P	N	P	P	N	P	P	P[(2)]
☒ Commercial/Industrial Development	P[(3)]	P	P[(1)]	P[(1)]	P[(5)]	P[(1)]	P	P
☐ Automotive Repair Shops	N	P	N	N	P[(4, 5)]	N	P	P
☐ Restaurants (>5,000 ft^2)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft^2)	P	N	P	P	N	P	P	P
☐ Parking Lots (>5,000 ft^2)	P[(6)]	P	P[(1)]	P[(1)]	P[(4)]	P[(1)]	P	P
☒ Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern	☒	☐	☒	☐	☒	☒	☐	☐

P = Potential
N = Not Potential
[(1)] *A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected*
[(2)] *A potential Pollutant if the project includes uncovered parking areas; otherwise not expected*
[(3)] *A potential Pollutant is land use involving animal waste*
[(4)] *Specifically petroleum hydrocarbons*
[(5)] *Specifically solvents*
[(6)] *Bacterial indicators are routinely detected in pavement runoff*

E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage[2]
N/A	
Total Credit Percentage[1]	

[1]Cannot Exceed 50%
[2]Obtain corresponding data from Table 3-8 in the WQMP Guidance Document

E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

Table E.3 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Area x Runoff Factor		***Enter BMP Name / Identifier Here***		
	[A]		[B]	[C]	[A] x [C]				
						Design Storm Depth (in)	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	A_T = Σ[A]				Σ= [D]	[E]	$[F] = \frac{[D]x[E]}{[G]}$	[F] X (1-[H])	[I]

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document
[E] is for Flow-Based Treatment Control BMPs [E] = .2, for Volume-Based Control Treatment BMPs, [E] obtained from Exhibit A in the WQMP Guidance Document
[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12
[H] is from the Total Credit Percentage as Calculated from Table E.2 above
[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must have a removal efficiency of a medium or high effectiveness as quantified below:

- **High**: equal to or greater than 80% removal efficiency
- **Medium**: between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]

[1] Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.
[2] Cross Reference Table E.1 above to populate this column.
[3] As documented in a Co-Permittee Approved Study and provided in Appendix 6.

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration	INSERT VALUE	INSERT VALUE	INSERT VALUE
Volume (Cubic Feet)	INSERT VALUE	INSERT VALUE	INSERT VALUE

[1] Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Susceptibility Maps.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier: INSERT TEXT HERE

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.

b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

	2 year – 24 hour		
	Pre-condition	Post-condition	% Difference
Time of Concentration	34.58	18.31	53%
Flow (CFS)	6.51	10.99	69%
Volume (Cubic Feet)	10,454	66,115	532%

The required retention volume was governed by the 2-year, 24-hour storm. To estimate the retention volume required for preliminary purposes, the pre-development volume was compared to the post-development volume to determine the increase in volume discharged from the project site. Since the detention system outlet riser structure will be sized in the Final Report, an additional 20% was added to the calculated difference in volume to account for the efficiency of the outlet structure. The resulting volume (66,804 cf) is the estimated retention volume for preliminary purposes. The proposed bio-retention basin will provide 225,788 cf of storage. Through the mitigation that the bio-retention basin will provide, the proposed development is expected to mitigate for HCOC criteria.

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and “housekeeping”, that must be implemented by the site’s occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. ***Identify Pollutant Sources*:** Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.

2. ***Note Locations on Project-Specific WQMP Exhibit*:** Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.

3. ***Prepare a Table and Narrative*:** Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.

4. ***Identify Operational Source Control BMPs:*** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-site storm drain inlets	Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify. **(CASQQ BMP SD-13, "Storm Drain Signage")**	Maintain and periodically repaint or replace inlet markings; Provide storm water pollution prevention information to new site owners, lessees, or operators; See applicable operational BMPs in Fact Sheet SC-74 "Drainage System Maintenance" provided in Appendix 8 of this report.
Landscape/ Outdoor pesticide use	State that final landscape plans will accomplish all of the following. Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to storm water pollution. Where landscaped areas are used to retain or detain storm water, specify plants that are tolerant of saturated soil conditions. Consider using pest-resistant plants, especially adjacent to hardscape. To ensure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions. **(CASQA BMP SD-10, "Site Design and Landscape Planning" and SD-12, "Efficient Irrigation")**	Maintain landscaping using minimum or no pesticides. For Bioswales: Remove any dead or diseased vegetation See applicable operational BMPs in "What you should know for…..Landscape and Gardening" at http://rcflood.org/stormwater/Downloads/LandscapeGardenBrochure.pdf. Provide IPM information to new owners, lessees and operators. Applicable operational BMPS in "What you should know for…. Landscape and Gardening": • Never apply pesticides or fertilizers when rain is predicted within the next 48 hours. • Do not overwater. Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Dispose of green waste by composting, hauling it to a permitted landfill, or recycling it through city's program.

<table>
<tr><td>Sidewalks, and parking lots.</td><td>None</td><td>Sweep sidewalks and parking lot regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect wash water containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.</td></tr>
<tr><td>Refuse areas</td><td>State how site refuse will be handled and provide supporting detail to what is shown on plans.

State that signs will be posted on or near dumpsters with the words “Do not dump hazardous materials here” or similar.

Trash enclosures shall have a solid impermeable roof with a minimum clearance height to allow the bin lid to completely open.

Trash enclosures to be constructed of reinforced masonry without wooden gates. Walls shall be at least 6’ high.

Trash enclosures shall have a concrete slab floor. The concrete slab shall be graded to collect any spill within the enclosure.

All trash bins in the trash enclosure shall be leak free and shall have a lid and be continuously closed.

The enclosure area shall be protected from receiving direct rainfall or run-on from collateral surfaces.

Method to handle site refuse:
Waste will be hauled by either public or commercial carriers.
(CASQA BMP SD-32, “Trash Storage Areas”)</td><td>Source control BMP will be implanted based on the following:
Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post “no hazardous materials” signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, “Waste Handling and Disposal” in the CASQA Storm water Quality Handbooks at www.cabmphandbooks.com
Any standing liquids must be cleaned up and disposed of properly using a mop and a bucket or a wet/dry vacuum machine. All non-hazardous liquids without solid trash may be put in the sanitary sewer.</td></tr>
</table>

Miscellaneous Drain or Wash Water or Other Sources: • Boiler drain lines Condensate drain lines • Rooftop equipment • Drainage sumps • Roofing, gutters, and trim. Other sources	• Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. • Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. • Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment. • Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water. • Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff. (**CASQA BMP SD-10, "Site Design and Landscape Planning" and SD-11, "Roof Runoff Controls")**	Additional Operational BMPs suggested on Fact Sheet SC-10: • Train employees to identify non-storm water discharges and report them to the appropriate departments.

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)	BMP Location (Lat/Long)
BMP-1	**Bioretention Basin Located near the western property line**	TBD*	TBD*

***To be completed in FWQMP**

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Section I: Operation, Maintenance and Funding

The Copermittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

Maintenance Mechanism: Pilot Travel Centers, LLC

Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

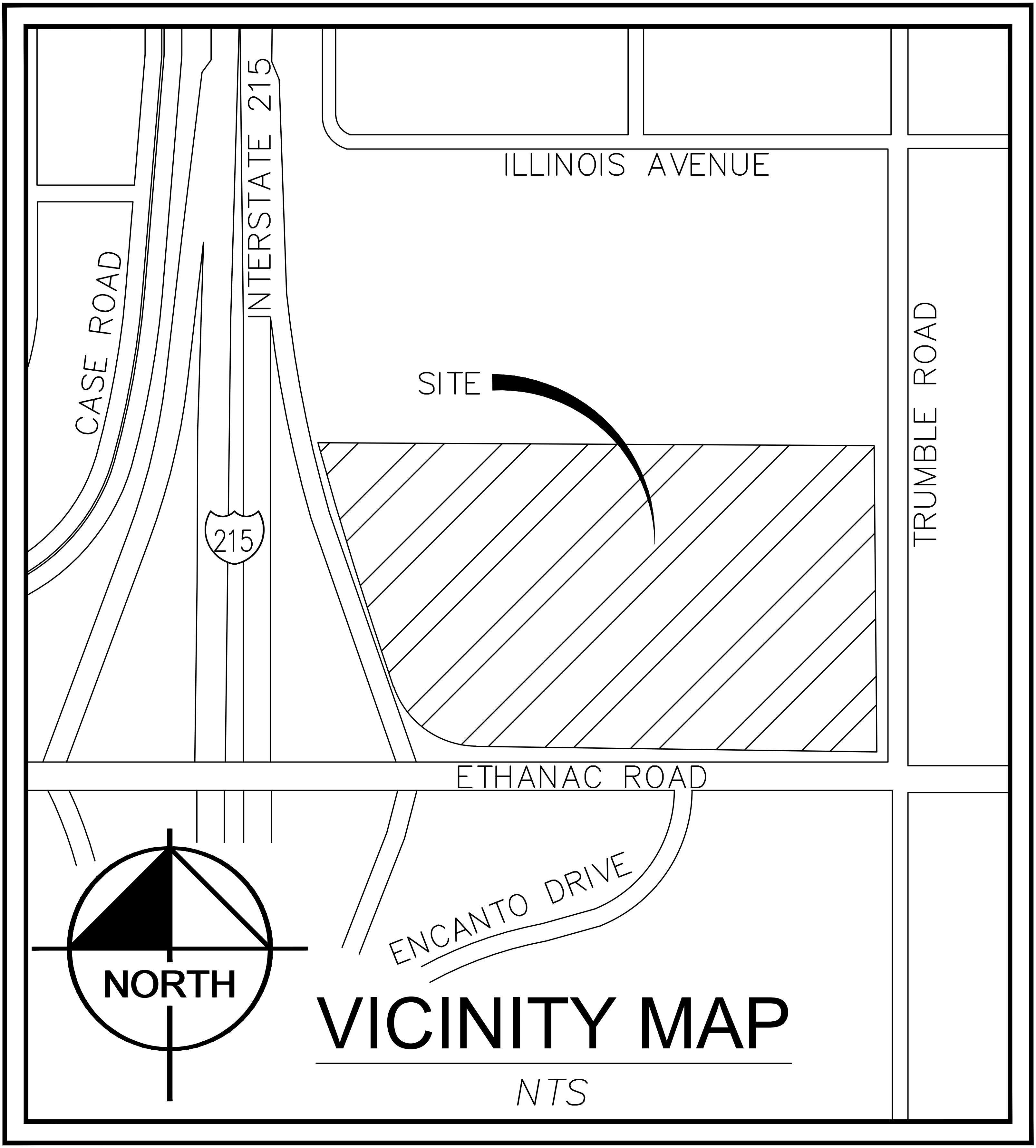
☐ Y ☒ N

Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9**. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

****To be completed in FWQMP**

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map


ILLINOIS AVENUE
INTERSTATE 215
215
CASE ROAD
SITE
TRUMBLE ROAD
ETHANAC ROAD
ENCANTO DRIVE
NORTH
VICINITY MAP
NTS

Illinois Ave
Case Rd
215
Case Rd
Trumble Rd
Sherman Rd
PROJECT SITE
Ethanac Rd
Ethanac Rd
Encanto Dr
Trumble Rd
Sherman Rd
Patricia Ln
Google Earth
Image Landsat / Copernicus
1000 ft
N

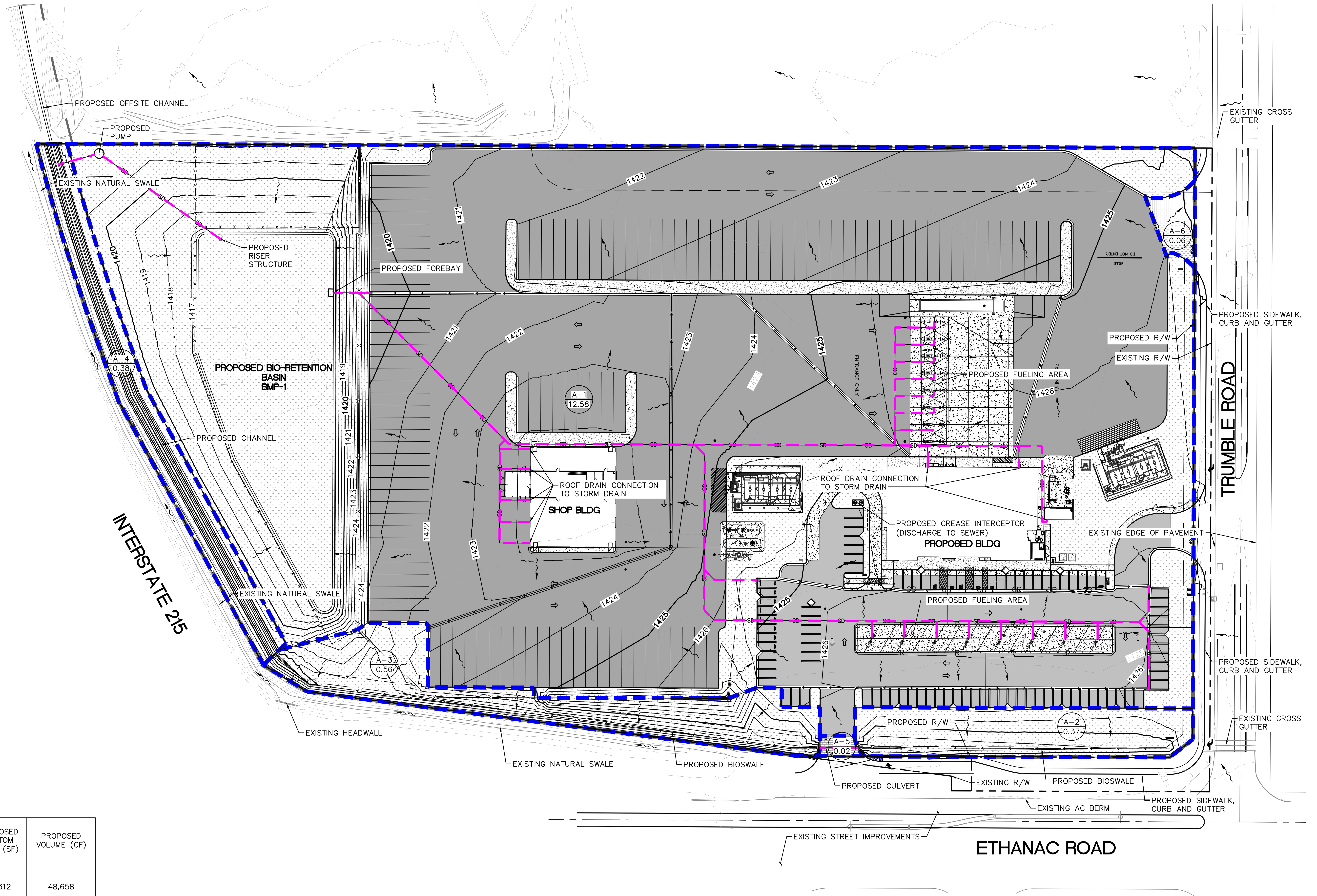
0 1 2 3 4 Miles

PILOT PERRIS
MAP OF RECEIVING WATERS

Kimley»Horn

LEGEND

1695 — PROPOSED CONTOUR
(1695) — EXISTING CONTOUR
PROPERTY LINE
DMA BOUNDARY
PROPOSED STORM DRAIN
FLOW ARROW
X / XX — DA NAME / DA AREA (IN ACRES)
RIGHT OF WAY



DMA	SURFACE TYPE	AREA (SF)	AREA (AC)	BMP ID	REQUIRED DESIGN CAPTURE VOLUME (CF)	MINIMUM BOTTOM AREA (SF)	PROPOSED BOTTOM AREA (SF)	PROPOSED VOLUME (CF)
A-1	CONCRETE/ASPHALT	395,859	12.58	BMP-1	18,619	13,864	36,312	48,658
	ORNAMENTAL LANDSCAPING	152,078						
A-2	LANDSCAPING	16,086	0.37	SELF-TREATING	N/A	N/A	N/A	N/A
A-3	LANDSCAPING	24,391	0.56	SELF-TREATING	N/A	N/A	N/A	N/A
A-4	LANDSCAPING	16,688	0.38	SELF-TREATING	N/A	N/A	N/A	N/A
A-5	LANDSCAPING	766	0.02	DE-MINIMIS	N/A	N/A	N/A	N/A
A-6	LANDSCAPING	2,470	0.06	DE-MINIMIS	N/A	N/A	N/A	N/A

Kimley»Horn

DMA PLAN
PILOT FUELING AND TRUCK STOP PERRIS (P22-05002)
SHEET 1 OF 1

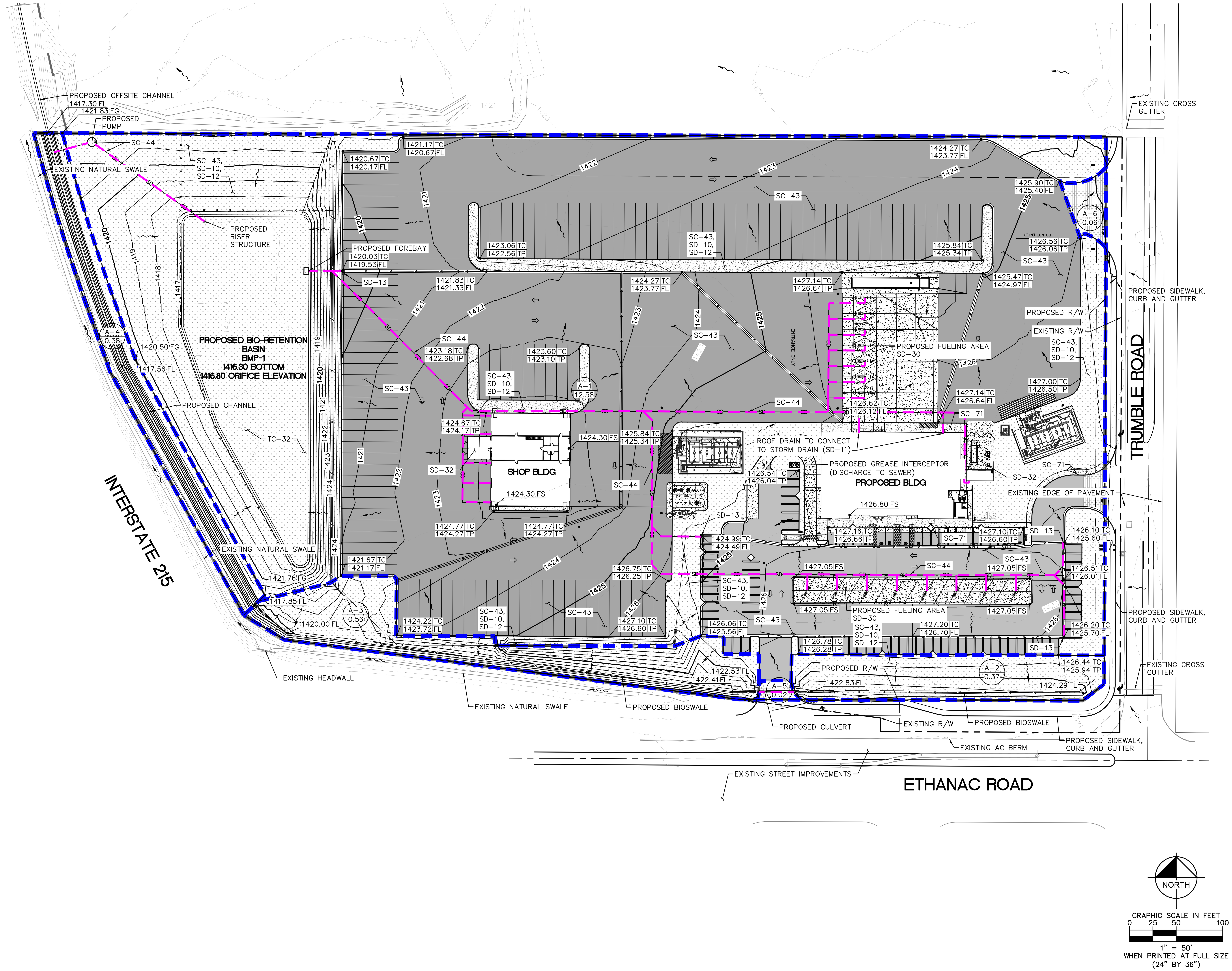
LEGEND

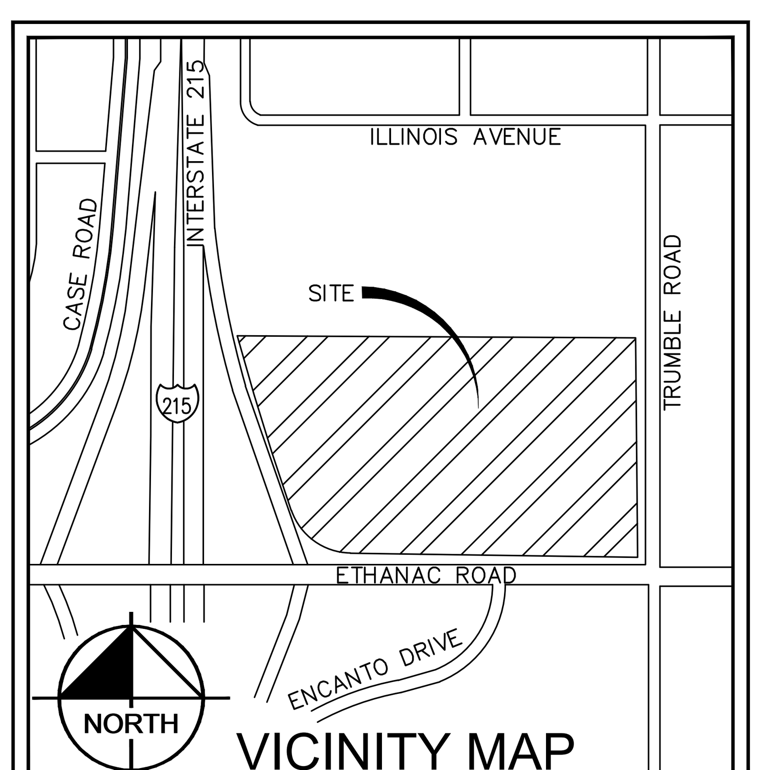
1695	PROPOSED CONTOUR
(1695)	EXISTING CONTOUR
	PROPERTY LINE
	DMA BOUNDARY
	PROPOSED STORM DRAIN
	FLOW ARROW
X / XX	DA NAME DA AREA (IN ACRES)
	RIGHT OF WAY

LANDSCAPE NOTE

FINISH GRADE OF LANDSCAPE AREAS IS TO BE DEPRESSED 1-2 INCHES (MIN.) BELOW TOP OF CURB, SIDEWALK OR PAVEMENT.

TREATMENT CONTROL & SOURCE CONTROL BMP'S	
BMP ID	BMP DESCRIPTION
TC-32	BIO-RETENTION FACILITY
SC-43	PARKING AREA MAINTENANCE
SC-44	DRAINAGE SYSTEM MAINTENANCE
SC-71	PLAZA & SIDEWALK CLEANING
SC-73	LANDSCAPE MAINTENANCE
SD-10	SITE DESIGN AND LANDSCAPE PLANNING
SD-11	ROOF RUNOFF CONTROL
SD-12	EFFICIENT IRRIGATION
SD-13	STORM DRAIN SIGNAGE
SD-30	FUELING AREAS
SD-32	TRASH STORAGE AREAS





VICINITY MAP

NTS

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Kimley»Horn

POST-CONSTRUCTION BMP SITE PLAN

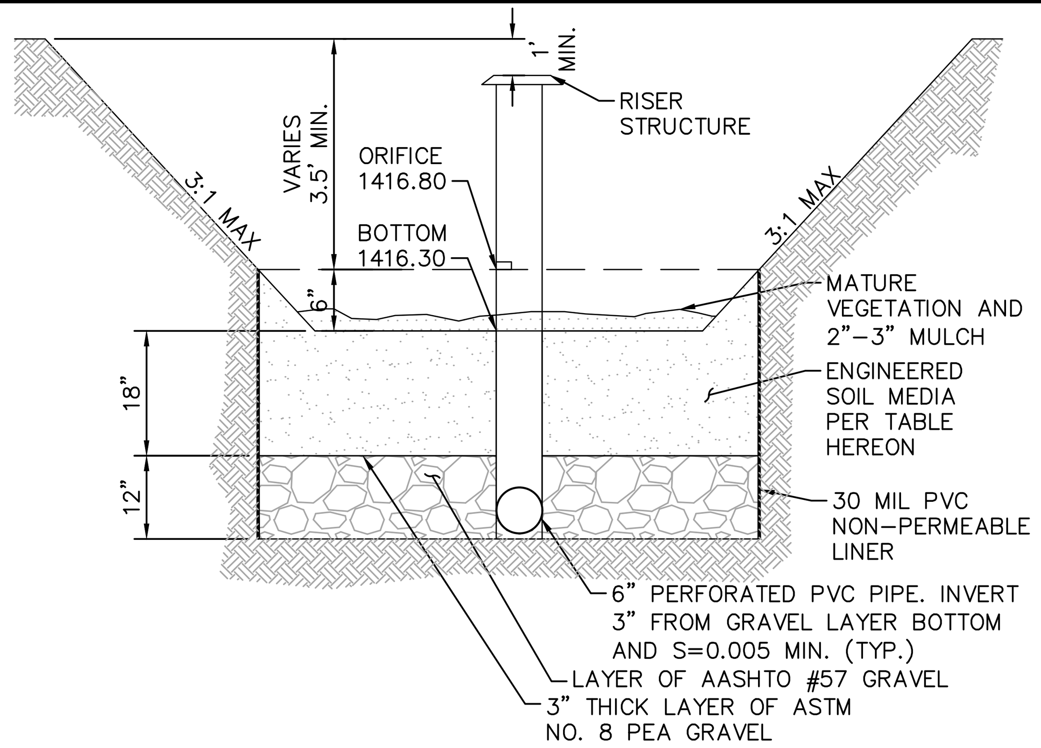
PILOT FUELING AND TRUCK STOP PERRIS (P22-05002)

SHT 1 OF 3

TABLE 1 MINERAL COMPONENT RANGE REQUIREMENTS FOR BIO-RETENTION FACILITY	
PERCENTAGE RANGE	COMPONENT
70–80	SAND
15–20	SILT
5–10	CLAY

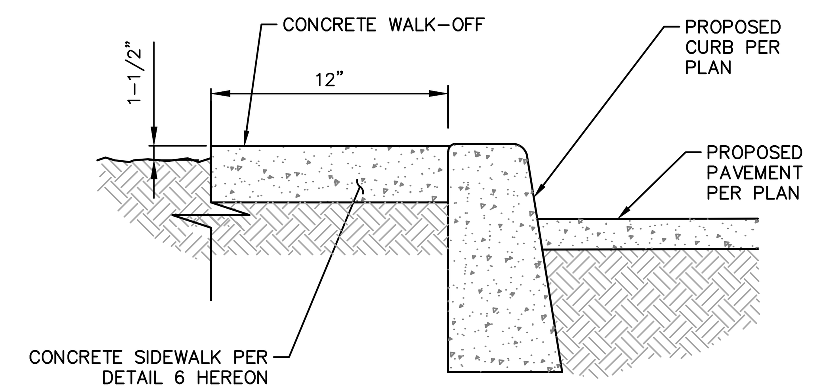
THE TRIP TICKET, OR CERTIFICATE OF COMPLIANCE, SHALL BE MADE AVAILABLE TO THE INSPECTOR TO PROVE THE ENGINEERED MIX MEETS THIS SPECIFICATION.

THE ENGINEERED SOIL MEDIA SHALL BE COMPRISED OF 85 PERCENT MINERAL COMPONENT AND 15 PERCENT ORGANIC COMPONENT, BY VOLUME, DRUM MIXED PRIOR TO PLACEMENT. THE MINERAL COMPONENT SHALL BE A CLASS A SANDY LOAM TOPSOIL THAT MEETS THE RANGE SPECIFIED IN TABLE 1 BELOW. THE ORGANIC COMPONENT SHALL BE NITROGEN STABILIZED COMPOST 1, SUCH THAT NITROGEN DOES NOT LEACH FROM THE MEDIA.



BMP-1 TYPICAL SECTION

NTS

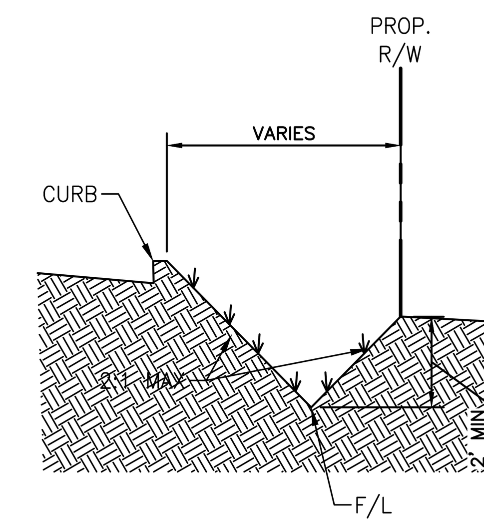


NOTES:

1. CONCRETE SHALL BE 2500 PSI.
2. ISOLATION JOINTS SHALL BE PLACED ONLY AS SPECIFIED
3. CONTRACTION JOINTS CONSISTING OF 1" DEEP SCORES SHALL BE PLACED AT 15' INTERVALS O.C.
4. WHERE A WALK IS ADJACENT TO THE CURB THE JOINTS SHALL ALIGN WITH JOINTS IN THE WALK.

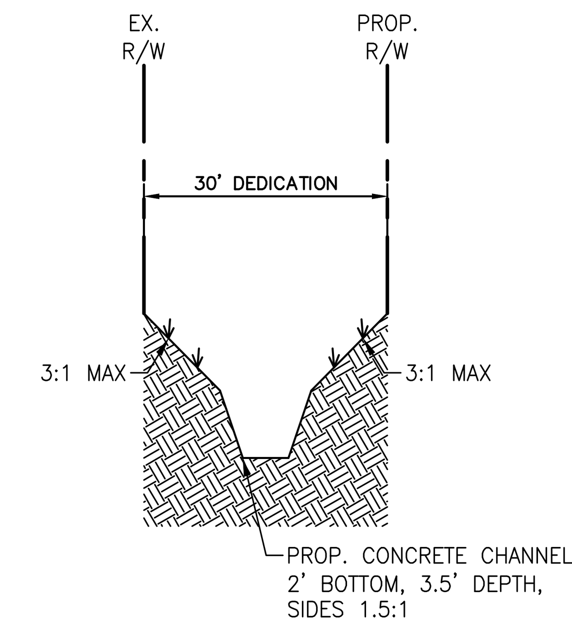
DEPRESSED LANDSCAPE DETAIL

NTS



BIOSWALE DETAIL

NTS



CHANNEL DETAIL

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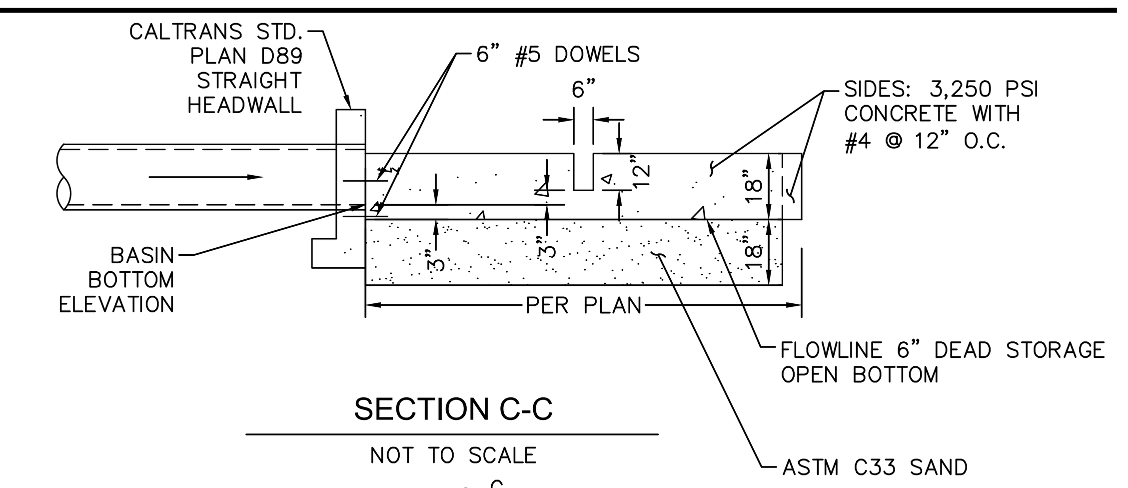
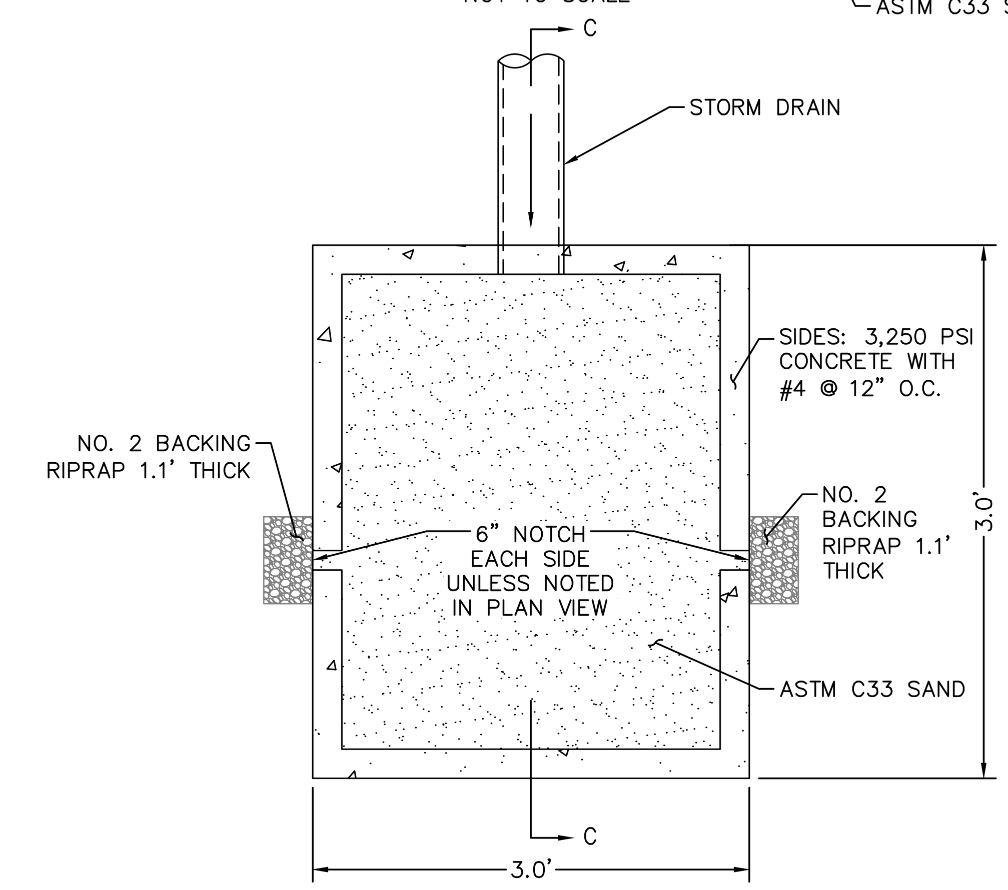


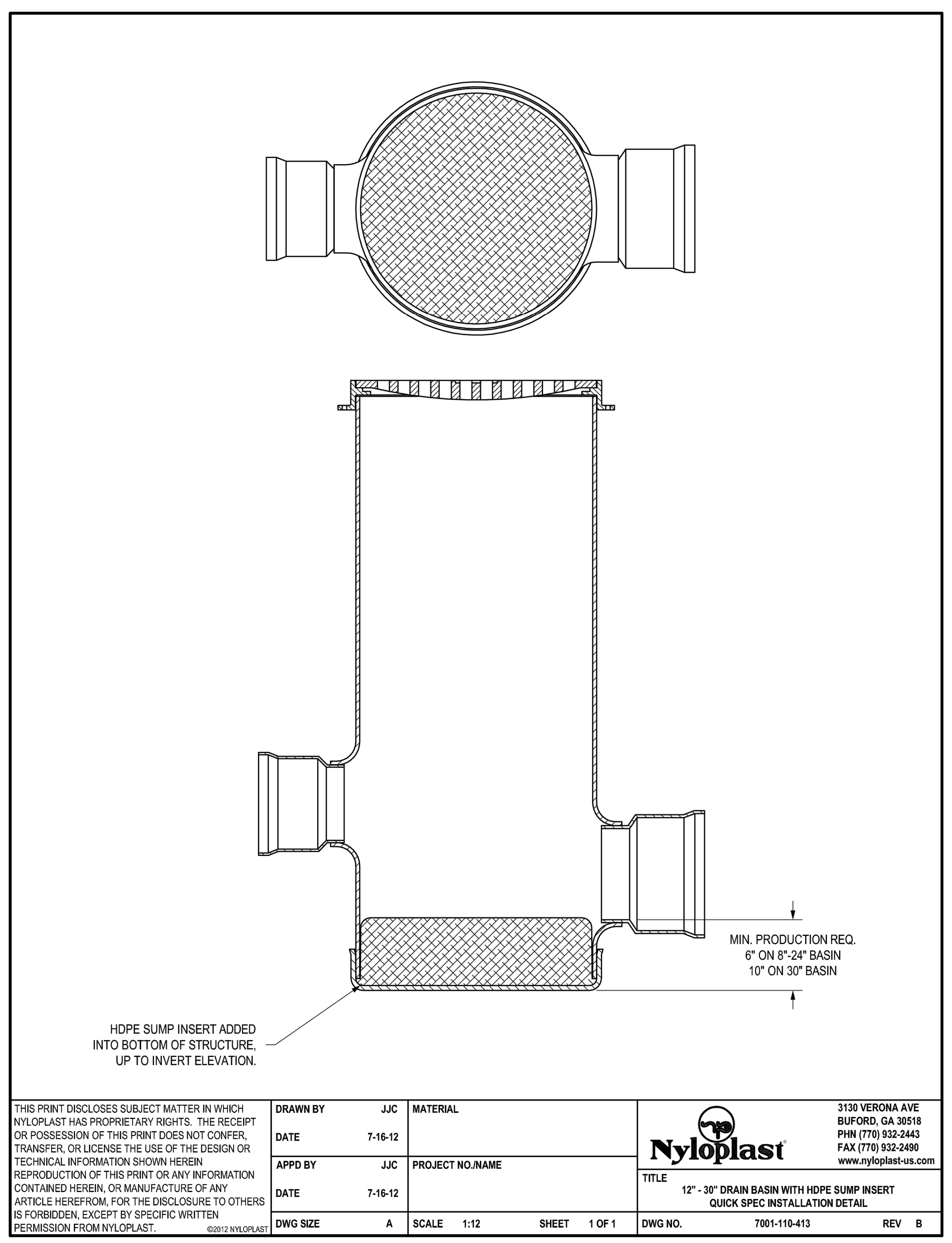
SECTION C-C

NOT TO SCALE



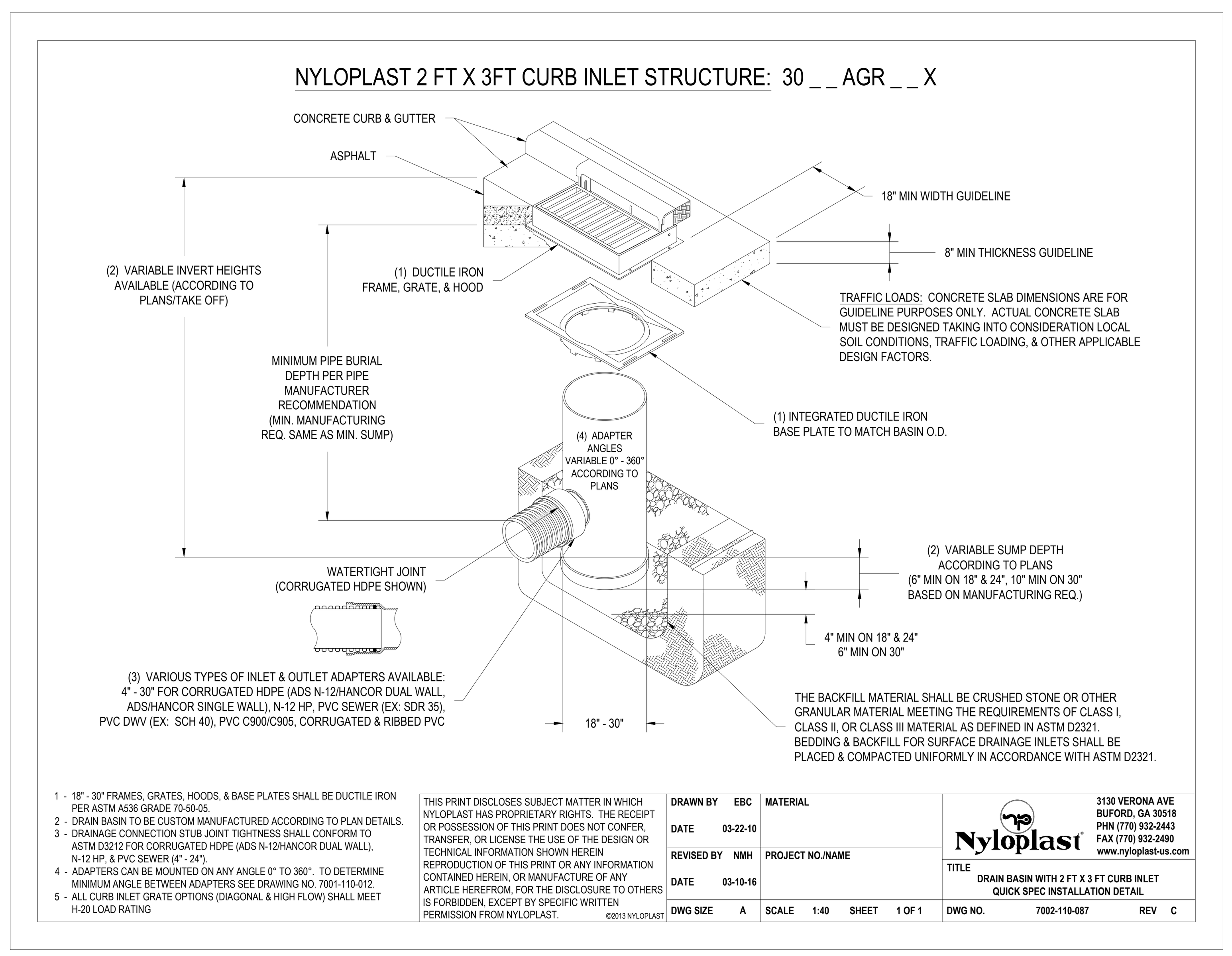
SAND FOREBAY DETAIL

NTS



DRAIN BASIN SUMP INSERT

NTS



DRAIN BASIN STANDARD DETAIL

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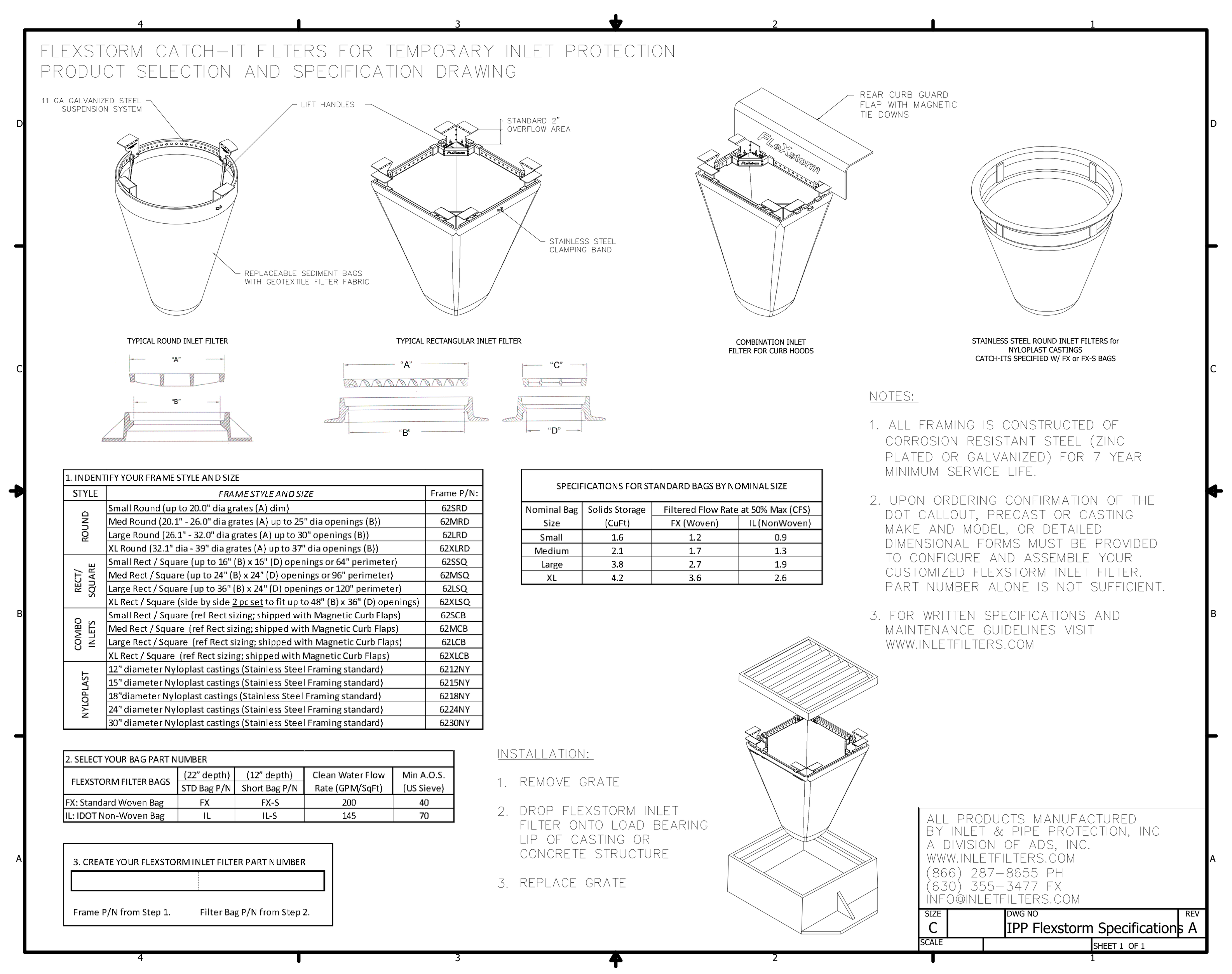


FLEXSTORM CATCH-IT INLET FILTER

NTS

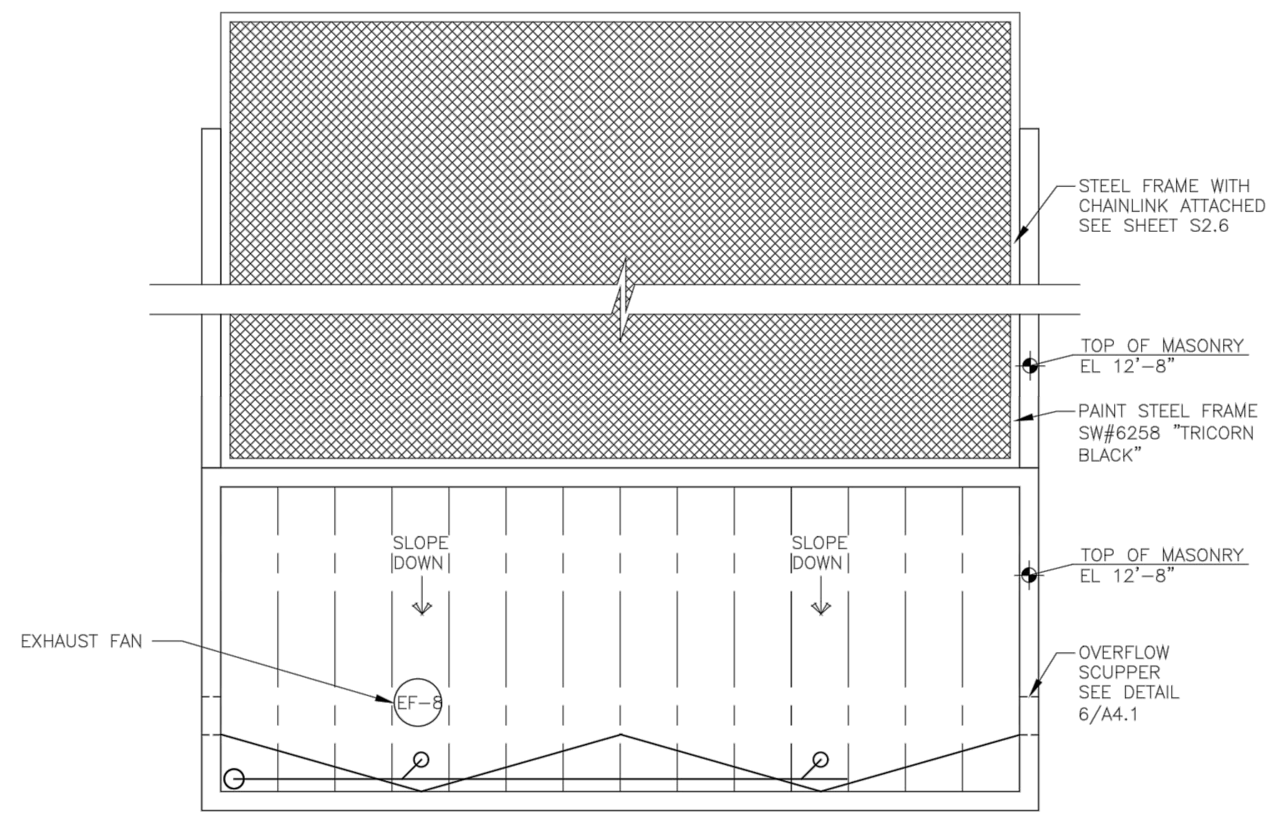
STENCIL EXAMPLE

NTS

Kimley»Horn

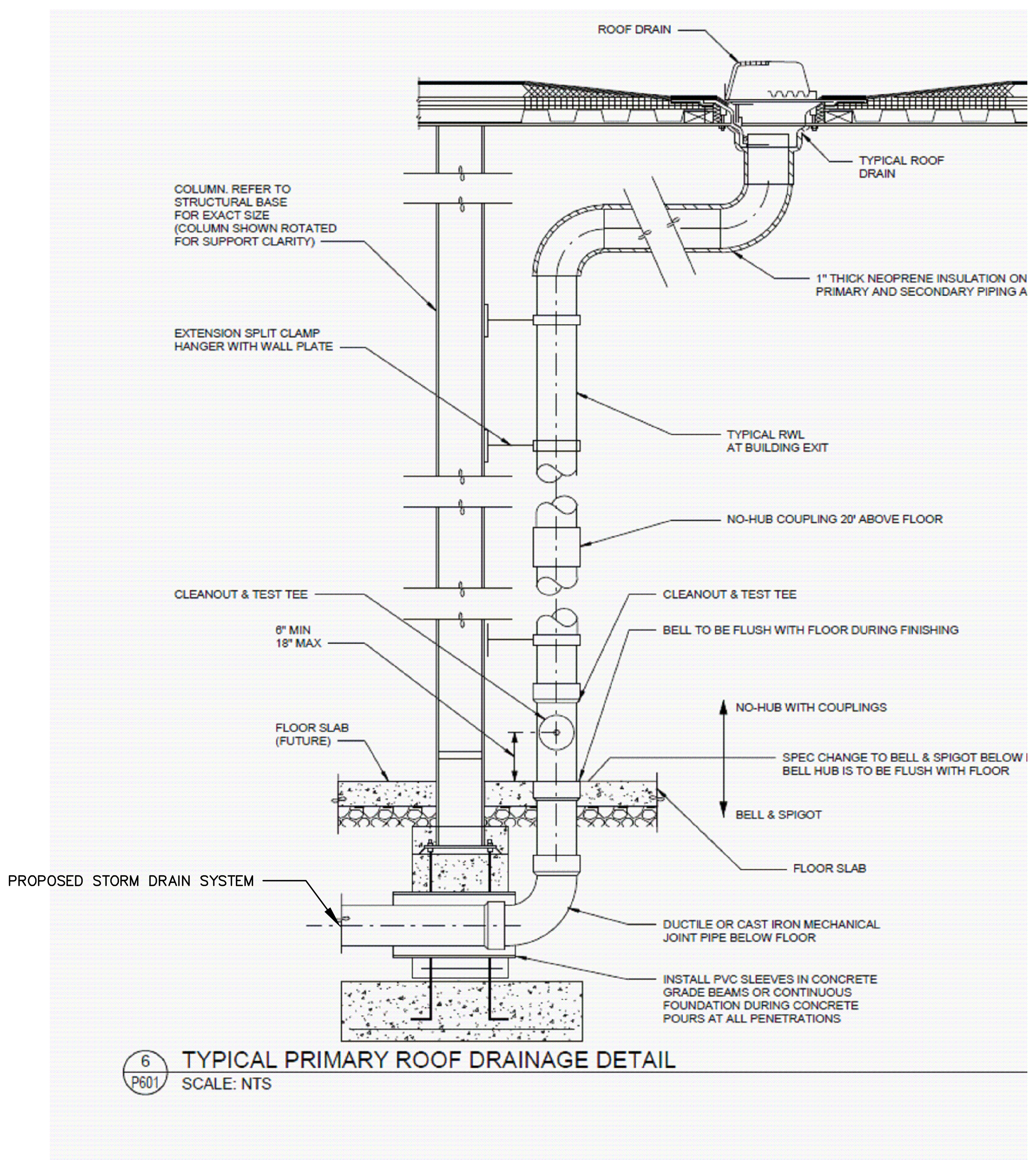
POST-CONSTRUCTION BMP DETAILS
PILOT FUELING AND TRUCK STOP PERRIS (P22-05002)

SHT 2 OF 3



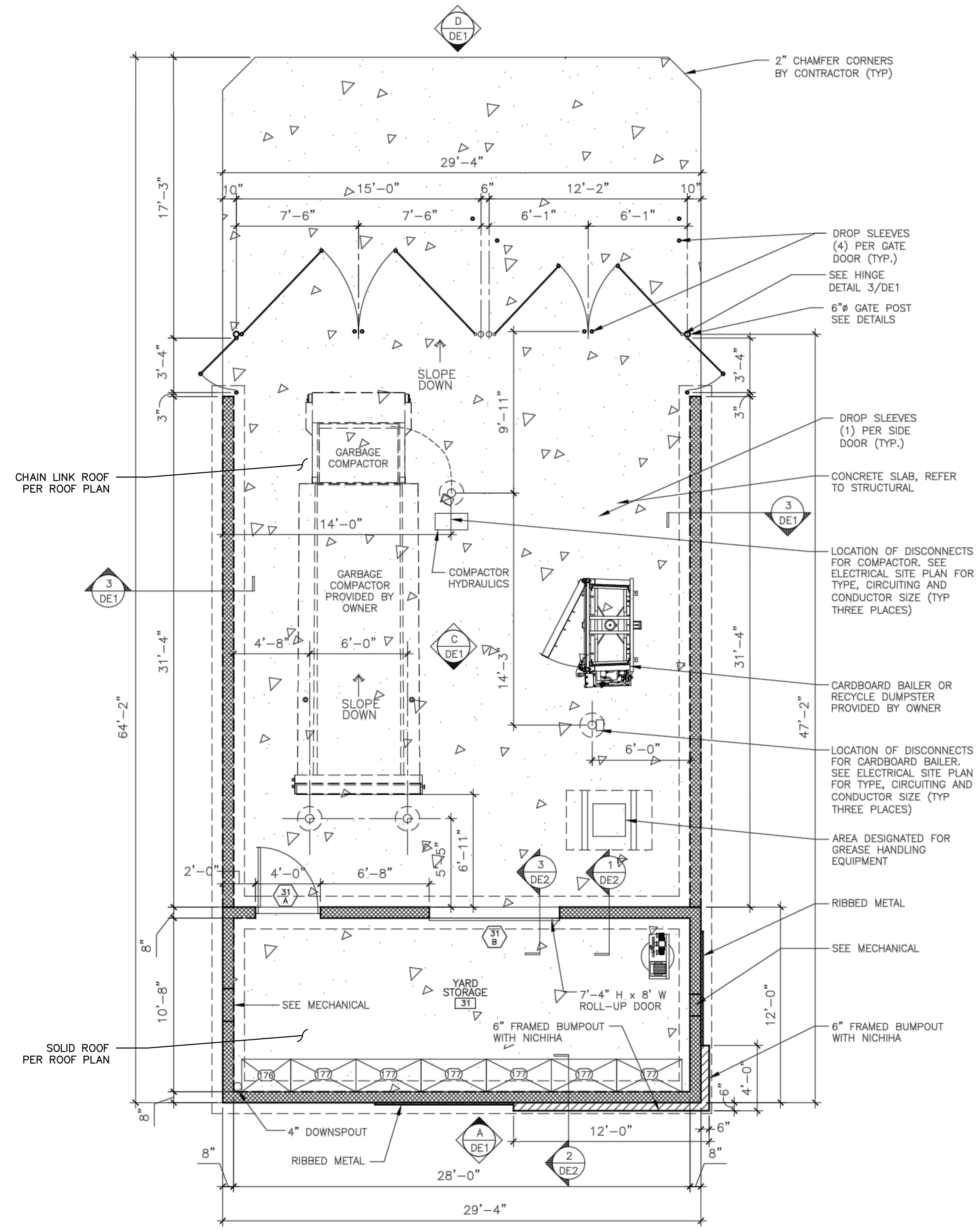
TRUCK STOP TRASH ENCLOSURE ROOF PLAN

NTS



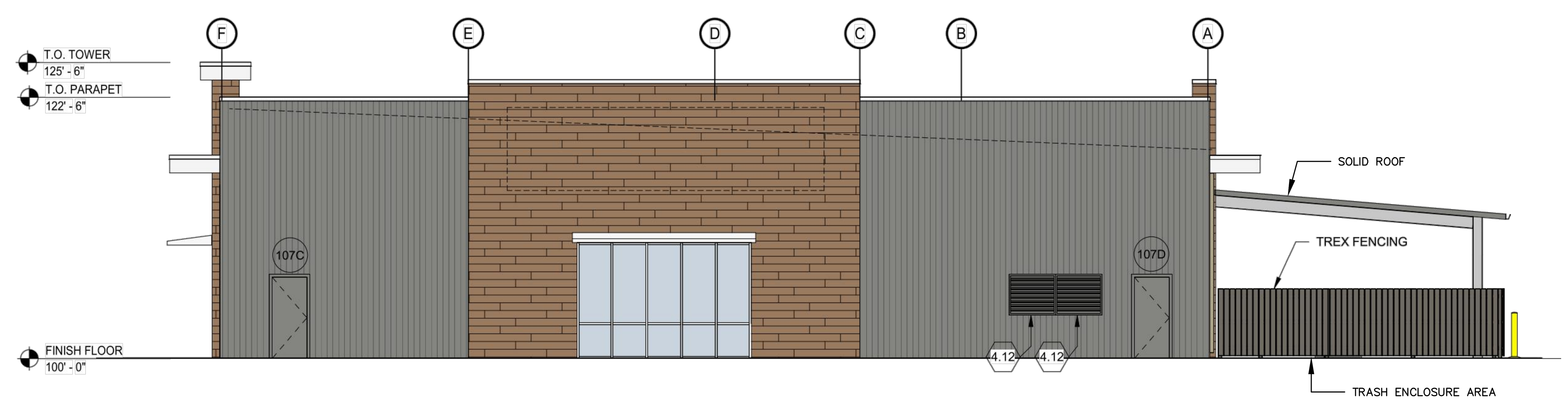
ROOF DRAIN CONNECTION TO STORM DRAIN DETAIL

NTS



TRUCK STOP TRASH ENCLOSURE PLAN

NTS



SHOP BUILDING/TRASH ENCLOSURE ELEVATION

NTS

Kimley»Horn

POST-CONSTRUCTION BMP SITE PLAN
PILOT FUELING AND TRUCK STOP PERRIS (P22-05002)
SHT 3 OF 3

Appendix 2: Construction Plans

Grading and Drainage Plans

CITY OF PERRIS
PRELIMINARY GRADING PLANS
PILOT PERRIS
ETHANAC ROAD AND TRUMBLE ROAD

PROJECT TEAM

OWNER/DEVELOPER
PILOT TRAVEL CENTERS LLC
5508 LONAS DRIVE
KNOXVILLE, TN 37909
(865) 588-7488

SURVEYOR
LG LAND SURVEYING, INC
30355 CALLE FELIZ TER
VALLEY CENTER, CA 92082
ATTN: JOHN GERVAIS, PLS 8674
(619) 535-1172
JOHN@LGLSINC.COM
DATE OF FIELD SURVEY: 07/13/2021

CIVIL ENGINEER
SHEA-MICHAEL ANTI. PE, LSIT, QSP/QSD
KIMLEY-HORN AND ASSOCIATES, INC.
3880 LEMON STREET, SUITE 420,
RIVERSIDE, CA 92501
(951) 335-8272
SHEA.ANTI@KIMLEY-HORN.COM

GEOTECHNICAL CONSULTANT
GEOTECHNICAL SOLUTIONS, INC
27 MAUCHLY #210
IRVINE, CA 92618
PROJECT No.: G-5908-01
DATED: JUNE 11, 2021

UTILITY PURVEYORS

WATER
EASTERN MUNICIPAL WATER DISTRICT
P.O. BOX 8300
2270 TRUMBLE ROAD PERRIS, CA
92572 (951) 928-3777

ELECTRICITY
SOUTHERN CALIFORNIA EDISON
26100 MENIFEE ROAD MENIFEE,
CA 92585
PHONE: (800) 655-4555

TELEPHONE/CABLE
FRONTIER COMMUNICATIONS
E 3RD ST PERRIS,
CA, 92570
PHONE: (909) 793-2826

SEWER
EASTERN MUNICIPAL WATER DISTRICT
P.O. BOX 8300
2270 TRUMBLE ROAD
PERRIS, CA 92572
(951) 928-3777

GAS
SOUTHERN CALIFORNIA GAS
1981 W. LUGONIA AVENUE
REDLANDS, CA 92374
PHONE: (800) 427-2200

PRIVATE ENGINEER'S NOTICE TO CONTRACTOR:

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. THESE LOCATIONS ARE APPROXIMATE AND SHALL BE CONFIRMED IN THE FIELD BY THE CONTRACTOR SO THAT ANY NECESSARY ADJUSTMENTS CAN BE MADE IN ALIGNMENT AND/OR GRADE OF THE PROPOSED IMPROVEMENTS. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PREVENT ANY UTILITY LINES SHOWN AND ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THESE PLANS.

ACTUAL THICKNESS OR BASE MATERIAL TO BE DETERMINED BY THE SOILS TEST AND RECOMMENDED BY THE SOILS ENGINEER.

CARE SHOULD BE TAKEN TO PREVENT GRADED DITCHES AND SWALES FROM UNDERMINING STREET IMPROVEMENTS.

ATTENTION CONTRACTORS:

CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND SHALL REPORT ALL DISCREPANCIES TO THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK.

CONSTRUCTION CONTRACTOR AGREES THAT, IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS. CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

BASIS OF BEARINGS:

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CENTERLINE OF TRUMBLE ROAD PER RS 85/71, I.E. N00°13'05"E.

FLOOD ZONE INFORMATION

THE LAND SHOWN IS MAINLY LOCATED IN FLOOD ZONE "X" BEING DESCRIBED AS AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN. PER FLOOD INSURANCE RATE MAP (FIRM) – COMMUNITY PANEL NUMBER 06065C2055H AND 06065C2060H, DATED AUGUST 18, 2014.

BUILDING NOTE:

ALL INFORMATION WITH BUILDING (INCLUDING SETBACKS AND FINISH FLOOR ELEVATIONS) IS FOR REFERENCE ONLY AND THE APPROVAL OF THESE GRADING PLANS DO NOT INCLUDE ANY PROVISIONS ASSOCIATED WITH BUILDINGS.

NOTE:

A PRE-GRADING/PRE-CONSTRUCTION MEETING AND SITE INSPECTION SHALL BE ARRANGED FOR BY THE SITE DEVELOPER PRIOR TO COMMENCING GRADING OPERATIONS. THOSE PARTIES REQUIRED TO ATTEND THE PRE-CONSTRUCTION MEETING SHALL INCLUDE BUT ARE NOT LIMITED TO THE DEVELOPER, PROJECT SUPERINTENDENT, ENGINEER OF RECORD, SOIL ENGINEER, GRADING CONTRACTOR, THE UNDERGROUND UTILITIES CONTRACTOR AND CITY INSPECTOR. THE FOCUS OF THE PRE-CONSTRUCTION MEETING SHALL BE TO DISCUSS THE VARIOUS ASPECTS AND RESPONSIBILITIES OF THE GRADING PROJECT AND TO PROVIDE AN APPROXIMATE TIME-TABLE FOR THE COMPLETION OF ROUGH GRADING. ARRANGE FOR A PRE-GRADING/PRE-CONSTRUCTION MEETING BY CALLING THE CITY OFFICE RESPONSIBLE FOR PROVIDING YOUR GRADING AND BUILDING INSPECTIONS. CALL CITY DISPATCH AT (951) 943-6504 TO SETUP PRE-CONSTRUCTION MEETING.

NO WORK SHALL COMMENCE WITHIN THE ROAD RIGHT-OF-WAY (R/W) PRIOR TO ISSUANCE OF AN ENCROACHMENT PERMIT BY CITY OF PERRIS.

PROJECT WILL COMPLY WITH PM10 REQUIREMENTS.

NOTIFICATIONS:

AT LEAST 48 HOURS PRIOR TO COMMENCING CONSTRUCTION, CONTRACTOR SHALL NOTIFY:

1. EASTERN MUNICIPAL WATER DISTRICT (FIELD ENGINEERING DEPARTMENT) — (951) 928-3777, EXT 4830
2. CITY OF PERRIS — (951) 943-5003
3. UNDERGROUND SERVICE ALERT (USA) — 1(800) 227-2600 OR 811
4. ALL OTHER AFFECTED UTILITIES AND PERMIT AGENCIES:
   A. THE GAS COMPANY — 1-800-427-2200
   B. SO. CAL EDISON (USA) — 1-800-684-8123
   C. VERIZON — 1-800-483-4000
   D. TIME WARNER CABLE — 1-887-475-3127

LEGAL DESCRIPTION

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF PERRIS, IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

PARCEL A:

LOT 13 OF WATERS HOMESTEAD, A SUBDIVISION OF THE SOUTHWEST QUARTER OF SECTION 10, TOWNSHIP 5 SOUTH, RANGE 3 WEST, SAN BERNARDINO BASE AND MERIDIAN, AS SHOWN BY MAP OF SAID SUBDIVISION ON FILE IN BOOK 14, PAGE 681, SAN DIEGO COUNTY RECORDS.

EXCEPT FROM SAID LOT 13 THAT PORTION THEREOF GRANTED TO THE STATE OF CALIFORNIA FOR FREEWAY PURPOSES BY DEED RECORDED JULY 3, 1951 IN BOOK 1284, PAGE 162, OFFICIAL RECORDS, RIVERSIDE COUNTY RECORDS.

ALSO EXCEPT THOSE PORTIONS OF LOT 13 OF WATERS HOMESTEAD, A SUBDIVISION OF THE SOUTHWEST QUARTER OF SECTION 10, TOWNSHIP 5 SOUTH, RANGE 3 WEST, SAN BERNARDINO BASE AND MERIDIAN, AS SHOWN BY MAP OF SAID SUBDIVISION ON FILE IN BOOK 14, PAGE 681 OF MAPS, SAN DIEGO COUNTY RECORDS, LYING WESTERLY AND SOUTHERLY OF THE FOLLOWING DESCRIBED LINE:

BEGINNING ON THE NORTHERLY LINE OF SAID LOT 12, DISTANT ALONG SAID NORTHERLY LINE SOUTH 89° 17' 04" EAST 50.61 FEET FROM THE WESTERLY LINE OF SAID SECTION;
THENCE COURSE (1) SOUTH 0° 21' 45" EAST 82.75 FEET;
THENCE ALONG A TANGENT CURVE CONCAVE EASTERLY WITH A RADIUS OF 2947 FEET, THROUGH AN ANGLE OF 3° 11' 29", 164.15 FEET;
THENCE ALONG A COMPOUND CURVE CONCAVE EASTERLY WITH A RADIUS OF 2197 FEET FROM A TANGENT BEARING SOUTH 3° 33' 14" EAST, THROUGH AN ANGLE OF 15° 40' 18", 600.93 FEET;
THENCE SOUTH 19° 13' 32" EAST 67.41 FEET;
THENCE SOUTH 28° 16' 41" EAST 298.72 FEET;
THENCE SOUTH 58° 11' 26" EAST, 50.93 FEET;
THENCE SOUTH 82° 01' 10" EAST 438.46 FEET;
THENCE COURSE (2) CONTINUING SOUTH 82° 01' 10" EAST 207.28 FEET;
THENCE COURSE (3) SOUTH 0° 46' 23" WEST 24.30 FEET TO THE SOUTHERLY LINE OF SAID LOT 14, AS CONVEYED TO THE STATE OF CALIFORNIA BY DEED RECORDED JUNE 18, 1965 AS INSTRUMENT NO. 70888 OF OFFICIAL RECORDS OF RIVERSIDE COUNTY.

APN: 329-250-011

PARCEL B:

LOT 14 OF WATERS HOMESTEAD, A SUBDIVISION OF THE SOUTHWEST QUARTER OF SECTION 10, TOWNSHIP 5 SOUTH, RANGE 3 WEST, SAN BERNARDINO BASE AND MERIDIAN, AS SHOWN BY MAP OF SAID SUBDIVISION ON FILE IN BOOK 14, PAGE 681, SAN DIEGO COUNTY RECORDS.

EXCEPT THE EASTERLY RECTANGULAR 30 FEET OF SAID LOT 14, AS GRANTED TO COUNTY OF RIVERSIDE BY DEED RECORDED AUGUST 16, 1950 IN BOOK 1197, PAGE 206 AND BY DEED RECORDED AUGUST 16, 1950 IN BOOK 1197, PAGE 229, BOTH OF OFFICIAL RECORDS, RIVERSIDE COUNTY RECORDS.

EXCEPT THOSE PORTIONS OF LOT 14 OF WATERS HOMESTEAD, A SUBDIVISION OF THE SOUTHWEST QUARTER OF SECTION 10, TOWNSHIP 5 SOUTH, RANGE 3 WEST, SAN BERNARDINO BASE AND MERIDIAN, AS SHOWN BY MAP OF SAID SUBDIVISION ON FILE IN BOOK 14, PAGE 681 OF MAPS, SAN DIEGO COUNTY RECORDS, LYING WESTERLY AND SOUTHERLY OF THE FOLLOWING DESCRIBED LINE:

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THENCE ALONG A COMPOUND CURVE CONCAVE EASTERLY WITH A RADIUS OF 2197 FEET FROM A TANGENT BEARING SOUTH 3° 33' 14" EAST, THROUGH AN ANGLE OF 15° 40' 18", 600.93 FEET;
THENCE SOUTH 19° 13' 32" EAST 67.41 FEET;
THENCE SOUTH 28° 16' 41" EAST 298.72 FEET; THENCE SOUTH 58° 11' 26" EAST, 50.93 FEET;
THENCE SOUTH 82° 01' 10" EAST 438.46 FEET;
THENCE COURSE (2) CONTINUING SOUTH 82° 01' 10" EAST 207.28 FEET;
THENCE COURSE (3) SOUTH 0° 46' 23" WEST 24.30 FEET TO THE SOUTHERLY LINE OF SAID LOT 14, AS CONVEYED TO THE STATE OF CALIFORNIA BY DEED RECORDED JUNE 18, 1965 AS INSTRUMENT NO. 70888 OF OFFICIAL RECORDS OF RIVERSIDE COUNTY.

APN: 329-250-012

ESTIMATED EARTHWORK QUANTITIES

CUT:	21,176 CY
FILL:	20,864 CY
NET:	312 CY CUT

NOTE:
THE ABOVE QUANTITIES ARE APPROXIMATE AND FOR PERMIT PROCESS ONLY. QUANTITIES HAVE BEEN CALCULATED FROM EXISTING GRADE SURFACE TO PROPOSED FINAL GRADE. QUANTITIES ACCOUNT FOR THICKNESS OF PAVEMENT SECTIONS, BUILDING SLAB, AND DETENTION SPOILS. THEY DO NOT REFLECT SHRINKAGE, SWELL, SUBSIDENCE AND REMOVAL OF EXISTING BUILDING STRUCTURES AND SURFACE IMPROVEMENTS.

THE CONTRACTOR SHALL RELY ON THEIR OWN EARTHWORK ESTIMATES FOR BIDDING PURPOSES.

STATEMENT BY ENGINEER OF RECORD

ALL EASEMENTS SHOWN ON THIS PLAN ARE PER THE ALTA PREPARED BY LG LAND SURVEYING DATED 07/13/21.

APPLICABLE CODES:

ALL NEW CONSTRUCTION SHALL MEET OR EXCEED THE MINIMUM REQUIREMENTS OF THE CALIFORNIA BUILDING CODE 2016 EDITION THAT INCLUDE THE BUILDING, PLUMBING, MECHANICAL, ELECTRICAL, FIRE AND ENERGY COMMISSION SERIES. IN CASES WHERE THE CODES MAY CONFLICT WITH THE PROVISIONS IN THESE PLANS OR SPECIFICATIONS, THE MORE RESTRICTIVE PROVISIONS SHALL GOVERN.

ABBREVIATIONS

AB	AGGREGATE BASE
AC	ASPHALT
AHJ	AUTHORITY HAVING JURISDICTION
BC	BACK OF CURB
BS	BOTTOM OF STAIR
BLDG	BUILDING
BW	BACK OF WALK
CAB	COMPACTED AGGREGATE BASE
CB	CATCH BASIN
CF	CURB FACE
C/L	CENTERLINE
CONC.	CONCRETE
CONST.	CONSTRUCT, CONSTRUCTION
CSG	COMPACTED SUBGRADE
DF	DEEPENED FOOTING
DI	DRAIN INLET
DW	DOMESTIC WATER
E	EAST
EG	EDGE OF GUTTER
ELEC	ELECTRIC
EP	EDGE OF PAVEMENT
FF	FINISHED FLOOR
FG	FINISHED GRADE
FL	FLOW LINE
FS	FINISHED SURFACE
FW	FIRE WATER
G	GAS
GB	GRADE BREAK
HP	HIGH POINT
INV	INVERT
IRR	IRRIGATION WATER
JS	JUNCTION STRUCTURE
L	LENGTH
LP	LOW POINT
MH	MANHOLE
N	NORTH
PCC	PORTLAND CEMENT CONCRETE
P/L	PROPERTY LINE
PUE	PUBLIC UTILITY EASEMENT
PVC	POLYVINYL CHLORIDE
R	RADIUS OR RIDGE
RD	ROOF DRAIN
RW	RECLAIMED WATER
ROW	RIGHT-OF-WAY
S	SLOPE GRADIENT
SD	STORM DRAIN
STA	STATION
SS	SANITARY SEWER
SPPWC	STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION
SW	SIDE WALK
T	TELEPHONE
TC	TOP OF CURB
TS	TOP OF STAIR
VIF	VERIFY IN FIELD
W	WATER OR WEST
XXX.XX	PROPOSED ELEVATION
(XXX.XX)	EXISTING ELEVATION

SHEET INDEX

SHEET NUMBER	SHEET TITLE
1	COVER SHEET
2	GENERAL NOTES
3	SITE PLAN
4	SITE PLAN
5	HORIZONTAL CONTROL PLAN
6	HORIZONTAL CONTROL PLAN
7	SIGNING, STRIPING, AND PAVEMENT PLAN
8	SIGNING, STRIPING, AND PAVEMENT PLAN
9	GRADING PLAN
10	GRADING PLAN
11	UTILITY PLAN
12	UTILITY PLAN BLOW UPS
13	STORM DRAIN PLAN
14	STORM DRAIN PLAN BLOW UPS
15	LANDSCAPE PLAN
16	LANDSCAPE PLAN

SITE DATA

APN'S: 329-250-011 AND 329-250-012

GROSS PARCEL	±14.4	ACRES
DISTURBED	±14.4	ACRES
TOTAL PERVIOUS	±4.5	ACRES
TOTAL IMPERVIOUS (INCLUDING BUILDING)	±9.9	ACRES

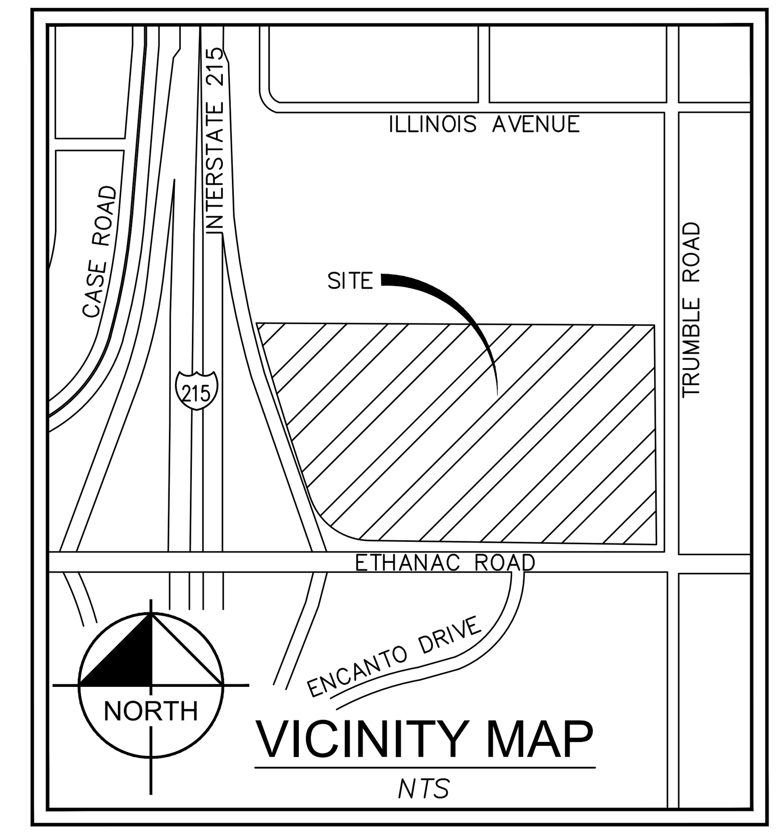
TOTAL GROSS FLOOR AREA: 13,980 SF

EXISTING: COMMERCIAL COMMUNITY (CC)

PROPOSED: COMMERCIAL COMMUNITY (CC)

PARKING PROVIDED:

STANDARD	88	SPACES
ACCESSIBLE	5	SPACES
TRUCK	116	SPACES
BICYCLE SPACES	2	PROPOSED



VICINITY MAP
NTS

LEGEND

PROPERTY LINE CIVIL
CENTERLINE
SETBACKS
EASEMENT LINE
LIMITS OF WORK LINE
SS — PROPOSED SANITARY SEWER PIPE
SD — PROPOSED STORM DRAIN PIPE
AIR — PROPOSED AIR
W — PROPOSED WATER PIPE
OWS — PROPOSED OIL WATER SEPARATOR
UGT — PROPOSED TELEPHONE LINE
UE — PROPOSED UNDERGROUND ELECTRIC
GB — GRADE BREAK
R — RIDGE LINE
ACCESSIBLE ROUTE
—x—x—x— FENCE
PARKING COUNT
(1422.27 TC) (1421.77 TP) — PROPOSED ELEVATION
1422.27 TC 1421.77 TP — EXISTING ELEVATION
1.2% — SLOPE

HEAVY DUTY CONCRETE PAVEMENT
HEAVY DUTY ASPHALT PAVEMENT
STANDARD DUTY ASPHALT PAVEMENT
LANDSCAPE/PLANTER AREA
DETECTABLE WARNINGS
DECORATIVE PAVEMENT

GEOTECHNICAL REPORT

THE GEOTECHNICAL EVALUATION REPORT TRAVEL PLAZA PERRIS PROJECT NO. G-5908-01 DATED JUNE 11, 2021 PREPARED BY GEOTECHNICAL SOLUTIONS, INC. AND ALL ADDENDA SHALL BE CONSIDERED PART OF THESE CONSTRUCTION DOCUMENTS. THE PROJECT IS CONSISTENT WITH SOILS REPORT REQUIREMENTS AND RECOMMENDATIONS; AS WELL AS, ALL REQUIRED TESTS, INSPECTIONS AND REPORTS WILL BE CONDUCTED AS NECESSARY.

GEOTECHNICAL ENGINEER OF RECORD
GEOTECHNICAL SOLUTIONS, INC

DECLARATION OF ENGINEER OF RECORD

I HEREBY DECLARE THAT IN MY PROFESSIONAL OPINION, THE DESIGN OF THE IMPROVEMENTS AS SHOWN ON THESE PLANS COMPLIES WITH THE CURRENT PROFESSIONAL ENGINEERING STANDARDS AND PRACTICES. AS THE ENGINEER IN RESPONSIBLE CHARGE OF THE DESIGN OF THESE IMPROVEMENTS, I ACCEPT FULL RESPONSIBILITY FOR SUCH DESIGN. I UNDERSTAND AND ACKNOWLEDGE THAT THE PLAN CHECK OF THESE PLANS BY THE CITY OF PERRIS IS A REVIEW FOR THE LIMITED PURPOSE OF ENSURING THAT THESE PLANS COMPLY WITH CITY PROCEDURES AND OTHER APPLICABLE CODES AND ORDINANCES. THE PLAN REVIEW PROCESS IS NOT A DETERMINATION OF THE TECHNICAL ADEQUACY OF THE DESIGN OF THE IMPROVEMENTS. SUCH PLAN CHECK DOES NOT THEREFORE RELIEVE ME OF MY DESIGN RESPONSIBILITY.

SIGNATURE ______ DATE 6/8/2022

LICENSE NO. 78274 EXP. 9/30/2023

REGISTERED PROFESSIONAL ENGINEER — SHEA-MICHAEL ANTI — RCE NO. 78274 — CIVIL — STATE OF CALIFORNIA

811 DIAL TOLL FREE 811
Know what's below. Call before you dig.
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

BENCH MARK:
COUNTY OF RIVERSIDE BENCHMARK "M 21-1 RESET", 373 FEET EAST ALONG ETHANAC ROAD FROM THE INTERSECTION OF ETHANAC ROAD AND THE SOUTHBOUND LANES OF HIGHWAY 395. 150 FEET SOUTH OF ETHANAC ROAD. 50 FEET SOUTHEAST OF THE NORTHEAST CORNER OF A 6 FOOT CHAIN LINK RIGHT-OF-WAY FENCE. 1 FOOT NORTHEAST OF AN ANGLE-POINT IN THE RIGHT-OF-WAY FENCE. 2 FEET NORTH OF A MARKER POST. A BRASS DISK STAMPED "M-21-1 RESET" SET IN THE TOP OF A CONCRETE POST 3 INCHES ABOVE GROUND. EL = 1421.891 NGVD 29 (5/85)

MARK	BY	DATE	REVISIONS	APPR	DATE
	ENGINEER			CITY	

CITY OF PERRIS
APPROVED BY:
CONTRACT CITY ENGINEER — DATE

Kimley»Horn
765 THE CITY DRIVE SUITE 200, ORANGE, CA 92868
PHONE: 714-939-1030

PREPARED BY:
SHEA-MICHAEL ANTI — R.C.E 78274 — 6/8/2022 DATE

COVER SHEET
PRELIMINARY PRECISE GRADING PLAN
PILOT PERRIS
ETHANAC ROAD AND TRUMBLE ROAD
APN: 329-250-011 & 329-250-012

PROJECT NUMBER: 095426010

SHEET NO. 1 OF 16 SHTS

FILE NO.:

GENERAL NOTES:

1. NOTIFY CITY ENGINEER, CITY OF PERRIS, AT (951) 943-6504, AT LEAST 24 HOURS PRIOR TO START OF CONSTRUCTION.
2. PROOF ROLL BUILDING AND ALL PARKING AREAS. NOTIFY ARCHITECT OF ALL UNACCEPTABLE AREAS.
3. EDGE OF NEW PAVEMENT TO BE FLUSH WITH EXISTING PAVEMENT.
4. ALL SIDEWALK, CURB AND GUTTER, STREET PAVING, CURB CUTS, DRIVEWAY APPROACHES, ACCESSIBLE RAMPS, ETC. CONSTRUCTED OUTSIDE THE PROPERTY LINE IN THE RIGHT-OF-WAY SHALL CONFORM TO ALL MUNICIPAL AND/OR STATE SPECIFICATIONS AND REQUIREMENTS.
5. FOR AREAS OUTSIDE THE PROPERTY LINES, REPAIR AND REPLACE ALL DAMAGE DONE TO EXISTING ELEMENTS (SIDEWALKS, PAVING, LANDSCAPING, ETC.) AS REQUIRED BY OWNERS AND/OR GOVERNING AUTHORITY.
6. FOR PROPOSED UTILITY LOCATIONS, SEE UTILITY PLAN.
7. ALL DIMENSIONS REFER TO THE FACE OF CURB UNLESS OTHERWISE NOTED.
8. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS PRIOR TO ORDERING MATERIALS AND STARTING WORK, AND NOTIFY ENGINEER OF ANY DISCREPANCIES IMMEDIATELY.
9. CONTRACTOR SHALL ENSURE CLEAN JOINTS AND PROTECT PAVEMENT WHEREVER PROPOSED PAVEMENT MATCHES EXISTING PAVEMENT.
10. REFER TO ARCHITECTURAL PLANS FOR SIGN DETAILS. SEE MEP PLANS FOR SITE ELECTRICAL DRAWINGS.
11. REFER TO ARCHITECTURAL AND STRUCTURAL PLANS TO VERIFY ALL BUILDING DIMENSIONS.
12. ANY WORK IN THE RIGHT-OF-WAY SHALL BE APPROVED BY THE CITY ENGINEER.
13. ALL EARTHWORK TO COMPLY WITH RECOMMENDATIONS IN GEOTECHNICAL REPORT.
14. ALL PAINT STRIPING TO BE TWO COATS.
15. ALL PROPERTY LINES, EASEMENTS AND BUILDING, EXISTING AND PROPOSED, ARE SHOWN ON THIS SITE PLAN.
16. THE CONTRACTOR AND SUBCONTRACTORS SHOULD BE FAMILIAR WITH ALL STATE AND LOCAL REQUIREMENTS RELATED TO SITE CONSTRUCTION ACTIVITIES PRIOR TO COMMENCING WORK. ALL WORK SHALL CONFORM AS APPLICABLE TO THESE GOVERNING STANDARDS AND SPECIFICATIONS.
17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING ALL MATERIAL AND LABOR TO CONSTRUCT THE FACILITY AS SHOWN AND DESCRIBED IN THE CONSTRUCTION DOCUMENTS IN ACCORDANCE WITH THE APPROPRIATE APPROVING AUTHORITIES, SPECIFICATIONS AND REQUIREMENTS. CONTRACTOR SHALL CLEAR AND GRUB ALL AREAS UNLESS OTHERWISE INDICATED, REMOVING TREES, STUMPS, ROOTS, MUCK, EXISTING PAVEMENT AND ALL OTHER DELETERIOUS MATERIAL.
18. EXISTING UTILITIES SHOWN ARE LOCATED ACCORDING TO THE INFORMATION AVAILABLE TO THE ENGINEER AT THE TIME OF THE TOPOGRAPHIC SURVEY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR THE ENGINEER. GUARANTEE IS NOT MADE THAT ALL EXISTING UNDERGROUND UTILITIES ARE SHOWN OR THAT THE LOCATION OF THOSE SHOWN ARE ENTIRELY ACCURATE. FINDING THE ACTUAL LOCATION OF ANY EXISTING UTILITIES IS THE CONTRACTOR'S RESPONSIBILITY AND SHALL BE DONE BEFORE COMMENCING ANY WORK IN THE VICINITY. FURTHERMORE, THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES DUE TO THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES. THE OWNER OR ENGINEER WILL ASSUME NO LIABILITY FOR ANY DAMAGES SUSTAINED OR COST INCURRED BECAUSE OF THE OPERATIONS IN THE VICINITY OF EXISTING UTILITIES OR STRUCTURES, NOR FOR TEMPORARY BRACING AND SHORING OF SAME. IF IT IS NECESSARY TO SHORE, BRACE, SWING OR RELOCATE A UTILITY, THE UTILITY COMPANY OR DEPARTMENT AFFECTED SHALL BE CONTACTED AND THEIR PERMISSION OBTAINED REGARDING THE METHOD TO USE FOR SUCH WORK.
19. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONTACT THE VARIOUS UTILITY COMPANIES WHICH MAY HAVE BURIED OR AERIAL UTILITIES WITHIN OR NEAR THE CONSTRUCTION AREA BEFORE COMMENCING WORK. THE CONTRACTOR SHALL PROVIDE 48 HOURS MINIMUM NOTICE TO ALL UTILITY COMPANIES PRIOR TO BEGINNING CONSTRUCTION. AN APPROXIMATE LIST OF THE UTILITY COMPANIES WHICH THE CONTRACTOR MUST CALL BEFORE COMMENCING WORK IS PROVIDED ON THE UTILITY SHEET OF THESE CONSTRUCTION PLANS. THIS LIST SERVES AS A GUIDE ONLY AND IS NOT INTENDED TO LIMIT THE UTILITY COMPANIES WHICH THE CONTRACTOR MAY WISH TO NOTIFY.
20. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL REQUIRED CONSTRUCTION PERMITS AND BONDS IF REQUIRED PRIOR TO CONSTRUCTION.
21. THE CONTRACTOR SHALL HAVE AVAILABLE AT THE JOB SITE AT ALL TIMES ONE COPY OF THE CONSTRUCTION DOCUMENTS INCLUDING PLANS, SPECIFICATIONS, GEOTECHNICAL REPORT AND SPECIAL CONDITIONS AND COPIES OF ANY REQUIRED CONSTRUCTION PERMITS.
22. ANY DISCREPANCIES ON THE DRAWINGS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE OWNER AND ENGINEER BEFORE COMMENCING WORK. NO FIELD CHANGES OR DEVIATIONS FROM DESIGN ARE TO BE MADE WITHOUT PRIOR APPROVAL OF THE OWNER AND NOTIFICATION TO THE ENGINEER.
23. ALL COPIES OF COMPACTION, CONCRETE AND OTHER REQUIRED TEST RESULTS ARE TO BE SENT TO THE OWNER AND DESIGN ENGINEER OF RECORD DIRECTLY FROM THE TESTING AGENCY.
24. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SUBMITTING TO THE ENGINEER A CERTIFIED RECORD SURVEY SIGNED AND SEALED BY A PROFESSIONAL LAND SURVEYOR REGISTERED IN THE STATE OF ARIZONA DEPICTING THE ACTUAL FIELD LOCATION OF ALL CONSTRUCTED IMPROVEMENTS THAT ARE REQUIRED BY THE JURISDICTIONAL AGENCIES FOR THE CERTIFICATION PROCESS. ALL SURVEY COSTS WILL BE THE CONTRACTORS RESPONSIBILITY.
25. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DOCUMENTING AND MAINTAINING AS-BUILT INFORMATION WHICH SHALL BE RECORDED AS CONSTRUCTION PROGRESSES OR AT THE COMPLETION OF APPROPRIATE CONSTRUCTION INTERVALS AND SHALL BE RESPONSIBLE FOR PROVIDING AS-BUILT DRAWINGS TO THE OWNER FOR THE PURPOSE OF CERTIFICATION TO JURISDICTIONAL AGENCIES AS REQUIRED. ALL AS-BUILT DATA SHALL BE COLLECTED BY A STATE OF CALIFORNIA PROFESSIONAL LAND SURVEYOR WHOSE SERVICES ARE ENGAGED BY THE CONTRACTOR.
26. ANY WELLS DISCOVERED ON SITE THAT WILL HAVE NO USE MUST BE PLUGGED BY A LICENSED WELL DRILLING CONTRACTOR IN A MANNER APPROVED BY ALL JURISDICTIONAL AGENCIES. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ANY WELL ABANDONMENT PERMITS REQUIRED.
27. ANY WELL DISCOVERED DURING EARTH MOVING OR EXCAVATION SHALL BE REPORTED TO THE APPROPRIATE JURISDICTIONAL AGENCIES WITHIN 24 HOURS AFTER DISCOVERY IS MADE.
28. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THAT THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS DO NOT CONFLICT WITH ANY KNOWN EXISTING OR OTHER PROPOSED IMPROVEMENTS. IF ANY CONFLICTS ARE DISCOVERED, THE CONTRACTOR SHALL NOTIFY THE OWNER PRIOR TO INSTALLATION OF ANY PORTION OF THE SITE WORK THAT WOULD BE AFFECTED. FAILURE TO NOTIFY OWNER OF AN IDENTIFIABLE CONFLICT PRIOR TO PROCEEDING WITH INSTALLATION RELIEVES OWNER OF ANY OBLIGATION TO PAY FOR A RELATED CHANGE ORDER.
29. ANY EXISTING UTILITY, WHICH IS TO BE EXTENDED, WHICH IS THE CONNECTION POINT FOR NEW UNDERGROUND UTILITIES, OR WHICH NEW FACILITIES CROSS, SHALL BE EXPOSED BY THE CONTRACTOR PRIOR TO PLACEMENT OF THE NEW UTILITIES. COST OF SUCH EXCAVATION AND SUBSEQUENT BACKFILL SHALL BE INCLUDED IN THE PRICES PAID FOR THE VARIOUS ITEMS OF WORK. THE ELEVATIONS AND LOCATIONS OF THE EXISTING FACILITIES WILL BE CHECKED BY THE PUBLIC WORKS INSPECTOR AND THE ENGINEER. IF IN THE OPINION OF THE INSPECTOR A CONFLICT EXISTS, THEN THE ENGINEER SHALL MAKE ANY NEEDED GRADE AND/ OR ALIGNMENT ADJUSTMENTS AND REVISE THE PLANS ACCORDINGLY. ALL GRAVITY FLOW PIPELINES TO BE LAID UPGRADE FROM THE LOWEST POINT STARTING AT THE END OF EXISTING IMPROVEMENTS. THE CONTRACTOR SHALL NOTIFY THE ENGINEER AT LEAST 24 HOURS PRIOR TO BACKFILLING OF ANY PIPE WHICH STUBS TO A FUTURE PHASE OF CONSTRUCTION FOR INVERT VERIFICATION. TOLERANCE SHALL BE IN ACCORDANCE WITH CITY STANDARD SPECIFICATIONS.

GENERAL NOTES CONTINUATION:

1. ALL WORK TO BE PERFORMED PER CITY OF PERRIS, RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT (R.C.T.D.), EASTERN MUNICIPAL WATER DISTRICT (E.M.W.D), CALTRANS AND THE 2009 MANUAL ON UNIFORM CONTROL DEVICES (M.U.T.C.D.) STANDARDS WITH CALIFORNIA SUPPLEMENT.
2. NOTIFY CITY ENGINEER, CITY OF PERRIS, AT (951) 943-6504, AT LEAST 24 HOURS PRIOR TO START OF CONSTRUCTION.
3. CONTRACTOR IS REQUIRED TO LOCATE AND ADJUST TO GRADE ALL EXISTING MANHOLES, METERS, AND VALVE COVERS FOR WATER, SEWER, TELEPHONE, ELECTRIC, CABLE TV AND OTHER FACILITIES AS REQUIRED (WHEATEAR CALLED-OUT OR NOT ON PLANS).
4. ALL STRIPING & LEGENDS SHALL BE REPLACED IN ACCORDANCE WITH THE STRIPING PLANS HEREIN. ALL STRIPING TO BE PAINT (TWO COATS) AND ALL MARKINGS (INCLUDING CROSSWALKS) TO BE THERMOPLASTIC ALL STRIPING AND PAVEMENT MARKINGS TO BE PER 2006 M.U.T.C.D. STANDARDS WITH CALIFORNIA SUPPLEMENT.
5. ALL EXISTING A.C. AND CONCRETE TO BE SAW-CUT WHERE WIDENING IS TO TAKE PLACE OR ADJACENT TO WHERE CONCRETE IS TO BE CONSTRUCTED (1' MINIMUM).
6. ANY STOCKPILE OR STORAGE YARD ON PRIVATE PROPERTY MUST HAVE CITY'S AND OWNER'S APPROVAL.
7. THE CITY INSPECTOR WILL MARK ALL CONCRETE REMOVALS PRIOR TO CONSTRUCTION ALL CONCRETE WILL BE SAW-CUT WHERE REQUIRED PRIOR TO BEING REMOVED.
8. CONTRACTOR SHALL VERIFY THE EXISTENCE OF EXISTING SURVEY MONUMENTS AND PROTECT THEM IN PLACE. ANY SURVEY MONUMENTS MISSING AND/OR DAMAGED DURING CONSTRUCTION WILL HAVE TO BE RESET PRIOR TO PROJECT COMPETITION BY A QUALIFIED REGISTERED SURVEYOR.
9. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROTECT THE NEW WORK, FROM VANDALISM UNTIL THE IMPROVEMENTS HAVE BEEN ACCEPTED BY THE CITY AND A NOTICE OF COMPLETION MUST BE FILED.
10. ALL ASPHALT REMOVALS TO BE MARKED BY THE CITY INSPECTOR PRIOR TO CONTRACTOR BEGINNING WORK ON THAT PARTICULAR STREET SEGMENT.
11. CONTRACTOR SHALL CONTACT UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA AND OTHER UTILITY COMPANIES AS NEEDED TO COORDINATE FOR PROTECTION AND/OR ADJUSTMENTS OF UTILITIES, AS REQUIRED.
12. CONTRACTOR TO VISIT THE SITE AND FAMILIARIZE HIMSELF WITH THE WORK AND AREA PRIOR TO BIDDING AND NOTIFY THE CITY OF DISCREPANCIES.
13. ALL DIMENSIONS ARE APPROXIMATE CONTRACTOR TO VERIFY IN FIELD.
14. CONTRACTOR IS RESPONSIBLE TO PROVIDE ALL TRAFFIC CONTROL DEVICES AS NEEDED AND PROVIDE TWO-WAY ACCESS AT ALL TIMES THROUGH THE SITE. THE CONTRACTOR SHALL MAINTAIN THESE DEVICES AT ALL TIMES INCLUDING HOLIDAYS AND WEEKENDS. FLAGMAN SHALL BE UTILIZED AS REQUIRED TO PROVIDE TWO-WAY TRAFFIC DURING CONSTRUCTION.
15. CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL IN COMPLIANCE WITH WATCH MANUAL, 2009 M.U.T.C.D., OR CURRENT EDITION, AND THE TRAFFIC PLANS PROVIDED HEREIN.
16. THE CONTRACTOR SHALL APPLY TO, AND BE ISSUED A NO FEE ENCROACHMENT PERMIT BY THE CITY OF PERRIS BEFORE BEGINNING ANY WORK WITH AN EXISTING CITY MAINTAINED PUBLIC STREET AND FOR UTILITY WORK WITHIN OFFERS OF DEDICATION FOR PUBLIC USE.
17. EXISTING PUBLIC STREETS, SHALL REMAIN OPEN TO THE PUBLIC DURING CONSTRUCTION AND SHALL BE MAINTAINED BY THE CONTRACTOR UNLESS OTHERWISE PROVIDED IN THE PLANS AND SPECIFICATIONS. PUBLIC INCONVENIENCE WILL BE MINIMIZED AT ALL TIMES AND SUCH STREETS SHALL BE LEFT FREE OF DIRT AND DEBRIS AT THE END OF EACH WORKING DAY UNLESS PERMISSION IS OTHERWISE GRANTED BY THE CITY ENGINEER.
18. THE CONTRACTOR IS RESPONSIBLE FOR CLEARING AND GRUBBING THE PROPOSED WORK AREA AND DISPOSAL OF EXCESS OR UNDESIRABLE MATERIAL CONTRACTOR SHALL RELOCATE OR CAUSE TO BE RELOCATED EXISTING CONFLICTING UTILITIES IF REQUIRED BY CONTRACT.
19. ANY PROPOSED DEVIATION FROM THESE PLANS BY THE CONTRACTOR MUST MET CITY'S APPROVAL. THE CONTRACTOR IS RESPONSIBLE TO REIMBURSE THE CITY FOR ANY RELATED COST TO THE CITY ASSOCIATED WITH SUCH CHANGE. IN THIS EVENT, NO INCREASE IN CONTRACTOR'S COST WILL BE APPROVED.
20. CONTRACTOR IS REQUIRED TO INSTALL BLUE REFLECTIVE PAVEMENT AT ALL FIRE HYDRANT LOCATION IN THE WORK AREA.
21. THE CONTRACTOR IS REQUIRED TO REMOVE ALL CONFLICTING STRIPING AND LEGENDS BY WET SANDBLASTING.
22. APPLY WEED KILL TO ALL EXISTING WEEDS BETWEEN 1-3 WEEKS PRIOR TO CONSTRUCTION AND REMOVE WEEDS. WEEDS SHALL BE REMOVED FROM ALL EXISTING PAVEMENT, MEDIANS, CURB AND GUTTER, SIDEWALK (BETWEEN CURB AND SIDEWALK) AND WHEREVER IMPROVEMENTS ARE PROPOSED, AND UP TO 4.0' BEHIND E.P. OR CURB WHEN NO SIDEWALK EXISTS.
23. CONTRACTOR SHALL REPLACE ALL STRIPING, LEGENDS, AND SIGNS IF THEY ARE DAMAGED DURING CONSTRUCTION AT NO EXTRA COST TO THE CITY. EXISTING STRIPING WITHIN PROJECT VICINITY THAT BECOME DULL, SHALL BE REFRESHED AS DIRECTED BY THE CITY ENGINEER. CONFLICTING SIGNS SHALL BE REMOVED AS DIRECTED BY THE CITY ENGINEER OR HIS REPRESENTATIVE.
24. EXISTING TO PROPOSED CONCRETE PAVEMENT JOINTS SHALL BE CONSTRUCTED PER CALTRANS REVISED STANDARD PLAN RSP P10. 1 INCH MINIMUM DIAMETER DOWEL BARS SHALL BE USED AND AS APPROVED BY THE CITY ENGINEER.
25. ALL GRADING AND CONSTRUCTION ACTIVITIES SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECTS SWPPP AND NOI. REFER TO NPDES NOTED ON EROSION CONTROL PLANS.
26. ALL STREET SECTION ARE MINIMUM REQUIREMENTS, ADDITIONAL SOILS TESTS SHALL BE TAKEN AFTER ROUGH GRADING TO DETERMINE THE RECOMMENDED STREET SECTIONS REQUIREMENTS. USE RIVERSIDE COUNTY STD 401 IF EXPANSIVE SOILS ARE ENCOUNTERED.
27. ON-SITE LIGHTING, LANDSCAPE, AND LAYOUT TO BE APPROVED BY THE CITY OF PERRIS PLANNING DEPARTMENT.
28. WALLS/FENCE REQUIRE A SEPARATE PERMIT.
29. HAULING ROUTE SHALL BE SUBMITTED FOR APPROVAL BY THE CITY ENGINEER PRIOR TO START OF THE IMPORTATION/EXPORTATION OF DIRT.

CITY OF PERRIS WQMP INSPECTION NOTIFICATION REQUIREMENTS:

1. GENERAL CONTRACTOR IS RESPONSIBLE TO CALL FOR WQMP (WATER QUALITY MANAGEMENT PLAN) INSPECTIONS. A MINIMUM OF TWO (2) WQMP INSPECTIONS ARE REQUIRED IN THE FOLLOWING ORDER:
   A. AT THE TIME OF PRECISE GRADE AND CONSTRUCTION OF FLOW-BASED/VOLUME BASED BMP'S, AND/OR INSTALLATION OF STORM DRAIN AND WQMP EQUIPMENT, WHEN THE TRENCHES ARE STILL OPEN; AND
   B. AT FINAL INSPECTION, WHEN ALL PLANT MATERIALS, STRUCTURAL TREATMENT CONTROL BMP'S, STENCILING, EMPLOYEE SOURCE CONTROL HANDBOOKS, AND WQMP EQUIPMENT HAVE BEEN INSTALLED AND ARE FULLY OPERATIONAL.
2. A WRITTEN CLEARANCE LETTER SHALL BE SIGNED BY THE CITY'S ENGINEERING DEPARTMENT TO SIGNIFY APPROVAL OF WQMP SITE DESIGN, SOURCE CONTROL AND TREATMENT CONTROL BMP'S (BEST MANAGEMENT PRACTICES). THIS LETTER WILL NEED TO BE PRESENTED TO BUILDING AND SAFETY DEPARTMENT AS PART OF THE FINAL APPROVALS.

UTILITY NOTES:

1. THE CONTRACTOR SHALL CONSTRUCT GRAVITY SEWER LATERALS, CLEANOUTS, GRAVITY SEWER LINES, AND DOMESTIC WATER AND FIRE PROTECTION SYSTEM AS SHOWN ON THESE PLANS. THE CONTRACTOR SHALL FURNISH ALL NECESSARY MATERIALS, EQUIPMENT, MACHINERY, TOOLS, MEANS OF TRANSPORTATION AND LABOR NECESSARY TO COMPLETE THE WORK IN FULL AND COMPLETE ACCORDANCE WITH THE SHOWN, DESCRIBED AND REASONABLY INTENDED REQUIREMENTS OF THE CONTRACT DOCUMENTS AND JURISDICTIONAL AGENCY REQUIREMENTS. IN THE EVENT THAT THE CONTRACT DOCUMENTS AND THE JURISDICTIONAL AGENCY REQUIREMENTS ARE NOT IN AGREEMENT, THE MOST STRINGENT SHALL GOVERN.
2. ALL EXISTING UNDERGROUND UTILITY LOCATIONS SHOWN ARE APPROXIMATE THE CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS FOR UTILITY LOCATION AND COORDINATION IN ACCORDANCE WITH THE NOTES CONTAINED IN THE GENERAL CONSTRUCTION SECTION OF THIS SHEET.
3. THE CONTRACTOR SHALL RESTORE ALL DISTURBED VEGETATION IN KIND, UNLESS SHOWN OTHERWISE.
4. DEFLECTION OF PIPE JOINTS AND CURVATURE OF PIPE SHALL NOT EXCEED THE MANUFACTURER'S SPECIFICATIONS. SECURELY CLOSE ALL OPEN ENDS OF PIPE AND FITTINGS WITH A WATERTIGHT PLUG WHEN WORK IS NOT IN PROGRESS. THE INTERIOR OF ALL PIPES SHALL BE CLEAN AND JOINT SURFACES WIPED CLEAN AND DRY AFTER THE PIPE HAS BEEN LOWERED INTO THE TRENCH. VALVES SHALL BE PLUMB AND LOCATED ACCORDING TO THE PLANS.
5. ALL PHASES OF INSTALLATION, INCLUDING UNLOADING, TRENCHING, LAYING AND BACK FILLING, SHALL BE DONE IN A FIRST CLASS WORKMANLIKE MANNER. ALL PIPE AND FITTINGS SHALL BE CAREFULLY STORED FOLLOWING MANUFACTURER'S RECOMMENDATIONS. ANY PIPE OR FITTING WHICH IS DAMAGED OR WHICH HAS FLAWS OR IMPERFECTIONS WHICH, IN THE OPINION OF THE ENGINEER OR OWNER, RENDERS IT UNFIT FOR USE, SHALL NOT BE USED. ANY PIPE NOT SATISFACTORY FOR USE SHALL BE CLEARLY MARKED AND IMMEDIATELY REMOVED FROM THE JOB SITE, AND SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
6. WATER FOR FIRE FIGHTING SHALL BE AVAILABLE FOR USE PRIOR TO COMBUSTIBLES BEING BROUGHT ON SITE.
7. ALL UTILITY AND STORM DRAIN TRENCHES LOCATED UNDER AREAS TO RECEIVE PAVING SHALL BE COMPLETELY BACK FILLED IN ACCORDANCE WITH THE GOVERNING JURISDICTIONAL AGENCY'S SPECIFICATIONS. IN THE EVENT THAT THE CONTRACT DOCUMENTS AND THE JURISDICTIONAL AGENCY REQUIREMENTS ARE NOT IN AGREEMENT, THE MOST STRINGENT SHALL GOVERN.
8. CONTRACTOR SHALL PERFORM, AT HIS OWN EXPENSE, ANY AND ALL TESTS REQUIRED BY THE SPECIFICATIONS AND/OR ANY AGENCY HAVING JURISDICTION. THESE TESTS MAY INCLUDE, BUT MAY NOT BE LIMITED TO, INFILTRATION AND EXFILTRATION, TELEVISION INSPECTION AND A MANDREL TEST ON GRAVITY SEWER. A COPY OF THE TEST RESULTS SHALL BE PROVIDED TO THE UTILITY PROVIDER, OWNER AND JURISDICTIONAL AGENCY AS REQUIRED.
9. THE EXISTING UTILITIES SHOWN ON THE PLAN ARE BASED ON AVAILABLE RECORDS. THE CONTRACTOR MUST FIELD DETERMINE THE LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO ANY CONSTRUCTION. REPORT DISCREPANCIES AND POTENTIAL CONFLICTS WITH PROPOSED UTILITIES TO ENGINEER PRIOR TO INSTALLATION OF ANY PIPING.
10. DIMENSIONS PROVIDED ARE TO OUTSIDE PIPE DIAMETERS.
11. ALL WATER LINES ARE TO BE BURIED A MINIMUM OF 40" DEEP, MEASURED TO TOP OF PIPE.
12. WATER PIPE TRENCHING PER EMWD STANDARD DETAIL B-408.
13. SEWER PIPE TRENCHING PER EMWD STANDARD DETAIL SB-157 AND SB-158.
14. CONFIRM UTILITY TIE-IN POINTS IN FIELD AND WITH MEP PLANS PRIOR TO CONSTRUCTION.

DEMOLITION NOTES:

1. REFER TO THE TOPOGRAPHIC SURVEY FOR ADDITIONAL DETAILS OF EXISTING STRUCTURES, ETC., LOCATED WITHIN THE PROJECT SITE. UNLESS OTHERWISE NOTED, ALL EXISTING BUILDINGS, STRUCTURES, SLABS, CONCRETE, ASPHALT, DEBRIS PILES, SIGNS, AND ALL APPURTENANCES ARE TO BE REMOVED FROM THE SITE BY THE CONTRACTOR AND PROPERLY DISPOSED OF IN A LEGAL MANNER AS PART OF THIS CONTRACT. SOME ITEMS TO BE REMOVED MAY NOT BE DEPICTED ON THE TOPOGRAPHIC SURVEY. REFER TO THE DEMOLITION PLAN FOR THE LIMITS OF ASPHALT REMOVAL (THE EXISTING PARKING LOT IS TO REMAIN). IT IS THE CONTRACTOR'S RESPONSIBILITY TO VISIT THE SITE AND DETERMINE THE FULL EXTENT OF ITEMS TO BE REMOVED. IF ANY ITEMS ARE IN QUESTION, THE CONTRACTOR SHALL CONTACT THE OWNER PRIOR TO REMOVAL OF SAID ITEMS.
2. THE CONTRACTOR SHALL CLEAR THE PROJECT SITE AREA WITHIN THE CONFINES OF THE DEMOLITION LIMIT LINE. THE CONTRACTOR SHALL CAP IN PLACE ALL EXISTING UTILITIES AT THE DEMOLITION LIMIT LINE, UNLESS NOTED ON THE PLAN. THE CONTRACTOR SHALL DEMOLISH AND LEGALLY REMOVE/DISPOSE OF ITEMS FROM THE SITE, INCLUDING ALL EXISTING UTILITY STRUCTURES, PLANTERS, TREES, AND ALL OTHER SITE FEATURES, UNLESS OTHERWISE NOTED ON THE PLAN.
3. DEMOLITION OF PAVEMENT INCLUDES PAVEMENT THICKNESS, REBAR IF ENCOUNTERED, AND BASE COURSE.
4. REMOVAL OF LANDSCAPING SHALL INCLUDE ROOTS AND ORGANIC MATERIAL.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ANY AND ALL PERMITS AND SHALL PAY ALL FEES NECESSARY FOR ENCROACHMENT, GRADING, DEMOLITION, AND DISPOSAL OF SAID MATERIALS AS REQUIRED BY PRIVATE, LOCAL AND STATE JURISDICTIONS.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR A SITE INSPECTION TO FULLY ACKNOWLEDGE THE EXTENT OF DEMOLITION WORK.
7. THE CONTRACTOR SHALL VERIFY AND LOCATE ALL EXISTING ABOVE AND UNDERGROUND UTILITIES. LOCATIONS SHOWN ON THE PLANS ARE APPROXIMATE AND ARE SHOWN FOR GENERAL INFORMATION ONLY. CONTRACTOR SHALL ADJUST TO GRADE ANY EXISTING UTILITIES TO REMAIN.
8. DAMAGE TO ANY EXISTING UTILITIES AND SERVICES TO REMAIN SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. CONTRACTOR SHALL REPAIR AND/OR REPLACE IN KIND.
9. EROSION CONTROL MEASURES SHALL BE IMPLEMENTED TO PREVENT DEBRIS AND UNSUITABLE MATERIALS FROM ENTERING SANITARY SEWERS AND STREETS.
10. DUST CONTROL MEASURES SHALL BE IMPLEMENTED DURING DEMOLITION.
11. DEMOLITION IS LIMITED TO WITHIN THE DEMOLITION LIMIT LINE UNLESS OTHERWISE NOTED.
12. CONTRACTOR SHALL REMOVE DEMOLISHED MATERIALS FROM THE SITE AS WORK PROGRESSES.
13. THE DRAWINGS MAY NOT INDICATE IN DETAIL ALL DEMOLITION WORK TO BE PERFORMED. THE CONTRACTOR SHALL EXAMINE EXISTING CONDITIONS TO DETERMINE THE FULL EXTENT OF DEMOLITION.
14. ALL DEMOLITION SHALL COMPLY WITH CHAPTER 24 AND ARTICLE 87 OF THE CALIFORNIA FIRE CODE.
15. CONTRACTOR TO USE CARE IN HANDLING DEBRIS FROM SITE TO ENSURE THE SAFETY OF THE PUBLIC. HAUL ROUTE TO BE CLOSELY MONITORED FOR DEBRIS OR MATERIALS TRACKED ONTO ADJOINING ROADWAYS, SIDEWALKS, ETC. ROADWAYS AND WALKWAYS TO BE CLEARED DAILY OR AS NECESSARY TO MAINTAIN PUBLIC SAFETY.
16. SEE EROSION CONTROL PLAN FOR EROSION PREVENTION.
17. CONTRACTOR TO INSTALL CHAIN LINK FENCE WITH MESH SCREEN TO PROTECT PUBLIC FROM ENTERING CONSTRUCTION AREA.
18. CONTINUOUS ACCESS SHALL BE MAINTAINED FOR SURROUNDING PROPERTIES AT ALL TIMES DURING DEMOLITION OF EXISTING FACILITIES.
19. MONITORING WELLS TO BE REMOVED PRIOR TO BEGINNING OF CONSTRUCTION.
20. FULL DEMOLITION LIMITS DUE TO CONSTRUCTION OF UTILITIES IS NOT SHOWN. CONTRACTOR TO REFER TO SHEET C3 AND UTILITY PLANS TO DETERMINE LIMITS. CONTRACTOR TO USE CAUTION AROUND EXISTING UTILITIES.
21. A CITY-APPROVED WASTE HAULER SHALL BE USED FOR ALL CONSTRUCTION/OTHER WASTE DISPOSAL.
22. CONTRACTOR SHALL ADJUST TO GRADE ANY EXISTING UTILITIES TO REMAIN.

PAVING, GRADING AND DRAINAGE NOTES:

1. ALL PAVING, CONSTRUCTION, MATERIALS, AND WORKMANSHIP WITHIN JURISDICTION'S RIGHT-OF-WAY SHALL BE IN ACCORDANCE WITH LOCAL OR COUNTY SPECIFICATIONS AND STANDARDS (LATEST EDITION) OR SPPWS SPECIFICATIONS AND STANDARDS (LATEST EDITION) IF NOT COVERED BY LOCAL OR COUNTY REGULATIONS.
2. ALL UNPAVED AREAS IN EXISTING RIGHTS-OF-WAY DISTURBED BY CONSTRUCTION SHALL BE REGRADED AND REPAIRED TO EXISTING CONDITION OR BETTER.
3. TRAFFIC CONTROL ON ALL CALTRANS, LOCAL AND COUNTY RIGHTS-OF-WAY SHALL MEET THE REQUIREMENTS OF THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (U.S. DOT/FHA) AND THE REQUIREMENTS OF THE STATE AND ANY LOCAL AGENCY HAVING JURISDICTION. IN THE EVENT THAT THE CONTRACT DOCUMENTS AND THE JURISDICTIONAL AGENCY REQUIREMENTS ARE NOT IN AGREEMENT, THE MOST STRINGENT SHALL GOVERN.
4. THE CONTRACTOR SHALL GRADE THE SITE TO THE ELEVATIONS INDICATED AND SHALL REGRADE WASHOUTS WHERE THEY OCCUR AFTER EVERY RAINFALL UNTIL AN ADEQUATE STABILIZATION OCCURS.
5. ALL AREAS INDICATED AS PAVEMENT SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE TYPICAL PAVEMENT SECTIONS AS INDICATED ON THE DRAWINGS.
6. WHERE EXISTING PAVEMENT IS INDICATED TO BE REMOVED AND REPLACED, THE CONTRACTOR SHALL SAW CUT A MINIMUM 2" DEEP FOR A SMOOTH AND STRAIGHT JOINT AND REPLACE THE PAVEMENT WITH THE SAME TYPE AND DEPTH OF MATERIAL AS EXISTING OR AS INDICATED.
7. WHERE NEW PAVEMENT MEETS THE EXISTING PAVEMENT, THE CONTRACTOR SHALL SAW CUT THE EXISTING PAVEMENT A MINIMUM 2" DEEP FOR A SMOOTH AND STRAIGHT JOINT AND MATCH THE EXISTING PAVEMENT ELEVATION WITH THE PROPOSED PAVEMENT UNLESS OTHERWISE INDICATED.
8. IF DEWATERING IS REQUIRED, THE CONTRACTOR SHALL OBTAIN ANY APPLICABLE REQUIRED PERMITS. THE CONTRACTOR IS TO COORDINATE WITH THE OWNER AND THE DESIGN ENGINEER PRIOR TO ANY EXCAVATION.
9. STRIP TOPSOIL AND ORGANIC MATTER FROM ALL AREAS OF THE SITE AS REQUIRED. IN SOME CASES TOPSOIL MAY BE STOCKPILED ON SITE FOR PLACEMENT WITHIN LANDSCAPED AREAS BUT ONLY AS DIRECTED BY THE OWNER.
10. FIELD DENSITY TESTS SHALL BE TAKEN AT INTERVALS IN ACCORDANCE WITH THE LOCAL JURISDICTIONAL AGENCY.
11. ALL SLOPES AND AREAS DISTURBED BY CONSTRUCTION SHALL BE GRADED AS PER PLANS. THE AREAS SHALL THEN BE STABILIZED BY MEANS AND METHODS APPROVED BY THE LOCAL AGENCY. ANY AREAS DISTURBED FOR ANY REASON PRIOR TO FINAL ACCEPTANCE OF THE JOB SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER. ALL EARTHEN AREAS WILL BE COVERED WITH ROCK OR MULCHED AS SHOWN ON THE LANDSCAPING PLAN.
12. ALL CUT OR FILL SLOPES SHALL BE 4 (HORIZONTAL) :1 (VERTICAL) OR FLATTER UNLESS OTHERWISE SHOWN.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONTROL OF DUST AND DIRT RISING AND SCATTERING IN THE AIR DURING CONSTRUCTION AND SHALL PROVIDE WATER SPRINKLING OR OTHER SUITABLE METHODS OF CONTROL. THE CONTRACTOR SHALL COMPLY WITH ALL GOVERNING REGULATIONS PERTAINING TO ENVIRONMENTAL PROTECTION.
14. THE CONTRACTOR SHALL TAKE ALL REQUIRED MEASURES TO CONTROL TURBIDITY, INCLUDING BUT NOT LIMITED TO THE INSTALLATION OF TURBIDITY BARRIERS AT ALL LOCATIONS WHERE THE POSSIBILITY OF TRANSFERRING SUSPENDED SOLIDS INTO THE RECEIVING WATER BODY EXISTS DUE TO THE PROPOSED WORK. TURBIDITY BARRIERS MUST BE MAINTAINED IN EFFECTIVE CONDITION AT ALL LOCATIONS UNTIL CONSTRUCTION IS COMPLETED AND DISTURBED SOIL AREAS ARE STABILIZED. THEREAFTER, THE CONTRACTOR MUST REMOVE THE BARRIERS. AT NO TIME SHALL THERE BE ANY OFF-SITE DISCHARGE WHICH VIOLATES THE WATER QUALITY STANDARDS OF THE GOVERNING CODE.
15. EXPOSED SLOPES SHOULD BE STABILIZED WITHIN 48 HOURS OF COMPLETING FINAL GRADING, AND AT ANY OTHER TIME AS NECESSARY, TO PREVENT EROSION, SEDIMENTATION OR TURBID DISCHARGES.
16. THE CONTRACTOR MUST REVIEW AND MAINTAIN A COPY OF THE REQUIRED PERMITS COMPLETE WITH ALL CONDITIONS, ATTACHMENTS, EXHIBITS, AND PERMIT MODIFICATIONS IN GOOD CONDITION AT THE CONSTRUCTION SITE. THE COMPLETE PERMIT MUST BE AVAILABLE FOR REVIEW UPON REQUEST BY GOVERNING JURISDICTIONS.
17. THE CONTRACTOR SHALL ENSURE THAT ISLAND PLANTING AREAS AND OTHER PLANTING AREAS ARE NOT COMPACTED AND DO NOT CONTAIN ROAD BASE MATERIALS. THE CONTRACTOR SHALL ALSO EXCAVATE AND REMOVE ALL UNDESIRABLE MATERIAL FROM ALL AREAS ON THE SITE TO BE PLANTED AND PROPERLY DISPOSED OF IN A LEGAL MANNER.
18. CONTRACTOR TO VERIFY ALL EXISTING TOPOGRAPHY AND STRUCTURES ON THE SITE AND IMMEDIATELY NOTIFY THE ENGINEER OF ANY DISCREPANCIES PRIOR TO STARTING WORK.
19. ALL PAVEMENT SPOT GRADE ELEVATIONS WITHIN OR ALONG THE CURB REFER TO THE EDGE OF PAVEMENT ELEVATIONS UNLESS OTHERWISE NOTED.
20. ALL ELEVATIONS SHOWN DEPICT FINISHED GRADE UNLESS OTHERWISE NOTED. GENERAL CONTRACTOR TO COORDINATE WITH EXCAVATION, LANDSCAPING, AND PAVING SUBCONTRACTORS REGARDING TOPSOIL THICKNESS FOR LANDSCAPING AREAS AND PAVEMENT SECTION THICKNESS FOR PAVED AREAS TO PROPERLY ENSURE ADEQUATE CUT TO ESTABLISH SUBGRADE ELEVATIONS.
21. NO EARTHEN SLOPE SHALL BE GREATER THAN 4:1 UNLESS OTHERWISE NOTED.
22. MAXIMUM SLOPE IN ACCESSIBLE PARKING SPACES AND LOADING ZONES SHALL NOTE EXCEED 2.0% IN ALL DIRECTIONS.
23. MAXIMUM RUNNING SLOPE SHALL NOTE EXCEED 5% AND CROSS SLOPE SHALL NOTE EXCEED 2.0% ON ALL SIDEWALKS AND ACCESSIBLE ROUTES UNLESS OTHERWISE NOTED.
24. WHEN NATURAL FLOW OF DRAINAGE IS AWAY FROM CURB CONTRACTOR TO INSTALL REVERSE GUTTER PITCH.
25. REFERENCE ARCHITECTURAL PLANS FOR ROOF DRAIN AND LOCATIONS.
26. CONTRACTOR TO USE APPROPRIATE PAINT COLORS PER DETAILS SHEET. ADA BARRIER FREE AREAS TO COMPLY WITH ALL LOCAL AND FEDERAL ADA STANDARDS.
27. ACCESSIBLE ROUTE TO ACCESSIBLE SPACES, BUILDING ENTRANCES, AND PUBLIC STREETS SHALL NOT EXCEED 5% RUNNING SLOPE AND 2% CROSS SLOPE.
28. THE ACCESSIBLE ROUTE IN FRONT OF PARKING SHALL BE A MINIMUM OF 48" WIDE AND NOT REDUCED BY VEHICLE OVERHANGS, CURBING, SIGN POSTS, OR OTHER OBSTRUCTIONS.
29. ANY WALK THAT CROSSES OR ADJOINS A VEHICULAR WAY NOT SEPARATED BY CURBS, RAILINGS, OR OTHER ELEMENTS SHALL BE DEFINED BY A CONTINUOUS 36" WIDE DETECTABLE WARNING.
30. SPECIAL RAMP RULES APPLY FOR ANY RISE GREATER THAN 6" INCLUDING BUT NOT LIMITED TO RESTRICTION ON SLOPE, TOTAL RISE BETWEEN LANDINGS, AND USE OF HANDRAILS.
31. TRANSITION CHANGE IN ELEVATION IS NOT TO EXCEED 1/4" WITHIN AN ACCESSIBLE ROUTE.
32. JOINT WIDTHS ARE NOT TO EXCEED 1/2" OF WIDTH.
33. CURB RAMPS MUST HAVE A DIFFERENT FINISH FROM THE ADJACENT PAVEMENT.
34. 2% SLOPE IN ALL DIRECTIONS WITHIN ADA PARKING STALLS. AFTER PROPOSED GRADE BREAK, ALLOWABLE SLOPE TO MATCH EXISTING IS 5.0%.
35. ALL AREAS WHERE STRIPING IS TO BE ERADICATED. CONTRACTOR IS TO ERADICATE AND SEAL COAT AREA.

PRECISE GRADING NOTES (CITY OF PERRIS):

1. ALL GRADING SHALL CONFORM TO THE UNIFORM CODE, APPENDIX CHAPTER 33, AS AMENDED BY ORDINANCE NO. 457.
2. ALL PROPERTY CORNERS SHALL BE CLEARLY DELINEATED IN THE FIELD PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION/GRADING.
3. DURING ROUGH GRADING OPERATIONS AND PRIOR TO CONSTRUCTION OF PERMANENT DRAINAGE STRUCTURES, TEMPORARY DRAINAGE CONTROL SHOULD BE PROVIDED TO PREVENT PONDING WATER AND DAMAGE TO ADJACENT STRUCTURES.
4. DUST SHALL BE CONTROLLED BY WATERING OR OTHER APPROVED METHODS.
5. NO FILL SHALL BE PLACED ON EXISTING GROUND UNTIL THE GROUND HAS BEEN CLEARED OF WEEDS, DEBRIS, TOPSOIL, AND OTHER DELETERIOUS MATERIAL.
6. MAXIMUM CUT AND FILL SLOPE = 2:1, UNLESS OTHERWISE SHOWN ON PLANS.
7. STABILITY CALCULATIONS WITH A FACTOR OF SAFETY OF AT LEAST ONE AND FIVE TENTHS (1.5) SHALL BE SUBMITTED BY A SOILS ENGINEER TO THE BUILDING AND SAFETY DEPARTMENT FOR CUT AND FILL SLOPES OVER 30' IN VERTICAL HEIGHT.
8. PROVIDE 5' BY 1' HIGH BERM OR EQUIVALENT ALONG THE TOP OF ALL FILL SLOPES OVER 5' HIGH.
9. PROVIDE A BROW DITCH, DESIGNED TO HANDLE 100 YR. Q STORM FLOWS, ALONG THE TOP OF ALL FILL SLOPES OVER 5' HIGH.
10. MINIMUM BUILDING PAD AND DRAINAGE SWALE SLOPE SHALL BE 1% IF CUT OF FILL IS LESS THAN 10'. 2% IF CUT OR FILL IS GREATER THAN 10'. DRAINAGE SWALES SHALL BE A MINIMUM OF 0.2' DEEP AND BE CONSTRUCTED A MINIMUM OF 2' FROM THE TOP OF CUT OR FILL SLOPES.
11. NO OBSTRUCTION OF FLOOD PLAINS OR NATURAL WATER COURSES SHALL BE PERMITTED.
12. ALL EXISTING DRAINAGE COURSES ON THE PROJECT SITE MUST CONTINUE TO FUNCTION, ESPECIALLY DURING STORM CONDITIONS. PROTECTIVE MEASURES AND TEMPORARY DRAINAGE PROVISIONS MUST BE USED TO PROTECT ADJOINING PROPERTIES DURING GRADING OPERATIONS.
13. FINISHED GRADE SHALL BE SLOPED AWAY FROM ALL EXTERIOR WALLS AT NOT LESS THAN $\frac{1}{2}$" PER FOOT FOR A MINIMUM OF 3'.
14. CUT AND FILL SLOPES EQUAL TO OR GREATER THAN 3' IN VERTICAL HEIGHT SHALL BE PLANTED WITH GRASS OR GROUND COVER TO PROTECT THE SLOPE FROM EROSION AND INSTABILITY IN ACCORDANCE WITH ORDINANCE NO. 457 PRIOR TO FINAL GRADING INSPECTION.
15. EROSION CONTROL: ALL SLOPES REQUIRED TO BE PLANTED SHALL BE PROVIDED WITH ROSEA ICE PLANT (OR EQUAL) GROUND COVER AT 12" ON CENTER. SLOPES EXCEEDING 15' IN VERTICAL HEIGHT SHALL BE PLANTED WITH APPROVED TREES SPACED NOT TO EXCEED 20' ON CENTER OR SHRUBS NOT TO EXCEED 10', OR A COMBINATION OF SHRUBS AND TREES NOT TO EXCEED 15' IN ADDITION TO A GRASS MIX OR GROUND COVER. SLOPES EXCEEDING 4' IN VERTICAL HEIGHT SHALL BE PROVIDED WITH AN IN-GROUND IRRIGATION SYSTEM. SLOPES EQUAL TO OR LESS THAN 4' MAY BE IRRIGATED BY HOSE BIB LOCATED AT THE TOP OR TOE OF THE SLOPE, SPACED TO MAKE USE OF A HOUSE NO LONGER THAN 50' IN HEIGHT. THE IRRIGATION SYSTEM SHALL BE PROVIDED WITH AN APPROPRIATE BACKFLOW DEVICE PER U.P.C., CHAPTER 10.
16. ALL GRADING SHALL BE DONE IN CONFORMANCE WITH RECOMMENDATIONS OF THE PRELIMINARY SOILS INVESTIGATION BY SALEM ENGINEERING GROUP, INC. TWO SETS OF THE FINAL COMPACTION REPORT SHALL BE SUBMITTED TO THE BUILDING AND SAFETY DEPARTMENT WHICH SHALL INCLUDE FOUNDATION DESIGN RECOMMENDATIONS AND CERTIFICATION THAT GRADING HAS BEEN DONE IN CONFORMANCE WITH THE RECOMMENDATIONS OF THE SITE INVESTIGATION REPORT.
17. IF STEEP SLOPING TERRAIN OCCURS UPON WHICH FILL IS TO BE PLACED, IT MUST BE CLEARED, KEYED AND BENCHED INTO FIRM NATURAL SOIL FOR FULL SUPPORT. PREPARATION SHALL BE APPROVED BY A SUITABLE QUALIFIED AND REGISTERED PROFESSIONAL PRIOR TO PLACEMENT OF FILL MATERIAL.
18. ALL GRADING SHALL BE DONE UNDER THE SUPERVISION OF A COMPETENT SOILS ENGINEER WHO SHALL CERTIFY THAT ALL FILL HAS BEEN PROPERLY PLACED AND WHO SHALL SUBMIT A FINAL COMPACTION REPORT FOR ALL FILLS OVER 1' DEEP.
19. FINAL COMPACTION REPORT WILL BE REQUIRED FOR ALL FILLS GREATER THAN 1'.
20. A SUITABLY QUALIFIED AND REGISTERED PROFESSIONAL SHALL SUBMIT TO THE BUILDING AND SAFETY DEPARTMENT WRITTEN CERTIFICATION OF COMPLETION OF ROUGH GRADING IN ACCORDANCE WITH THE APPROVED GRADING PLAN PRIOR TO REQUESTING INSPECTION AND ISSUANCE OF THE BUILDING PERMIT. CERTIFICATION SHALL INCLUDE LINE, GRADE, ELEVATION AND LOCATION OF CUT/FILL SLOPES.
21. A SUITABLE QUALIFIED AND REGISTERED PROFESSIONAL SHALL SUBMIT CERTIFICATION OF BUILDING PAD ELEVATION, WHERE SPECIFIC ELEVATIONS ARE REQUIRED. THE ELEVATION (WITH RESPECT TO MEAN SEA LEVEL) SHALL BE GIVEN. IF AN ELEVATION WITH RESPECT TO ADJACENT GROUND SURFACE IS REQUIRED, THE ACTUAL DISTANCE ABOVE THE ADJACENT SHALL BE GIVEN.
22. A SUITABLY QUALIFIED AND REGISTERED PROFESSIONAL SHALL SUBMIT TO THE BUILDING AND SAFETY DEPARTMENT WRITTEN CERTIFICATION OF COMPLETION OF FINAL GRADING IN ACCORDANCE WITH THE APPROVED PLANS FOR ALL GRADING AS "ENGINEERED GRADING".
23. THE CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALERT TWO DAYS BEFORE YOU DIG AT 1-800-227-2600. A GRADING PERMIT MUST BE OBTAINED FROM THE DEPARTMENT OF BUILDING AND SAFETY, CITY OF PERRIS, PRIOR TO GRADING.
24. THE CONTRACTOR SHALL NOTIFY THE BUILDING AND SAFETY DEPARTMENT, 101 NORTH "D" STREET, PERRIS, CA 92571, TELEPHONE (951) 943-5003, AT LEAST 24 HOURS IN ADVANCE REQUESTING LOT GRADE AND DRAINAGE INSPECTION. THE INSPECTION MUST BE APPROVED PRIOR TO BUILDING PERMIT FINAL INSPECTION.
25. THE EARTHWORK QUANTITIES SHOWN ARE SUBJECT TO FIELD CONDITIONS. THE GRADING CONTRACTOR SHALL SATISFY HIMSELF AS TO THE QUANTITIES AND ADDITIONAL WORK SHOWN ON THIS PLAN AS PART OF THIS BID.
26. CONSTRUCTION ACTIVITIES AND EQUIPMENT MAINTENANCE IS LIMITED TO THE HOURS BETWEEN 7:00 A.M. AND 7:00 P.M. PER ZONING ORDINANCE, NOISE CONTROL, SECTION 7.34.060, IT IS UNLAWFUL FOR ANY PERSONS BETWEEN THE HOURS OF 7:00 P.M. OF ANY DAY AND 7:00 A.M. OF THE FOLLOWING DAY, OR ON A LEGAL HOLIDAY, OR ON SUNDAYS TO ERECT, CONSTRUCT, DEMOLISH, EXCAVATE, ALTER OR REPAIR ANY BUILDING OR STRUCTURE IN A MANNER AS TO CREATE DISTURBING EXCESSIVE OR OFFENSIVE NOISE.
27. STATIONARY CONSTRUCTION EQUIPMENT THAT GENERATES NOISE IN EXCESS OF 65 DBA AT THE PROJECT BOUNDARIES MUST BE SHIELDED AND LOCATED AT LEAST 100 FEET FROM OCCUPIED RESIDENCES. THE EQUIPMENT AREA WITH APPROPRIATE ACOUSTIC SHIELDING SHALL BE DESIGNATED ON BUILDING AND GRADING PLANS. EQUIPMENT AND SHIELDING SHALL REMAIN IN THE DESIGNATED LOCATION THROUGHOUT CONSTRUCTION ACTIVITIES.
28. CONSTRUCTION ROUTES ARE LIMITED TO CITY OF PERRIS DESIGNATED TRUCK ROUTES.
29. WATER TRUCKS OR SPRINKLER SYSTEMS SHALL BE USED DURING CLEANING, GRADING, EARTH MOVING, EXCAVATION, TRANSPORTATION OF CUT OR FILL MATERIALS AND CONSTRUCTION PHASES TO PREVENT DUST FROM LEAVING THE SITE AND TO CREATE A CRUST AFTER EACH DAY'S ACTIVITIES CEASE. AT A MINIMUM, THIS WOULD INCLUDE WETTING DOWN SUCH AREAS IN THE LATER MORNING AND AFTER WORK IS COMPLETED FOR THE DAY AND WHENEVER WIND EXCEEDS 15 MILES PER HOUR.
30. A PERSON OR PERSONS SHALL BE DESIGNATED TO MONITOR THE DUST CONTROL PROGRAM AND TO ORDER INCREASED WATERING AS NECESSARY TO PREVENT TRANSPORT OF DUST OFF-SITE. THE NAME AND TELEPHONE NUMBER OF SUCH PERSON SHALL BE PROVIDED TO THE CITY.
31. PROJECT APPLICANTS SHALL PROVIDE CONSTRUCTION SITE ELECTRICAL HOOK-UPS FOR ELECTRIC HAND TOOLS SUCH AS SAWS, DRILLS, AND COMPRESSORS, TO ELIMINATE THE NEED FOR DIESEL-POWERED ELECTRIC GENERATORS OR PROVIDE EVIDENCE THAT ELECTRICAL HOOK-UPS AT CONSTRUCTION SITES ARE NOT PRACTICAL OR PROHIBITIVELY EXPENSIVE.

811
DIAL TOLL FREE
811
AT LEAST TWO DAYS BEFORE YOU DIG
Know what's below. Call before you dig.
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

BENCH MARK:
COUNTY OF RIVERSIDE BENCHMARK "M 21-1 RESET", 373 FEET EAST ALONG ETHANAC ROAD FROM THE INTERSECTION OF ETHANAC ROAD AND THE SOUTHBOUND LANES OF HIGHWAY 395. 150 FEET SOUTH OF ETHANAC ROAD. 50 FEET SOUTHEAST OF THE NORTHEAST CORNER OF A 6 FOOT CHAIN LINK RIGHT-OF-WAY FENCE. 1 FOOT NORTHEAST OF AN ANGLE-POINT IN THE RIGHT-OF-WAY FENCE. 2 FEET NORTH OF A MARKER POST. A BRASS DISK STAMPED "M-21-1 RESET" SET IN THE TOP OF A CONCRETE POST 3 INCHES ABOVE GROUND. EL = 1421.891 NGVD 29 (5/85)

MARK	BY	DATE	REVISIONS	APPR	DATE
	ENGINEER			CITY	

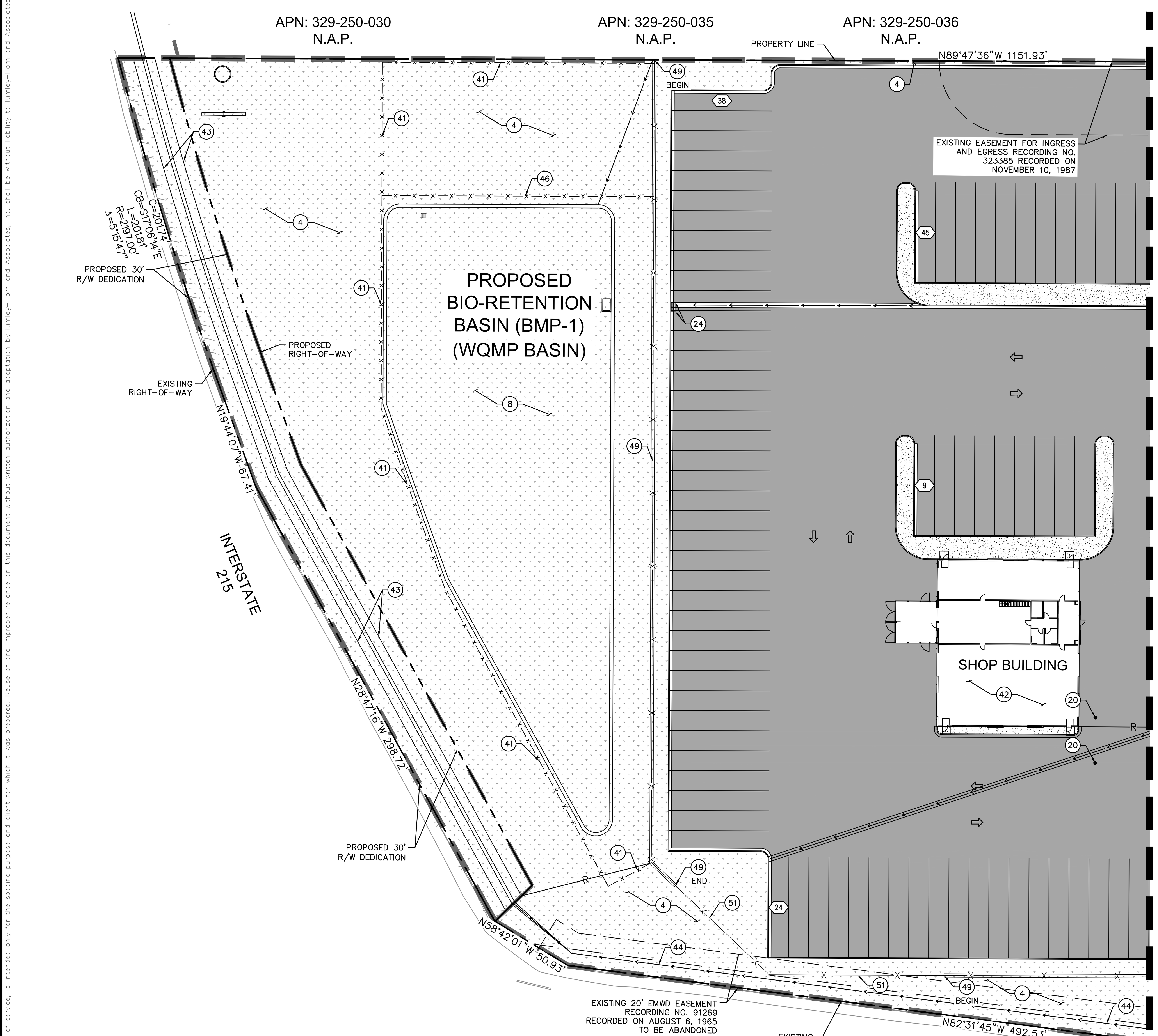
CITY OF PERRIS
APPROVED BY:
CONTRACT CITY ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER SHEA-MICHAEL ANTI RCE NO. 78274 CIVIL STATE OF CALIFORNIA

Kimley»Horn
765 THE CITY DRIVE SUITE 200, ORANGE, CA 92868
PHONE: 714-939-1030
PREPARED BY:
SHEA-MICHAEL ANTI R.C.E 78274 6/8/2022 DATE

GENERAL NOTES
PRELIMINARY PRECISE GRADING PLAN
PILOT PERRIS
ETHANAC ROAD AND TRUMBLE ROAD
APN: 329-250-011 & 329-250-012
PROJECT NUMBER: 095426010

SHEET NO. 2 OF 16 SHTS
FILE NO.:



LEGEND

- PROPERTY LINE CIVIL
- LIMITS OF WORK
- CENTER LINE
- SETBACKS
- EASEMENT LINE
- ACCESSIBLE ROUTE
- FENCE
- GRADE BREAK
- RIDGE LINE
- PARKING COUNT
- DETECTABLE WARNINGS
- DECORATIVE PAVEMENT
- STANDARD DUTY CONCRETE PAVEMENT
- HEAVY DUTY CONCRETE PAVEMENT
- HEAVY DUTY ASPHALT PAVEMENT
- STANDARD DUTY ASPHALT PAVEMENT
- LANDSCAPE/ PLANTER AREA

DEVELOPMENT STANDARDS

LOT SIZE	MINIMUM LOT SIZE OF ONE ACRE
LOT DIMENSIONS	MINIMUM LOT WIDTH 100 FEET MINIMUM LOT DEPTH 150 FEET
STRUCTURE SIZE	NO MINIMUM SIZE; HOWEVER FLOOR AREA RATION CANNOT EXCEED 0.75
ACCESSORY STRUCTURE	NO MAXIMUM SIZE
LOT COVERAGE	MAXIMUM LOT COVERAGE OF 50%
STRUCTURE HEIGHT	MAXIMUM HEIGHT OF 45 FEET
SETBACKS	FOR BUILDING THAT ARE 25 FEET FOR LESS IN HEIGHT • MIN. FRONT YARD •• LOCAL AND COLLECTOR STREET 5 FEET •• SECONDARY AND PRIMARY ARTERIALS 10 FEET •• EXPRESSWAYS AND FREEWAYS 15 FEET •• FOR BUILDING GREATER THAN 25 FEET IN HEIGHT SHALL BE SETBACK AN ADDITIONAL 5 FEET FOR EACH TEN FEET OF ADDITIONAL STRUCTURE HEIGHT • MAX FRONT YARD: NONE • MIN. SIDE YARD: NONE. IF ADJOINING A RESIDENTIAL ZONE THE SETBACK SHALL NOT BE LESS THAN 10 FEET. IF LOADING AND UNLOADING ARE PROVIDED THE SETBACK SHALL BE NOT LESS THAN 25 FEET. • MIN. STREET SIDE YARD: SEE REQUIREMENTS FOR FRONT YARDS • MIN. REAR YARD: NONE. IF ADJOINING A RESIDENTAIL ZONE THE SETBACK SHALL BE THE DAME AD THE SIDE YARD REQUIREMENTS.
STRUCTURE SEPARATION	NONE REQUIRED
LOT FRONTAGE	MINIMUM LOT FRONTAGE OF 100 FEET

SITE INFORMATION

APN	329-250-012 AND 329-250-012
EXISTING ZONING	COMMERCIAL COMMUNITY (CC)
PROPOSED ZONING	COMMERCIAL COMMUNITY (CC)
EXISTING LOT SIZE	±14.4 ACRES
PROPOSED PARCEL	±14.0 ACRES
DISTURBED AREA	±14.4 ACRES
TOTAL PERVIOUS AREA	±4.5 ACRES
TOTAL IMPERVIOUS (INCLUDING BUILDING)	±9.9 ACRES
TOTAL GROSS FLOOR AREA (INCLUDING FUTURE SHOP BUILDING)	22,432 SQUARE FEET
FLOOR AREA RATIO (FAR) (INCLUDING THE CANOPIES)	0.05
PROPOSED BLDG HEIGHT	PILOT TRAVEL CENTER 31'-10" FUTURE SHOP BUILDING 22'-6"
SITE SETBACKS	SOUTH RIGHT OF WAY 10 FEET EAST RIGHT OF WAY 10 FEET WEST PROPERTY LINE NONE NORTH PROPERTY LINE NONE

CONSTRUCTION NOTES

1. PILOT TRAVEL CENTER BUILDING (SEE ARCHITECTURAL DRAWINGS), INSTALLED BY CONTRACTOR.
2. ABOVE GROUND STORAGE TANK FARM WITH CONTAINMENT. EACH AST FARM CONTAINS (4) 12,000 GALLON TACKS FOR DIESEL AND BIO. SEE PRODUCT PIPING DRAWINGS FOR MORE INFORMATION.
3. 25'-0" x 253'-7" AUTO CANOPY, FURNISHED AND INSTALLED BY CANOPY SUPPLIER. CANOPY FOUNDATIONS INSTALLED BY CONTRACTOR.
4. LANDSCAPE AREA INSTALLED BY CONTRACTOR. REFER TO LANDSCAPE AND IRRIGATION PLANS FOR MORE INFORMATION.
5. GREASE TRAP. FURNISHED AND INSTALLED BY CONTRACTOR.
6. CONCRETE ISLAND WITH A GAS/AUTO DIESEL (3+1) DISPENSER AND CONTAINMENT BOX TYPICAL AT (8) PLACES, INSTALLED BY CONTRACTOR.
7. 2'-0' HIGH GUARDRAIL AROUND CONTAINMENT AREA, 1'-0" OUTSIDE OF FENCE.
8. PROPOSED BIORETENTION BASIN. SEE UTILITY PLAN FOR MORE INFORMATION.
9. 25'-0" x 124'-9" TRUCK CANOPY, FURNISHED AND INSTALLED BY CANOPY SUPPLIER, CANOPY FOUNDATIONS INSTALLED BY CONTRACTOR.
10. TRUCK AIR STAND, TYPICAL AT EVERY OTHER TRUCK FUELING ISLAND, SUPPLIED BY OWNER AND INSTALLED BY CONTRACTOR.
11. CONCRETE ISLAND WITH A DIESEL DISPENSER AND CONTAINMENT BOX TYPICAL AT (8) PLACES, INSTALLED BY CONTRACTOR.
12. PREFABRICATED TRUCK ISLAND CATCH BASIN (TYP (7) PLACES). SUPPLIED BY OWNER INSTALLED BY CONTRACTOR
13. TRUCK FREEZE PROOF WATER STAND TYPICAL AT EVERY OTHER TRUCK FUELING ISLAND FURNISHED AND INSTALLED BY CONTRACTOR.
14. TANK #1, PRODUCT #1. 20,000 GALLON, 10'-0"ø X 37'-8 3/4" LONG, DOUBLE-WALL FIBERGLASS UNDERGROUND REGULAR UNLEADED GASOLINE TANK. FURNISHED BY OWNER, INSTALLED BY CONTRACTOR (TYP (1) PLACE). SEE PP DRAWINGS FOR MORE INFORMATION.
15. TANK #2 AND TANK #3. 20,000 GALLON, 10'-0"ø X 37'-10" LONG (2) CHAMBER UNDERGROUND DOUBLE WALL FIBERGLASS TANK, TANK #2, PRODUCT #2 – 12,000 GALLON SUPER UNLEADED GASOLINE, TANK #3, PRODUCT #3 – 8,000 AUTO DIESEL. FURNISHED BY OWNER, INSTALLED BY CONTRACTOR. (SEE PP DRAWINGS FOR MORE INFORMATION).
16. LOCAL UTILITY ELECTRICAL TRANSFORMER INSTALLED BY CONTRACTOR.
17. TRAVEL CENTER DISTRIBUTION ELECTRICAL TRANSFORMER INSTALLED BY CONTRACTOR.
18. PROPOSED WATER METER AND BACKFLOW. SEE UTILITY PLANS SHEET 11-12 FOR MORE INFORMATION.
19. PROPOSED IRRIGATION METER AND BACKFLOW PREVENTOR. SEE UTILITY PLANS SHEET 11-12 FOR MORE INFORMATION.
20. PROPOSED SEWER CLEANOUT. SEE UTILITY PLANS SHEET 11-12 FOR MORE INFORMATION.
21. PROPOSED U-SHAPED BIKE RACKS PER CITY STANDARDS AND SPECIFICATIONS.
22. INSTALL ACCESSIBLE RAMP. INSTALL CAST-IN-PLACE DETECTABLE WARNING SYSTEM (TRUNCATED DOMES) PER ARMOR TILE – 36" X 48" PANEL. PRODUCT NO. ADA-C-3648W PER DETAIL X, SHEET XX.
23. INSTALL DETECTABLE WARNINGS.
24. PROPOSED CATCH BASIN. SEE STORM DRAIN PLANS SHEET 13-14 FOR MORE INFORMATION.
25. AUTO AIR/VACUUM (PROVIDED BY OWNER, ELECTRICAL BY CONTRACTOR), YARD HYDRANT BY CONTRACTOR.
26. NEW TANK VENT RISER CLUSTER, INSTALLED BY CONTRACTOR.
27. 4,000 GALLON, 6'-0"ø x 21'-11" LONG, SINGLE-WALL FIBERGLASS UNDERGROUND OIL/ WATER SEPARATOR, FURNISHED BY OWNER, INSTALLED BY CONTRACTOR.
28. CLEAN OUT FOR OIL/WATER SEPARATOR FURNISHED AND INSTALLED BY CONTRACTOR.
29. B99 INJECTION SHED WITH SUMP. SUPPLIED BY OWNER. (SEE PRODUCT PIPING DRAWINGS FOR MORE INFORMATION).
30. 4" STEEL PIPE BOLLARD FURNISHED, INSTALLED BY CONTRACTOR (SEE CIVIL DWGS FOR SPECS.).
31. 6" STEEL PIPE BOLLARD FURNISHED, INSTALLED BY CONTRACTOR (SEE CIVIL DWGS FOR SPECS.).
32. 1'-0" CONCRETE BOLLARD FURNISHED, INSTALLED AND PAINTED BY CONTRACTOR (SEE CIVIL DWGS FOR SPECS.).
33. GREASE CONTAINER, PROVIDED BY OWNER.
34. SITE LIGHT, FURNISHED BY OWNER, INSTALLED BY CONTRACTOR. (LOCATION TO BE DETERMINED DURING FINAL ENGINEERING)
35. TRUCK SCALE, CONCRETE TRUCK SCALE PIT AND TRUCK SCALE FURNISHED AND INSTALLED BY TRUCK SCALE SUPPLIER. ELECTRICAL, COMMUNICATIONS AND DRAINAGE PROVIDED TO THE SCALE PIT BY CONTRACTOR, COORDINATION BY CONTRACTOR.
36. PARKING AREA DESIGNATED FOR GOLF CART.
37. TRASH ENCLOSURE 8' CHAIN LINK FENCE WITH VINYL INSERTS MOUNTED ON REINFORCED CONCRETE PAD WITH PROTECTIVE STEEL BOLLARDS, INSTALLED BY CONTRACTOR (SEE ARCH DWGS FOR DETAILS).
38. TRASH COMPACTOR, FURNISHED AND INSTALLED BY TRASH COMPACTOR SUPPLIER.
39. CARDBOARD BAILER OR RECYCLE DUMPSTER, FURNISHED AND INSTALLED BY DUMPSTER SUPPLIER.
40. STORAGE UNIT, FURNISHED BY OWNER. ELECTRICAL & A/C INSTALL BY CONTRACTOR.
41. PROPOSED "CERTAIN TEED BRAND; BUFFTECH VINYL FENCING; PRIVACY SERIES; STYLE "GALVESTON", 8' TALL; COLOR ALMOND." OR APPROVED EQUAL. FURNISHED AND INSTALLED BY CONTRACTOR.
42. PROPOSED SHOP BUILDING LOCATION.
43. PROPOSED CHANNEL (BOTTOM WIDTH 2', DEPTH 3.5', SIDE SLOPE 1.5:1) PER RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT PLAN FOR M.D.P. – ROMOLAND AREA LATERAL A-11A.
44. PROPOSED V-DITCH. REFER TO GRADING PLAN SHEET 9 AND 10 FOR MORE INFORMATION.
45. PROPOSED PORTE-COCHERE. REFER TO ARCHITECTURAL PLANS FOR MORE INFORMATION.
46. PROPOSED 4' CHAIN LINK FENCE.
47. INSTALL CHAIN LINK FENCE PER LANDSCAPE PLANS.
48. PROPOSED COMMERCIAL DRIVEWAY.
49. PROPOSED 8' AMETCO TITAN DESIGN ALUMINUM FENCE (COLOR TO MATCH BUILDING) ON TOP OF 3' BERM.
50. PROPOSED 10' CONCRETE MASONRY UNITS WALL.
51. PROPOSED 8' AMETCO TITAN DESIGN ALUMINUM FENCE (COLOR TO MATCH BUILDING) AT GRADE.
52. PROPOSED DECORATIVE PAVEMENT.

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80
1" = 40'
WHEN PRINTED AT FULL SIZE (24"X36")

LOADING REQUIREMENTS

BUILDING	SF	CODE	REQUIRED	PROVIDED
PROPOSED TRAVEL CENTER WITH DRIVE THRU RESTAURANT AND SHOP BUILDING	22,432	10,000-25,000 SQUARE FEET OF BUILDING AREA: ONE LOADING SPACE	1 LOADING SPACE	1 LOADING SPACE

PARKING REQUIREMENTS

BUILDING	SF	CODE	REQUIRED	PARKING PROVIDED
PROPOSED DRIVE-THRU RESTAURANT	1,688	1 SPACE PER 50 SQUARE FEET OF DINING OR SERVING AREA PLUS 10 SPACES	44 CAR	93 CAR SPACES (88 STANDARD STALL 5 ACCESSIBLE STALLS) 116 TRUCK SPACES 2 BICYCLE SPACES
PROPOSED TRAVEL CENTER RETAIL AREA	3,145	1 SPACE PER 250 SQUARE FEET OF BUILDING AREA	13 CAR	
PROPOSED SHOP BUILDING WITH 3 BAYS	8,452	5 SPACES PER BAY	15 CAR SCAPES	

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UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

BENCH MARK:
COUNTY OF RIVERSIDE BENCHMARK "M 21-1 RESET", 373 FEET EAST ALONG ETHANAC ROAD FROM THE INTERSECTION OF ETHANAC ROAD AND THE SOUTHBOUND LANES OF HIGHWAY 395. 150 FEET SOUTH OF ETHANAC ROAD. 50 FEET SOUTHEAST OF THE NORTHEAST CORNER OF A 6 FOOT CHAIN LINK RIGHT-OF-WAY FENCE. 1 FOOT NORTHEAST OF AN ANGLE-POINT IN THE RIGHT-OF-WAY FENCE. 2 FEET NORTH OF A MARKER POST. A BRASS DISK STAMPED "M-21-1 RESET" SET IN THE TOP OF A CONCRETE POST 3 INCHES ABOVE GROUND. EL = 1421.891 NGVD 29 (5/85)

MARK	BY	DATE	REVISIONS	APPR	DATE
	ENGINEER			CITY	

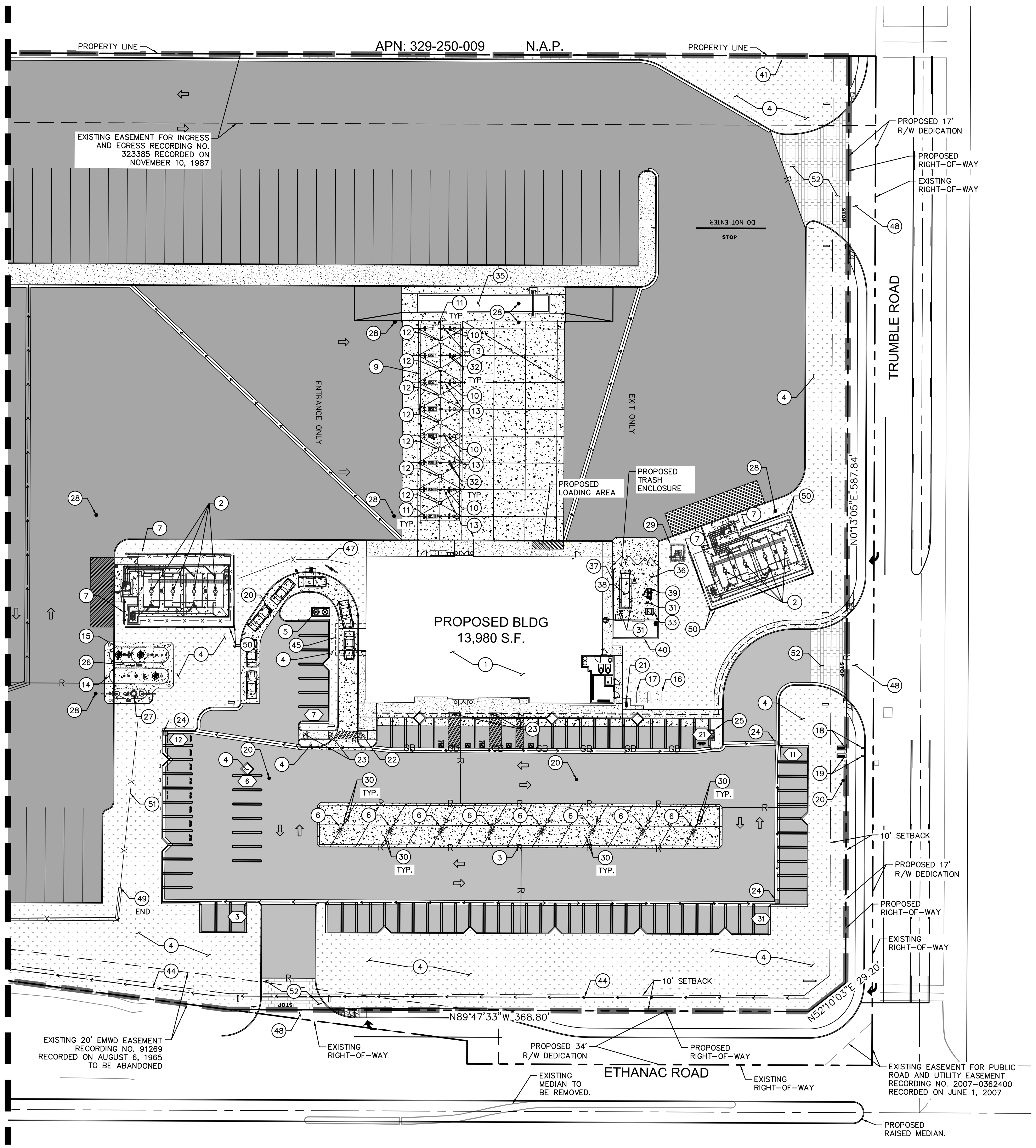
CITY OF PERRIS
APPROVED BY:
CONTRACT CITY ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER SHEA-MICHAEL ANTI RCE NO. 78274 CIVIL STATE OF CALIFORNIA

Kimley»Horn
765 THE CITY DRIVE SUITE 200, ORANGE, CA 92868
PHONE: 714-939-1030
PREPARED BY:
SHEA-MICHAEL ANTI R.C.E 78274 6/8/2022 DATE

SITE PLAN
PRELIMINARY PRECISE GRADING PLAN
PILOT PERRIS
ETHANAC ROAD AND TRUMBLE ROAD
APN: 329-250-011 & 329-250-012
PROJECT NUMBER: 095426010

SHEET NO. 3 OF 16 SHTS
FILE NO.:



LEGEND

- PROPERTY LINE CIVIL
- LIMITS OF WORK
- CENTER LINE
- SETBACKS
- EASEMENT LINE
- ACCESSIBLE ROUTE
- FENCE
- GRADE BREAK
- RIDGE LINE
- PARKING COUNT
- DETECTABLE WARNINGS
- DECORATIVE PAVEMENT
- STANDARD DUTY CONCRETE PAVEMENT
- HEAVY DUTY CONCRETE PAVEMENT
- HEAVY DUTY ASPHALT PAVEMENT
- STANDARD DUTY ASPHALT PAVEMENT
- LANDSCAPE/ PLANTER AREA

CONSTRUCTION NOTES

1. PILOT TRAVEL CENTER BUILDING (SEE ARCHITECTURAL DRAWINGS), INSTALLED BY CONTRACTOR.
2. ABOVE GROUND STORAGE TANK FARM WITH CONTAINMENT. EACH AST FARM CONTAINS (4) 12,000 GALLON TACKS FOR DIESEL AND BIO. SEE PRODUCT PIPING DRAWINGS FOR MORE INFORMATION.
3. 25'-0" x 253'-7" AUTO CANOPY, FURNISHED AND INSTALLED BY CANOPY SUPPLIER. CANOPY FOUNDATIONS INSTALLED BY CONTRACTOR.
4. LANDSCAPE AREA INSTALLED BY CONTRACTOR. REFER TO LANDSCAPE AND IRRIGATION PLANS FOR MORE INFORMATION.
5. GREASE TRAP. FURNISHED AND INSTALLED BY CONTRACTOR.
6. CONCRETE ISLAND WITH A GAS/AUTO DIESEL (3+1) DISPENSER AND CONTAINMENT BOX TYPICAL AT (8) PLACES, INSTALLED BY CONTRACTOR.
7. 2'-0' HIGH GUARDRAIL AROUND CONTAINMENT AREA, 1'-0" OUTSIDE OF FENCE.
8. PROPOSED BIORETENTION BASIN. SEE UTILITY PLAN FOR MORE INFORMATION.
9. 25'-0" x 124'-9" TRUCK CANOPY, FURNISHED AND INSTALLED BY CANOPY SUPPLIER, CANOPY FOUNDATIONS INSTALLED BY CONTRACTOR.
10. TRUCK AIR STAND, TYPICAL AT EVERY OTHER TRUCK FUELING ISLAND, SUPPLIED BY OWNER AND INSTALLED BY CONTRACTOR.
11. CONCRETE ISLAND WITH A DIESEL DISPENSER AND CONTAINMENT BOX TYPICAL AT (8) PLACES, INSTALLED BY CONTRACTOR.
12. PREFABRICATED TRUCK ISLAND CATCH BASIN (TYP (7) PLACES). SUPPLIED BY OWNER INSTALLED BY CONTRACTOR
13. TRUCK FREEZE PROOF WATER STAND TYPICAL AT EVERY OTHER TRUCK FUELING ISLAND FURNISHED AND INSTALLED BY CONTRACTOR.
14. TANK #1, PRODUCT #1. 20,000 GALLON, 10'-0"ø X 37'-8 3/4" LONG, DOUBLE-WALL FIBERGLASS UNDERGROUND REGULAR UNLEADED GASOLINE TANK. FURNISHED BY OWNER, INSTALLED BY CONTRACTOR (TYP (1) PLACE). SEE PP DRAWINGS FOR MORE INFORMATION.
15. TANK #2 AND TANK #3. 20,000 GALLON, 10'-0"ø X 37'-10" LONG (2) CHAMBER UNDERGROUND DOUBLE WALL FIBERGLASS TANK, TANK #2, PRODUCT #2 - 12,000 GALLON SUPER UNLEADED GASOLINE, TANK #3, PRODUCT #3 - 8,000 AUTO DIESEL. FURNISHED BY OWNER, INSTALLED BY CONTRACTOR. (SEE PP DRAWINGS FOR MORE INFORMATION).
16. LOCAL UTILITY ELECTRICAL TRANSFORMER INSTALLED BY CONTRACTOR.
17. TRAVEL CENTER DISTRIBUTION ELECTRICAL TRANSFORMER INSTALLED BY CONTRACTOR.
18. PROPOSED WATER METER AND BACKFLOW. SEE UTILITY PLANS SHEET 11-12 FOR MORE INFORMATION.
19. PROPOSED IRRIGATION METER AND BACKFLOW PREVENTOR. SEE UTILITY PLANS SHEET 11-12 FOR MORE INFORMATION.
20. PROPOSED SEWER CLEANOUT. SEE UTILITY PLANS SHEET 11-12 FOR MORE INFORMATION.
21. PROPOSED U-SHAPED BIKE RACKS PER CITY STANDARDS AND SPECIFICATIONS.
22. INSTALL ACCESSIBLE RAMP. INSTALL CAST-IN-PLACE DETECTABLE WARNING SYSTEM (TRUNCATED DOMES) PER ARMOR TILE - 36" X 48" PANEL. PRODUCT NO. ADA-C-3648W PER DETAIL X, SHEET XX.
23. INSTALL DETECTABLE WARNINGS.
24. PROPOSED CATCH BASIN. SEE STORM DRAIN PLANS SHEET 13-14 FOR MORE INFORMATION.
25. AUTO AIR/VACUUM (PROVIDED BY OWNER, ELECTRICAL BY CONTRACTOR), YARD HYDRANT BY CONTRACTOR.
26. NEW TANK VENT RISER CLUSTER, INSTALLED BY CONTRACTOR.
27. 4,000 GALLON, 6'-0"ø x 21'-11" LONG, SINGLE-WALL FIBERGLASS UNDERGROUND OIL/ WATER SEPARATOR, FURNISHED BY OWNER, INSTALLED BY CONTRACTOR.
28. CLEAN OUT FOR OIL/WATER SEPARATOR FURNISHED AND INSTALLED BY CONTRACTOR.
29. B99 INJECTION SHED WITH SUMP. SUPPLIED BY OWNER. (SEE PRODUCT PIPING DRAWINGS FOR MORE INFORMATION).
30. 4" STEEL PIPE BOLLARD FURNISHED, INSTALLED BY CONTRACTOR (SEE CIVIL DWGS FOR SPECS.).
31. 6" STEEL PIPE BOLLARD FURNISHED, INSTALLED BY CONTRACTOR (SEE CIVIL DWGS FOR SPECS.).
32. 1'-0" CONCRETE BOLLARD FURNISHED, INSTALLED AND PAINTED BY CONTRACTOR (SEE CIVIL DWGS FOR SPECS.).
33. GREASE CONTAINER, PROVIDED BY OWNER.
34. SITE LIGHT, FURNISHED BY OWNER, INSTALLED BY CONTRACTOR. (LOCATION TO BE DETERMINED DURING FINAL ENGINEERING)
35. TRUCK SCALE, CONCRETE TRUCK SCALE PIT AND TRUCK SCALE FURNISHED AND INSTALLED BY TRUCK SCALE SUPPLIER. ELECTRICAL, COMMUNICATIONS AND DRAINAGE PROVIDED TO THE SCALE PIT BY CONTRACTOR, COORDINATION BY CONTRACTOR.
36. PARKING AREA DESIGNATED FOR GOLF CART.
37. TRASH ENCLOSURE 8' CHAIN LINK FENCE WITH VINYL INSERTS MOUNTED ON REINFORCED CONCRETE PAD WITH PROTECTIVE STEEL BOLLARDS, INSTALLED BY CONTRACTOR (SEE ARCH DWGS FOR DETAILS).
38. TRASH COMPACTOR, FURNISHED AND INSTALLED BY TRASH COMPACTOR SUPPLIER.
39. CARDBOARD BAILER OR RECYCLE DUMPSTER, FURNISHED AND INSTALLED BY DUMPSTER SUPPLIER.
40. STORAGE UNIT, FURNISHED BY OWNER. ELECTRICAL & A/C INSTALL BY CONTRACTOR.
41. PROPOSED "CERTAIN TEED BRAND; BUFFTECH VINYL FENCING; PRIVACY SERIES; STYLE "GALVESTON", 8' TALL; COLOR ALMOND." OR APPROVED EQUAL. FURNISHED AND INSTALLED BY CONTRACTOR.
42. PROPOSED SHOP BUILDING LOCATION.
43. PROPOSED CHANNEL (BOTTOM WIDTH 2', DEPTH 3.5', SIDE SLOPE 1.5:1) PER RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT PLAN FOR M.D.P. - ROMOLAND AREA LATERAL A-11A.
44. PROPOSED V-DITCH. REFER TO GRADING PLAN SHEET 9 AND 10 FOR MORE INFORMATION.
45. PROPOSED PORTE-COCHERE. REFER TO ARCHITECTURAL PLANS FOR MORE INFORMATION.
46. PROPOSED 4' CHAIN LINK FENCE.
47. INSTALL CHAIN LINK FENCE PER LANDSCAPE PLANS.
48. PROPOSED COMMERCIAL DRIVEWAY.
49. PROPOSED 8' AMETCO TITAN DESIGN ALUMINUM FENCE (COLOR TO MATCH BUILDING) ON TOP OF 3' BERM. REFER TO SHEET 9-10 FOR MORE INFORMATION.
50. PROPOSED 10' CONCRETE MASONRY UNITS WALL.
51. PROPOSED 8' AMETCO TITAN DESIGN ALUMINUM FENCE (COLOR TO MATCH BUILDING) AT GRADE.
52. PROPOSED DECORATIVE PAVEMENT.

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80

1" = 40'
WHEN PRINTED AT FULL SIZE
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PHONE: 714-939-1030
PREPARED BY:
SHEA-MICHAEL ANTI R.C.E 78274 6/8/2022 DATE

SITE PLAN
PRELIMINARY PRECISE GRADING PLAN
PILOT PERRIS
ETHANAC ROAD AND TRUMBLE ROAD
APN: 329-250-011 & 329-250-012
PROJECT NUMBER: 095426010

SHEET NO. 4
OF 16 SHTS
FILE NO.:

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PHONE: 714-939-1030

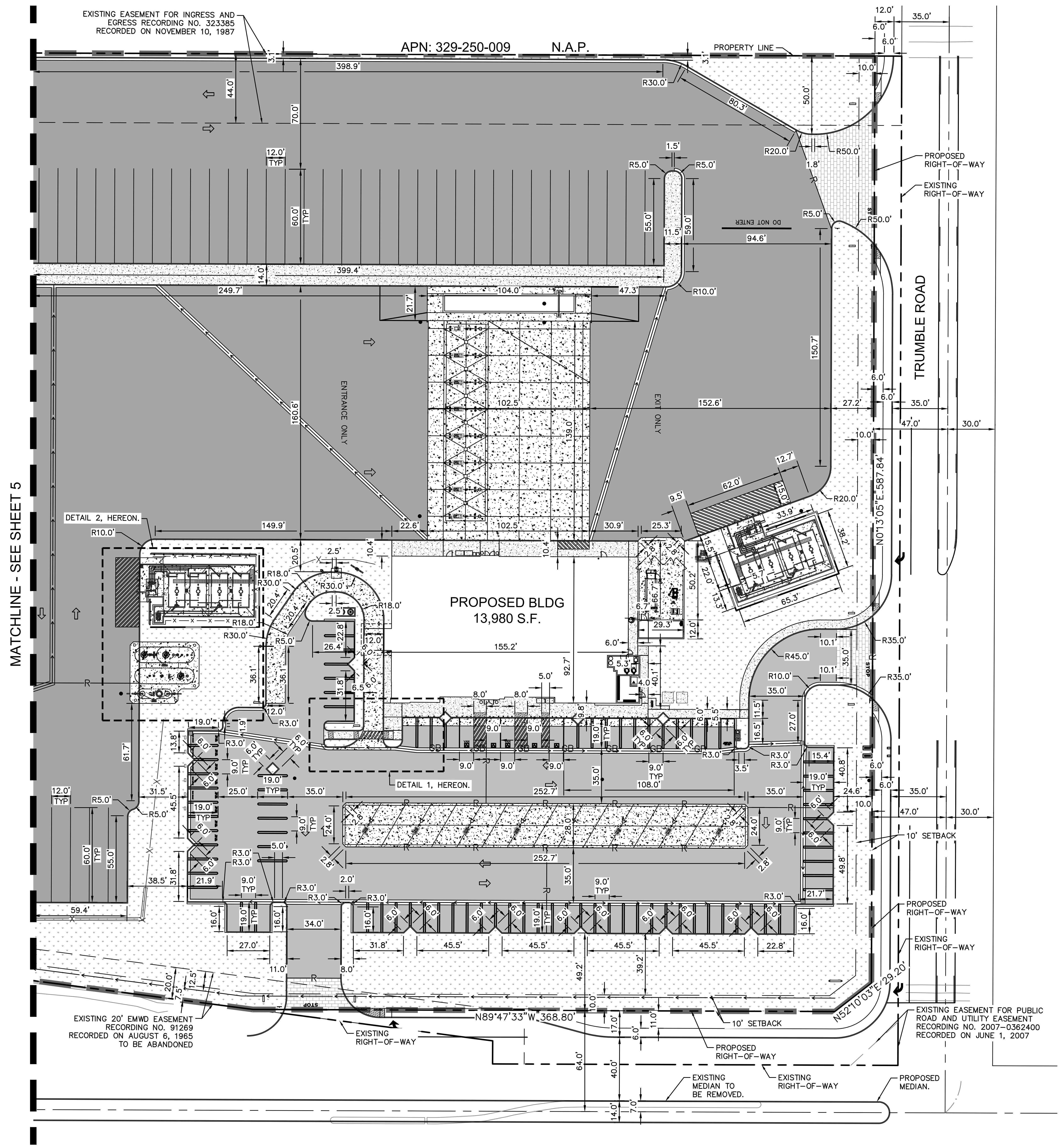
PREPARED BY:
SHEA-MICHAEL ANTI R.C.E 78274 6/8/2022 DATE

HORIZONTAL CONTROL PLAN
PRELIMINARY PRECISE GRADING PLAN
PILOT PERRIS
ETHANAC ROAD AND TRUMBLE ROAD
APN: 329-250-011 & 329-250-012

PROJECT NUMBER: 095426010

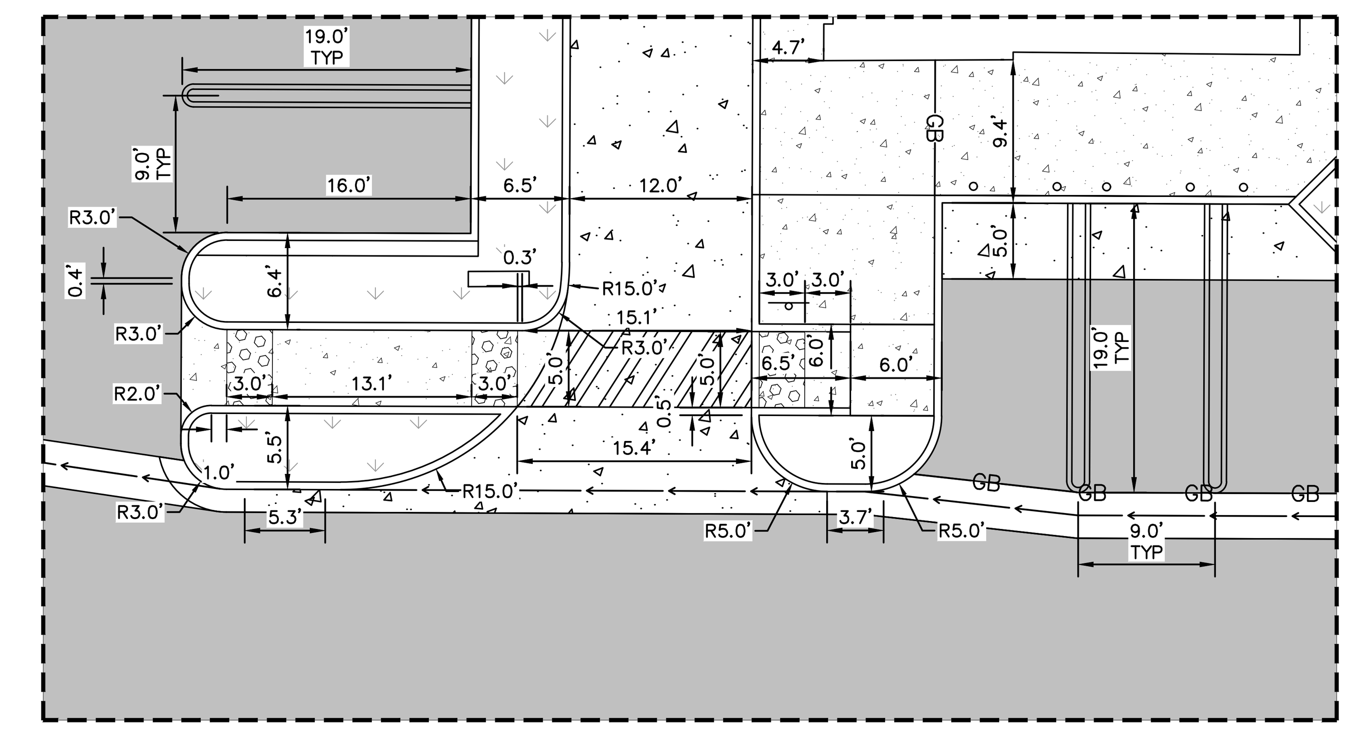
SHEET NO. 5 OF 16 SHTS

FILE NO.:

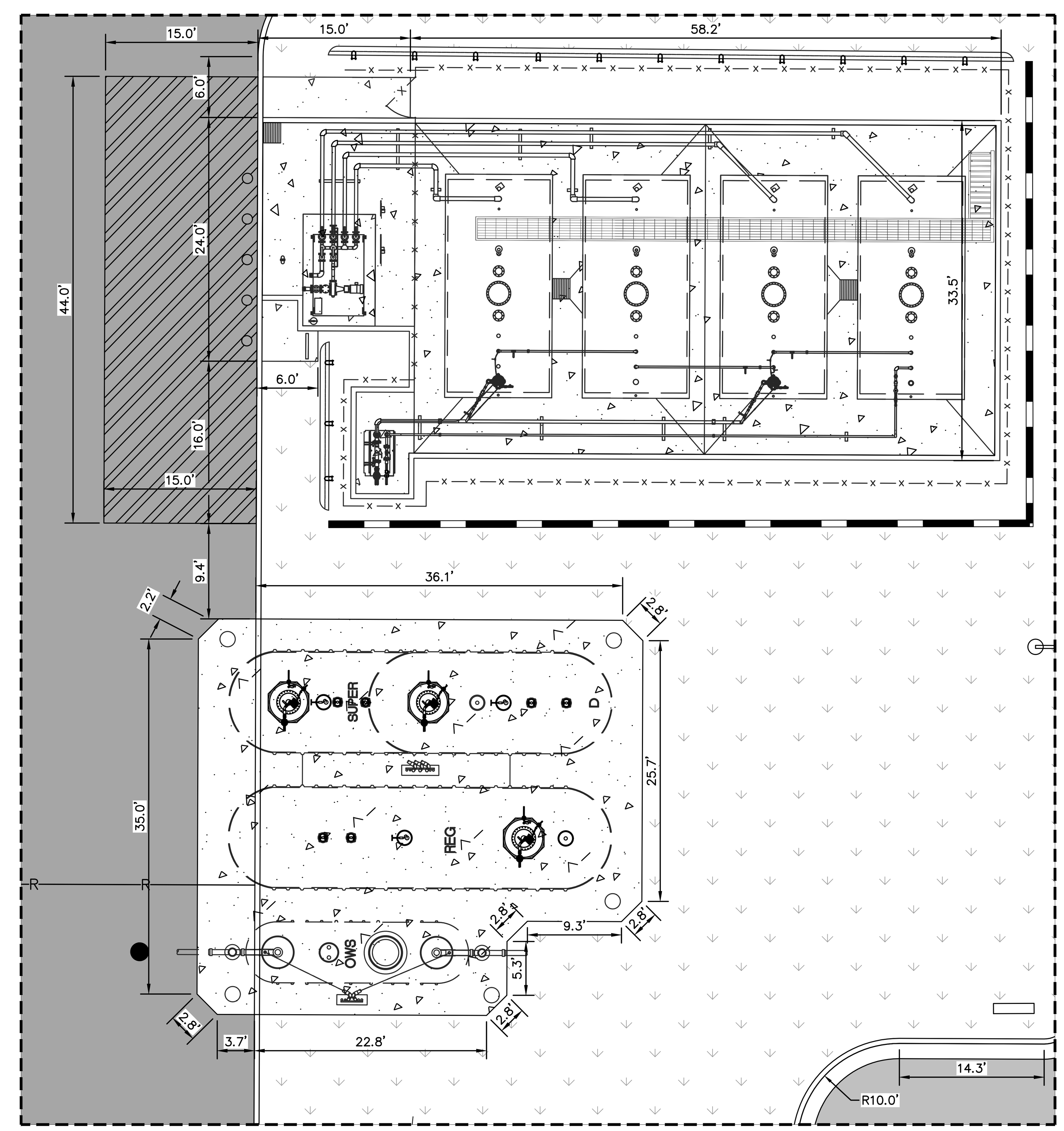


LEGEND

PROPERTY LINE CIVIL		STANDARD DUTY CONCRETE PAVEMENT	
LIMITS OF WORK		HEAVY DUTY CONCRETE PAVEMENT	
CENTER LINE		HEAVY DUTY ASPHALT PAVEMENT	
SETBACKS		STANDARD DUTY ASPHALT PAVEMENT	
EASEMENT LINE		LANDSCAPE/ PLANTER AREA	
DETECTABLE WARNINGS			
DECORATIVE PAVEMENT			



DETAIL 1
1"=10'



DETAIL 2
1"=10'

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80
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PREPARED BY:
SHEA-MICHAEL ANTI R.C.E 78274 6/8/2022 DATE

HORIZONTAL CONTROL PLAN
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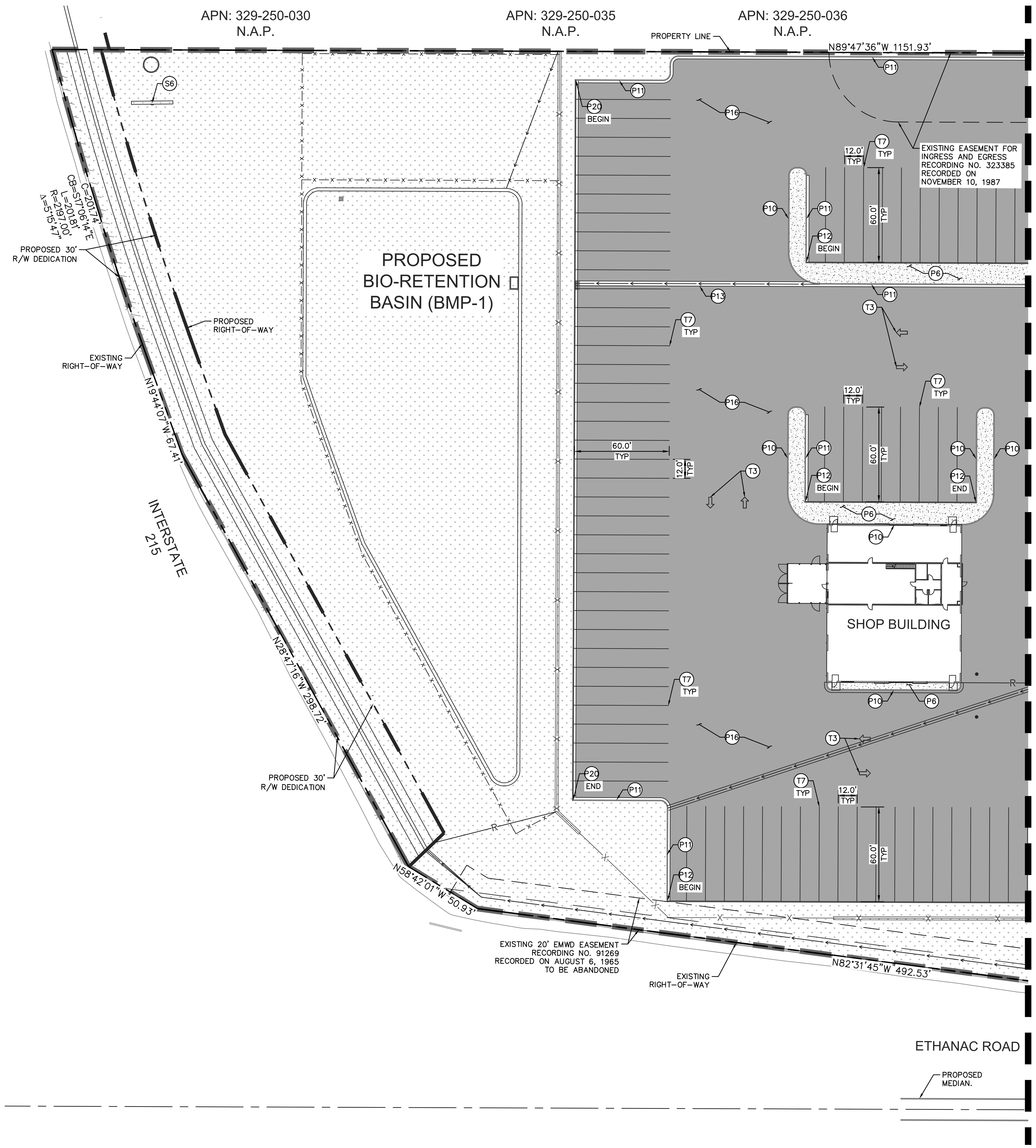
PILOT PERRIS
ETHANAC ROAD AND TRUMBLE ROAD
APN: 329-250-011 & 329-250-012

PROJECT NUMBER: 095426010

SHEET NO. 6 OF 16 SHTS

FILE NO.:



LEGEND

- PROPERTY LINE CIVIL
- LIMITS OF WORK
- CENTER LINE
- SETBACKS
- EASEMENT LINE
- ACCESSIBLE ROUTE
- FENCE
- DETECTABLE WARNINGS
- DECORATIVE PAVEMENT
- STANDARD DUTY CONCRETE PAVEMENT
- HEAVY DUTY CONCRETE PAVEMENT
- HEAVY DUTY ASPHALT PAVEMENT
- STANDARD DUTY ASPHALT PAVEMENT
- LANDSCAPE/ PLANTER AREA

PAVEMENT NOTES

P1 6" REINFORCED CONCRETE PAD FOR AUTO CANOPY. WATER FROM SITE SHOULD NOT DRAIN ACROSS THE CONCRETE PAD FOR THE AUTO CANOPY. ASPHALT PAVING ON ALL (4) SIDES OF THE CONCRETE PAD SHOULD DRAIN AWAY FROM CONCRETE PAD. SEE DETAIL X SHEET X, INSTALLED BY CONTRACTOR.

P2 8" REINFORCED CONCRETE PAD FOR TRUCK CANOPY. WATER FROM SITE SHOULD NOT DRAIN ACROSS THE CONCRETE PAD FOR THE TRUCK CANOPY. ASPHALT PAVING ON BOTH SIDES OF THE CONCRETE PAD SHOULD DRAIN AWAY FROM CONCRETE PAD. CONCRETE PAD FOR THE TRUCK CANOPY MUST DRAIN TO CATCH BASIN. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P3 8" REINFORCED CONCRETE PAD AT TANK FARM. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P4 8" REINFORCED CONCRETE PAD TRASH ENCLOSURE. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P5 6" REINFORCED CONCRETE PARKING APRON AT PARKING SPACES IN FRONT OF BUILDING. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P6 4" REINFORCED CONCRETE SIDEWALK. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P7 7'–0" X 7'–0" X 6" REINFORCED CONCRETE PAD FOR ELECTRICAL TRANSFORMER. CONTRACTOR TO COORDINATE WITH UTILITY COMPANY FOR SIZE AND REINFORCING REQUIREMENTS. INSTALLED BY CONTRACTOR.

P8 8" REINFORCED CONCRETE PAD AT OIL/WATER SEPARATOR. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P9 SEE BUILDING PLANS FOR AST AND BIO SHED FOUNDATION DESIGN.

P10 STANDARD DUTY 6" CURB. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P11 STANDARD DUTY CURB AND GUTTER. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P12 HEAVY DUTY CURB. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P13 INSTALL RIBBON GUTTER PER DETAIL X, SHEET X.

P14 0" ELEVATION CURB. SEE GRADING PLANS FOR DETAILS AND SPECIFICATIONS.

P15 8" REINFORCED CONCRETE RAMP FOR CAT SCALE.

P16 CONSTRUCT HEAVY DUTY ASPHALT PAVEMENT PER DETAIL X SHEET X.

P17 CONSTRUCT STANDARD DUTY ASPHALT PAVEMENT DETAIL X SHEET X.

P18 CONSTRUCT THICKENED EDGE PER DETAIL X, SHEET X.

P19 CONSTRUCT CONCRETE WALK–OFF PER DETAIL X, SHEET X.

P20 HEAVY DUTY CURB AND GUTTER PER DETAIL X, SHEET X.

P21 DECORATIVE PAVEMENT

STRIPING NOTES

T1 INSTALL ACCESSIBLE PATH OF TRAVEL STRIPING.

T2 INSTALL ACCESSIBLE STRIPING PARKING STALL AND ACCESSIBLE PARKING SYMBOL.

T3 ALL DIRECTIONAL AND PARKING STRIPING TO BE SAFETY YELLOW–UNLESS NOTED OTHERWISE (TYP).

T4 STOP LINE INSTALLED BY CONTRACTOR.

T5 5'–0" X 20'–0" PASSENGER DROP–OFF/LOADING ZONE. TRAFFIC STRIPING 4" WIDE PAINTED (SAFETY YELLOW) PARALLEL STRIPES AT 16" O.C. FURNISHED AND INSTALLED BY CONTRACTOR.

T6 4" YELLOW DOUBLE HAIRPIN STRIPING, TYP. (COLOR PER CITY CODE).

T7 4" YELLOW PAINTED SOLID LINE, TYP. (COLOR PER CITY CODE).

T8 PROPOSED "PARKING FOR SERVICE ISLAND USE ONLY." PAVEMENT MARKING.

T9 PROPOSED "CLEAN AIR/ VAN POOL." PAVEMENT MARKING.

T10 PROPOSED FUTURE EVCS PARKING STALLS.

T11 PROPOSED "ENTRANCE ONLY" PAVEMENT MARKING.

T12 PROPOSED "EXIT ONLY" PAVEMENT MARKING.

SIGNING NOTES

S1 INSTALL ACCESSIBLE PARKING STALL SIGN PER DETAIL X SHEET X AND SINGLE BASE SIGN POST PER DETAIL X SHEET X.

S2 INSTALL VAN ACCESSIBLE PARKING STALL SIGN PER DETAIL X SHEET X AND SINGLE BASE SIGN POST PER DETAIL X SHEET X.

S3 "PASSENGER LOADING ZONE ONLY" SIGN FURNISHED AND INSTALLED BY CONTRACTOR SHALL BE WALL MOUNTED.

S4 "STOP SIGN" SIGN INSTALLED BY CONTRACTOR.

S5 "PED–XING" SIGN FURNISHED AND INSTALLED BY CONTRACTOR.

S6 SEE BUILDING PLANS DRAWINGS FOR ALL OTHER SIGNAGE.

S7 RESTAURANT "DRIVE–THRU" (INTERNALLY ILLUMINATED) DIRECTIONAL SIGN FURNISHED BY OWNER, INSTALLED BY SIGN SUPPLIER. CONCRETE FOUNDATION AND ELECTRICAL INSTALLED BY CONTRACTOR.

S8 "DRIVE–THRU CLEARANCE 9 FT. 6 IN." SIGN FURNISHED BY OWNER, INSTALLED BY SIGN SUPPLIER. CONCRETE FOUNDATION INSTALLED BY CONTRACTOR.

S9 RESTAURANT PREVIEW BOARD (INTERNALLY ILLUMINATED) FURNISHED BY OWNER, INSTALLED BY SIGN SUPPLIER. CONCRETE FOUNDATION AND ELECTRICAL INSTALLED BY CONTRACTOR.

S10 "RESTAURANT" MENU BOARD (INTERNALLY ILLUMINATED) AND INTERCOM SYSTEM FURNISHED BY OWNER, INSTALLED BY SIGN SUPPLIER. CONCRETE FOUNDATION AND ELECTRICAL INSTALLED BY CONTRACTOR.

S11 "THANK YOU / DO NOT ENTER" DIRECTIONAL SIGN (INTERNALLY ILLUMINATED) FURNISHED BY OWNER, INSTALLED BY SIGN SUPPLIER. CONCRETE FOUNDATION AND ELECTRICAL INSTALLED BY CONTRACTOR.

GENERAL PAVING NOTES

1. ALL MANHOLES MUST BE SET 2" HIGHER THAN PAVING TO PROVIDE A CROWN IN A 24"Ø AREA AROUND EACH MANHOLE.
2. SUB–BASE MUST BE COMPACTED TO 95% STANDARD PROCTOR WITH A WATER CONTENT WITHIN 1.5% OF OPTIMUM.
3. STONE BASE MUST BE COMPACTED TO 95% STANDARD PROCTOR WITH A WATER CONTENT WITHIN 1.5% OF OPTIMUM.
4. PRIOR TO INSTALLING BITUMINOUS PAVING CONTRACTOR IS TO PROOF–ROLL SUB–BASE USING HEAVY, PNEUMATIC–TIRED ROLLERS TO LOCATE AREAS THAT ARE UNSTABLE OR THAT REQUIRE FURTHER COMPACTION. NOTIFY CONSTRUCTION MANAGER IN WRITING OF ANY UNSATISFACTORY CONDITIONS. DO NOT BEGIN PAVING INSTALLATION UNTIL THESE CONDITIONS HAVE BEEN SATISFACTORILY CORRECTED.
5. ASPHALT PAVING @ EDGE OF CONCRETE PAD FOR THE TRUCK CANOPY SHOULD BE LAID @1/4" HIGHER THAN CONCRETE PAD ON EXIT SIDE CANOPY.
6. CONCRETE COLLAR IS REQUIRED FOR ALL STRUCTURES IN PAVEMENT.

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SIGNING, STRIPING, AND PAVEMENT PLAN
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SHEET NO. 7 OF 16 SHTS
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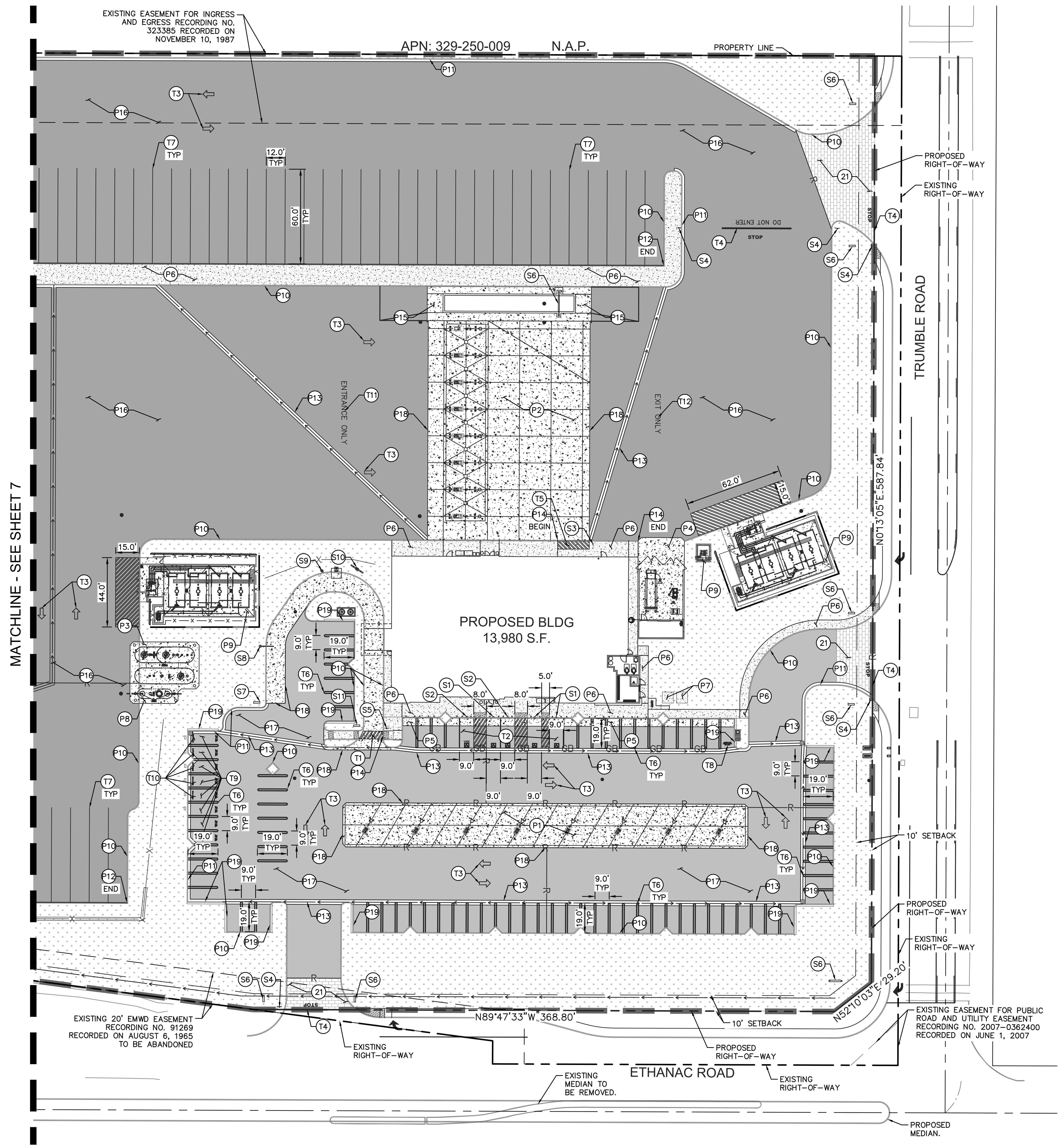

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PAVEMENT NOTES

P1 6" REINFORCED CONCRETE PAD FOR AUTO CANOPY. WATER FROM SITE SHOULD NOT DRAIN ACROSS THE CONCRETE PAD FOR THE AUTO CANOPY. ASPHALT PAVING ON ALL (4) SIDES OF THE CONCRETE PAD SHOULD DRAIN AWAY FROM CONCRETE PAD. SEE DETAIL X SHEET X, INSTALLED BY CONTRACTOR.

P2 8" REINFORCED CONCRETE PAD FOR TRUCK CANOPY. WATER FROM SITE SHOULD NOT DRAIN ACROSS THE CONCRETE PAD FOR THE TRUCK CANOPY. ASPHALT PAVING ON BOTH SIDES OF THE CONCRETE PAD SHOULD DRAIN AWAY FROM CONCRETE PAD. CONCRETE PAD FOR THE TRUCK CANOPY MUST DRAIN TO CATCH BASIN. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P3 8" REINFORCED CONCRETE PAD AT TANK FARM. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P4 8" REINFORCED CONCRETE PAD TRASH ENCLOSURE. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P5 6" REINFORCED CONCRETE PARKING APRON AT PARKING SPACES IN FRONT OF BUILDING. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P6 4" REINFORCED CONCRETE SIDEWALK. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P7 7'-0" X 7'-0" X 6" REINFORCED CONCRETE PAD FOR ELECTRICAL TRANSFORMER. CONTRACTOR TO COORDINATE WITH UTILITY COMPANY FOR SIZE AND REINFORCING REQUIREMENTS. INSTALLED BY CONTRACTOR.

P8 8" REINFORCED CONCRETE PAD AT OIL/WATER SEPARATOR. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P9 SEE BUILDING PLANS FOR AST AND BIO SHED FOUNDATION DESIGN.

P10 STANDARD DUTY 6" CURB. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P11 STANDARD DUTY CURB AND GUTTER. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P12 HEAVY DUTY CURB. SEE DETAIL X SHEET X. INSTALLED BY CONTRACTOR.

P13 INSTALL RIBBON GUTTER PER DETAIL X, SHEET X.

P14 0" ELEVATION CURB. SEE GRADING PLANS FOR DETAILS AND SPECIFICATIONS.

P15 8" REINFORCED CONCRETE RAMP FOR CAT SCALE.

P16 CONSTRUCT HEAVY DUTY ASPHALT PAVEMENT PER DETAIL X SHEET X.

P17 CONSTRUCT STANDARD DUTY ASPHALT PAVEMENT DETAIL X SHEET X.

P18 CONSTRUCT THICKENED EDGE PER DETAIL X, SHEET X.

P19 CONSTRUCT CONCRETE WALK-OFF PER DETAIL X, SHEET X.

P20 HEAVY DUTY CURB AND GUTTER PER DETAIL X, SHEET X.

P21 DECORATIVE PAVEMENT

STRIPING NOTES

T1 INSTALL ACCESSIBLE PATH OF TRAVEL STRIPING.

T2 INSTALL ACCESSIBLE STRIPING PARKING STALL AND ACCESSIBLE PARKING SYMBOL.

T3 ALL DIRECTIONAL AND PARKING STRIPING TO BE SAFETY YELLOW-UNLESS NOTED OTHERWISE (TYP).

T4 STOP LINE INSTALLED BY CONTRACTOR.

T5 5'-0" X 20'-0" PASSENGER DROP-OFF/LOADING ZONE. TRAFFIC STRIPING 4" WIDE PAINTED (SAFETY YELLOW) PARALLEL STRIPES AT 16" O.C. FURNISHED AND INSTALLED BY CONTRACTOR.

T6 4" YELLOW DOUBLE HAIRPIN STRIPING, TYP. (COLOR PER CITY CODE).

T7 4" YELLOW PAINTED SOLID LINE, TYP. (COLOR PER CITY CODE).

T8 PROPOSED "PARKING FOR SERVICE ISLAND USE ONLY." PAVEMENT MARKING.

T9 PROPOSED "CLEAN AIR/ VAN POOL." PAVEMENT MARKING.

T10 PROPOSED FUTURE EVCS PARKING STALLS.

T11 PROPOSED "ENTRANCE ONLY" PAVEMENT MARKING.

T12 PROPOSED "EXIT ONLY" PAVEMENT MARKING.

SIGNING NOTES

S1 INSTALL ACCESSIBLE PARKING STALL SIGN PER DETAIL X SHEET X AND SINGLE BASE SIGN POST PER DETAIL X SHEET X.

S2 INSTALL VAN ACCESSIBLE PARKING STALL SIGN PER DETAIL X SHEET X AND SINGLE BASE SIGN POST PER DETAIL X SHEET X.

S3 "PASSENGER LOADING ZONE ONLY" SIGN FURNISHED AND INSTALLED BY CONTRACTOR SHALL BE WALL MOUNTED.

S4 "STOP SIGN" SIGN INSTALLED BY CONTRACTOR.

S5 "PED-XING" SIGN FURNISHED AND INSTALLED BY CONTRACTOR.

S6 SEE BUILDING PLANS DRAWINGS FOR ALL OTHER SIGNAGE.

S7 RESTAURANT "DRIVE-THRU" (INTERNALLY ILLUMINATED) DIRECTIONAL SIGN FURNISHED BY OWNER, INSTALLED BY SIGN SUPPLIER. CONCRETE FOUNDATION AND ELECTRICAL INSTALLED BY CONTRACTOR.

S8 "DRIVE-THRU CLEARANCE 9 FT. 6 IN." SIGN FURNISHED BY OWNER, INSTALLED BY SIGN SUPPLIER. CONCRETE FOUNDATION INSTALLED BY CONTRACTOR.

S9 RESTAURANT PREVIEW BOARD (INTERNALLY ILLUMINATED) FURNISHED BY OWNER, INSTALLED BY SIGN SUPPLIER. CONCRETE FOUNDATION AND ELECTRICAL INSTALLED BY CONTRACTOR.

S10 "RESTAURANT" MENU BOARD (INTERNALLY ILLUMINATED) AND INTERCOM SYSTEM FURNISHED BY OWNER, INSTALLED BY SIGN SUPPLIER. CONCRETE FOUNDATION AND ELECTRICAL INSTALLED BY CONTRACTOR.

S11 "THANK YOU / DO NOT ENTER" DIRECTIONAL SIGN (INTERNALLY ILLUMINATED) FURNISHED BY OWNER, INSTALLED BY SIGN SUPPLIER. CONCRETE FOUNDATION AND ELECTRICAL INSTALLED BY CONTRACTOR.

GENERAL PAVING NOTES

1. ALL MANHOLES MUST BE SET 2" HIGHER THAN PAVING TO PROVIDE A CROWN IN A 24"Ø AREA AROUND EACH MANHOLE.
2. SUB-BASE MUST BE COMPACTED TO 95% STANDARD PROCTOR WITH A WATER CONTENT WITHIN 1.5% OF OPTIMUM.
3. STONE BASE MUST BE COMPACTED TO 95% STANDARD PROCTOR WITH A WATER CONTENT WITHIN 1.5% OF OPTIMUM.
4. PRIOR TO INSTALLING BITUMINOUS PAVING CONTRACTOR IS TO PROOF-ROLL SUB-BASE USING HEAVY, PNEUMATIC-TIRED ROLLERS TO LOCATE AREAS THAT ARE UNSTABLE OR THAT REQUIRE FURTHER COMPACTION. NOTIFY CONSTRUCTION MANAGER IN WRITING OF ANY UNSATISFACTORY CONDITIONS. DO NOT BEGIN PAVING INSTALLATION UNTIL THESE CONDITIONS HAVE BEEN SATISFACTORILY CORRECTED.
5. ASPHALT PAVING @ EDGE OF CONCRETE PAD FOR THE TRUCK CANOPY SHOULD BE LAID @1/4" HIGHER THAN CONCRETE PAD ON EXIT SIDE CANOPY.
6. CONCRETE COLLAR IS REQUIRED FOR ALL STRUCTURES IN PAVEMENT.

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80
1" = 40'
WHEN PRINTED AT FULL SIZE (24"X36")

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BENCH MARK:
COUNTY OF RIVERSIDE BENCHMARK "M 21-1 RESET", 373 FEET EAST ALONG ETHANAC ROAD FROM THE INTERSECTION OF ETHANAC ROAD AND THE SOUTHBOUND LANES OF HIGHWAY 395. 150 FEET SOUTH OF ETHANAC ROAD. 50 FEET SOUTHEAST OF THE NORTHEAST CORNER OF A 6 FOOT CHAIN LINK RIGHT-OF-WAY FENCE. 1 FOOT NORTHEAST OF AN ANGLE-POINT IN THE RIGHT-OF-WAY FENCE. 2 FEET NORTH OF A MARKER POST. A BRASS DISK STAMPED "M-21-1 RESET" SET IN THE TOP OF A CONCRETE POST 3 INCHES ABOVE GROUND. EL = 1421.891 NGVD 29 (5/85)

MARK	BY	DATE	REVISIONS	APPR	DATE
ENGINEER				CITY	

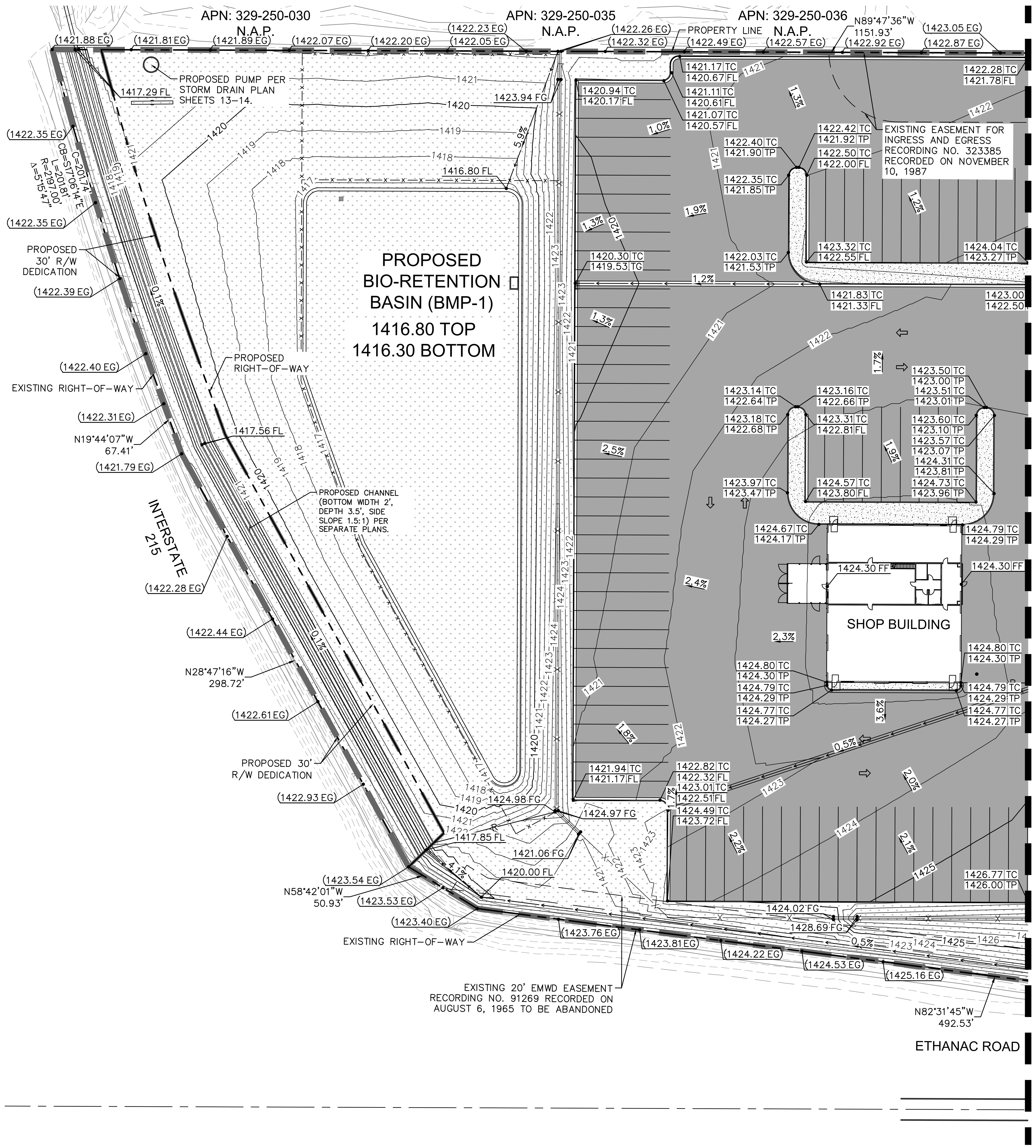
CITY OF PERRIS
APPROVED BY:
CONTRACT CITY ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER SHEA-MICHAEL ANTI RCE NO. 78274 CIVIL STATE OF CALIFORNIA

Kimley»Horn
765 THE CITY DRIVE SUITE 200, ORANGE, CA 92868
PHONE: 714-939-1030
PREPARED BY:
SHEA-MICHAEL ANTI R.C.E 78274 6/8/2022 DATE

SIGNING, STRIPING, AND PAVEMENT PLAN
PRELIMINARY PRECISE GRADING PLAN
PILOT PERRIS
ETHANAC ROAD AND TRUMBLE ROAD
APN: 329-250-011 & 329-250-012
PROJECT NUMBER: 095426010

SHEET NO. 8
OF 16 SHTS
FILE NO.:



LEGEND

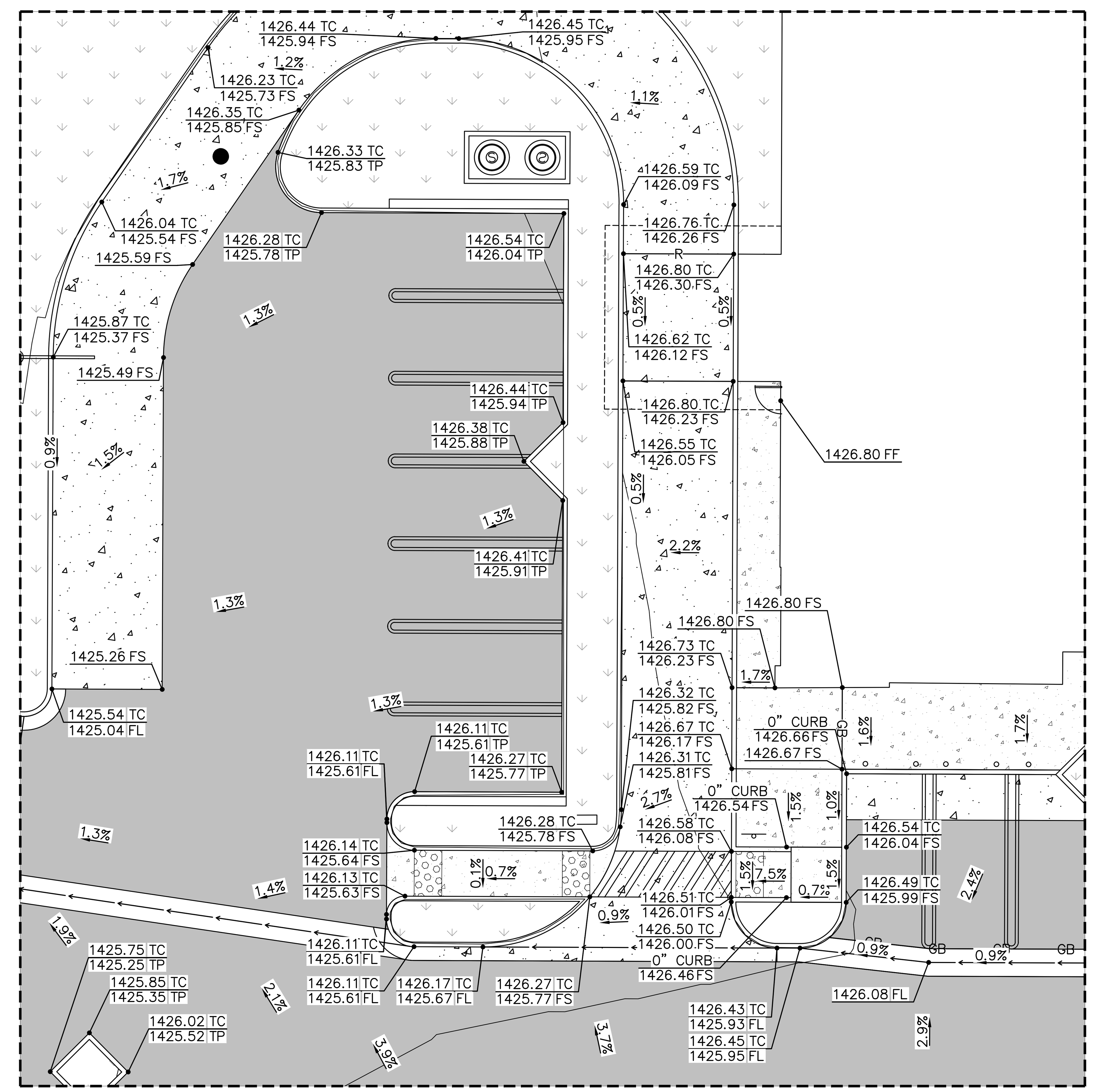
	PROPERTY LINE CIVIL		STANDARD DUTY CONCRETE PAVEMENT
	LIMITS OF WORK		HEAVY DUTY CONCRETE PAVEMENT
	CENTER LINE		HEAVY DUTY ASPHALT PAVEMENT
	SETBACKS		STANDARD DUTY ASPHALT PAVEMENT
	EASEMENT LINE		LANDSCAPE/ PLANTER AREA
GB	GRADE BREAK		DECORATIVE PAVEMENT
R	RIDGE LINE		
(1422.27 TC) (1421.77 TP)	PROPOSED ELEVATION		
1422.27 TC 1421.77 TP	EXISTING ELEVATION		
1.2%	SLOPE		
	DETECTABLE WARNINGS		

ABBREVIATIONS:

EG	EXISTING GROUND
FF	FINISHED FLOOR ELEVATION
FS	FINISH SURFACE
FG	FINISH GROUND
FL	FLOW LINE
GB	GRADE BREAK
HP	HIGH POINT
N.A.P	NOT A PART
TC	TOP OF CURB
TG	TOP OF GRATE
TP	TOP OF PAVEMENT

GRADING NOTES

1. CONTRACTOR TO VERIFY ALL EXISTING TOPOGRAPHY AND STRUCTURES ON THE SITE AND IMMEDIATELY NOTIFY THE ENGINEER OF ANY DISCREPANCIES PRIOR TO STARTING WORK.
2. ALL PAVEMENT SPOT GRADE ELEVATIONS AND RIM ELEVATIONS WITHIN OR ALONG CURB AND GUTTER REFER TO FLOW LINE ELEVATIONS UNLESS OTHERWISE NOTED.
3. ALL ELEVATIONS SHOWN DEPICT FINISHED GRADE OR EDGE OF PAVEMENT UNLESS OTHERWISE NOTED. GENERAL CONTRACTOR TO COORDINATE WITH EXCAVATION, LANDSCAPE AND PAVING SUBCONTRACTORS REGARDING TOPSOIL THICKNESS FOR LANDSCAPE AREAS AND PAVEMENT SECTION THICKNESS FOR PAVED AREAS TO PROPERLY ENSURE ADEQUATE CUT TO ESTABLISH SUBGRADE ELEVATIONS.
4. NO EARTHEN SLOPE SHALL BE GREATER THAN 2:1, UNLESS OTHERWISE NOTED.
5. MAXIMUM SLOPE IN ACCESSIBLE PARKING SPACES AND LOADING ZONES SHALL NOT EXCEED 2.0% IN ALL DIRECTIONS.
6. MAXIMUM RUNNING SLOPE SHALL NOT EXCEED 5% AND CROSS SLOPE SHALL NOT EXCEED 2% ON ALL SIDEWALKS AND ACCESSIBLE ROUTES.
7. MATCH EXISTING ELEVATIONS AT THE PROPERTY LIMITS.
8. REFER TO STORM DRAIN PLANS FOR INLET SIZE AND LOCATION.
9. EARTHWORK AND PAVING SPECIFICATION PER GEOTECHNICAL REPORT.
10. A GRADING PERMIT FROM THE CITY OF PERRIS WILL BE REQUIRED PRIOR TO COMMENCEMENT OF WORK.
11. ALL WORK DETAILED ON THESE PLANS TO BE PERFORMED, EXCEPT AS OTHERWISE STATED OR PROVIDED HEREON, SHALL BE CONSTRUCTED IN ACCORDANCE WITH CITY OF PERRIS STANDARDS AND SPECIFICATIONS.



DETAIL 1
1"=10'

NORTH

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ENGINEER				CITY	

CITY OF PERRIS

APPROVED BY:

CONTRACT CITY ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER SHEA-MICHAEL ANTI RCE NO. 78274 CIVIL STATE OF CALIFORNIA

Kimley»Horn
765 THE CITY DRIVE SUITE 200, ORANGE, CA 92868
PHONE: 714-939-1030

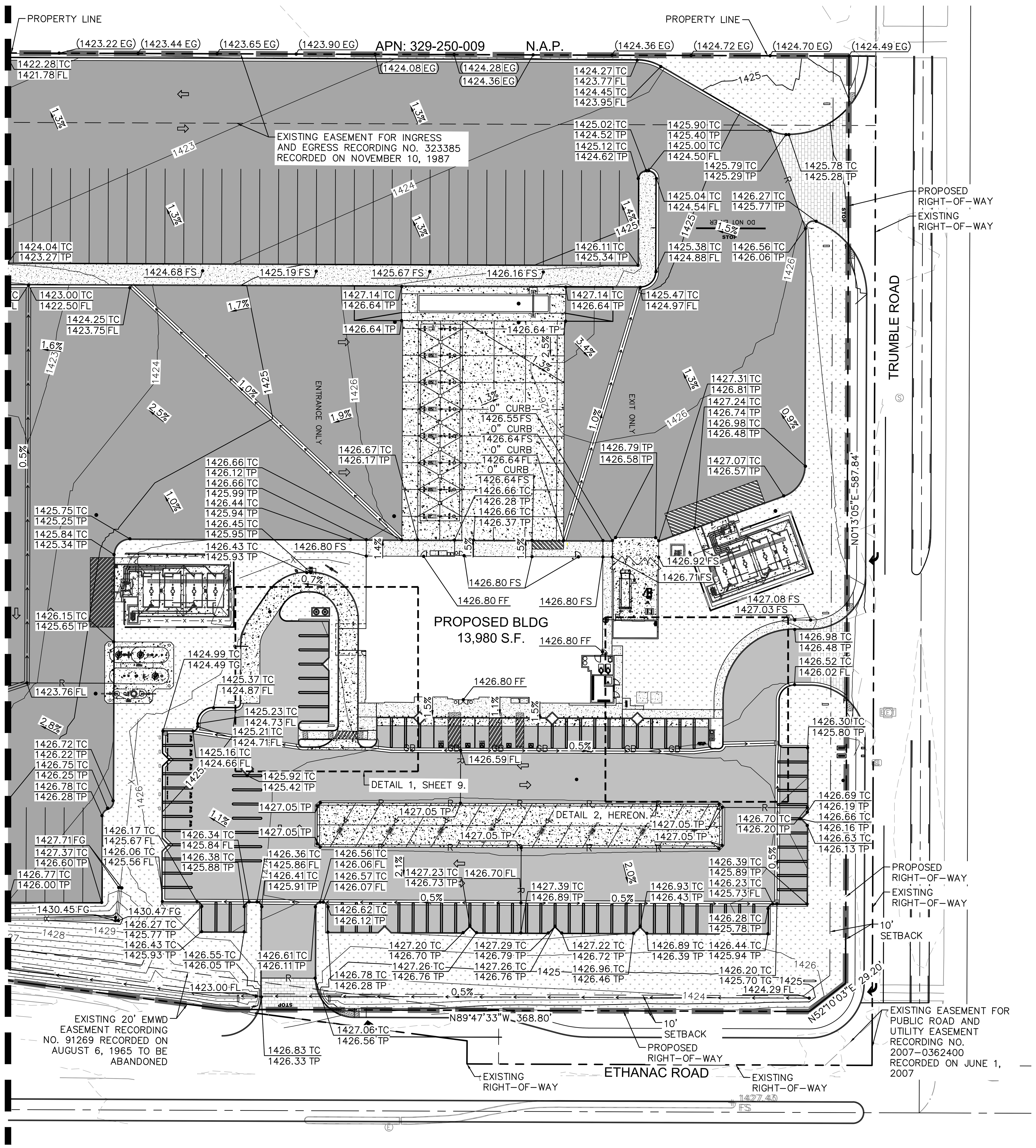
PREPARED BY:
SHEA-MICHAEL ANTI R.C.E 78274 6/8/2022 DATE

GRADING PLAN
PRELIMINARY PRECISE GRADING PLAN
PILOT PERRIS
ETHANAC ROAD AND TRUMBLE ROAD
APN: 329-250-011 & 329-250-012

PROJECT NUMBER: 095426010

SHEET NO. 9 OF 16 SHTS

FILE NO.:



LEGEND

PROPERTY LINE CIVIL	STANDARD DUTY CONCRETE PAVEMENT
LIMITS OF WORK	HEAVY DUTY CONCRETE PAVEMENT
CENTER LINE	HEAVY DUTY ASPHALT PAVEMENT
SETBACKS	STANDARD DUTY ASPHALT PAVEMENT
EASEMENT LINE	LANDSCAPE/ PLANTER AREA
GRADE BREAK	DECORATIVE PAVEMENT
RIDGE LINE	
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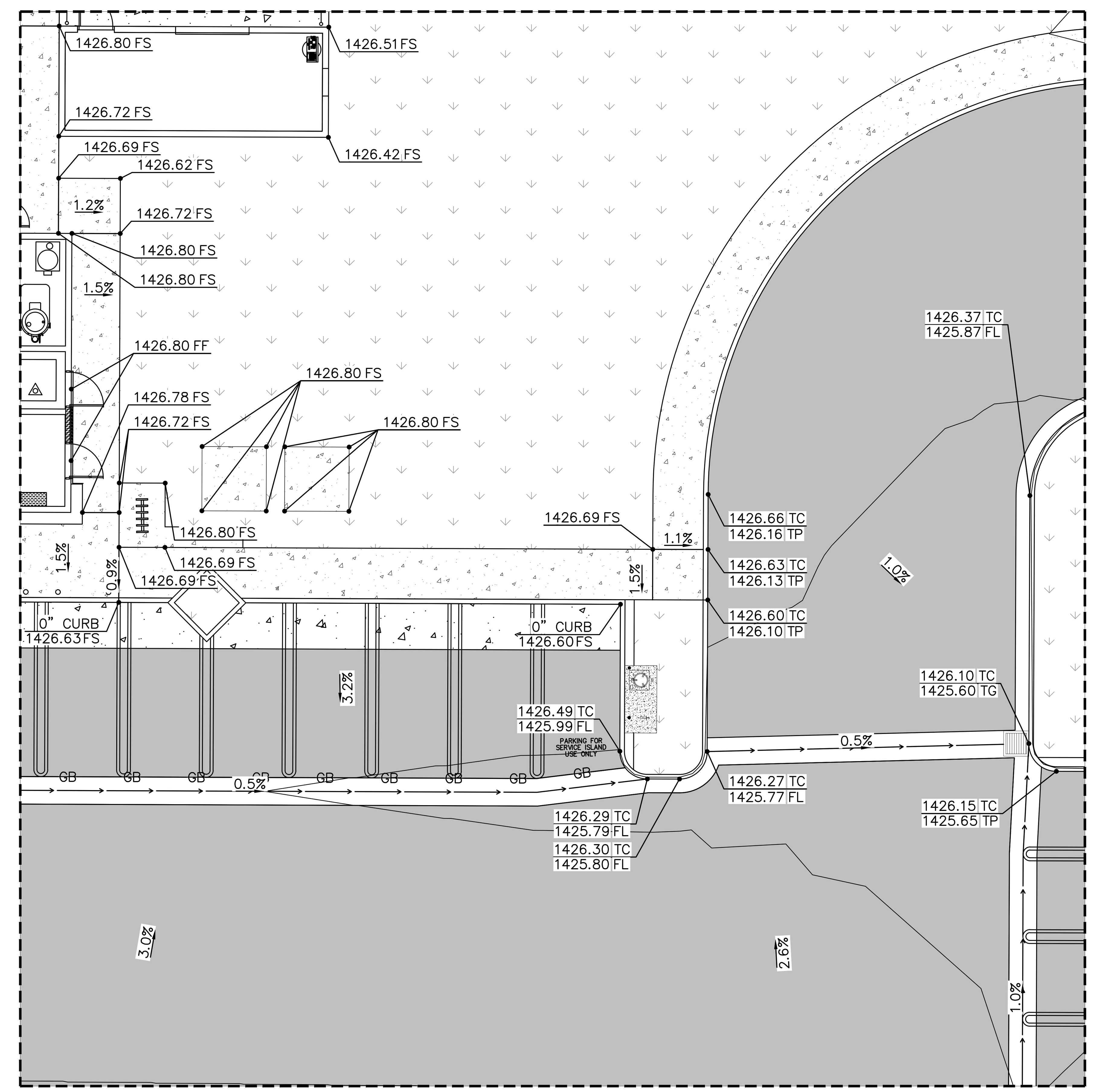

DETAIL 2

1"=10'

NORTH

GRAPHIC SCALE IN FEET

0 20 40 80

1" = 40' WHEN PRINTED AT FULL SIZE (24"X36")

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Kimley»Horn

765 THE CITY DRIVE SUITE 200, ORANGE, CA 92868 PHONE: 714-939-1030

PREPARED BY:

SHEA-MICHAEL ANTI R.C.E 78274 6/8/2022 DATE

GRADING PLAN
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PILOT PERRIS
ETHANAC ROAD AND TRUMBLE ROAD
APN: 329-250-011 & 329-250-012

PROJECT NUMBER: 095426010

SHEET NO. 10 OF 16 SHTS

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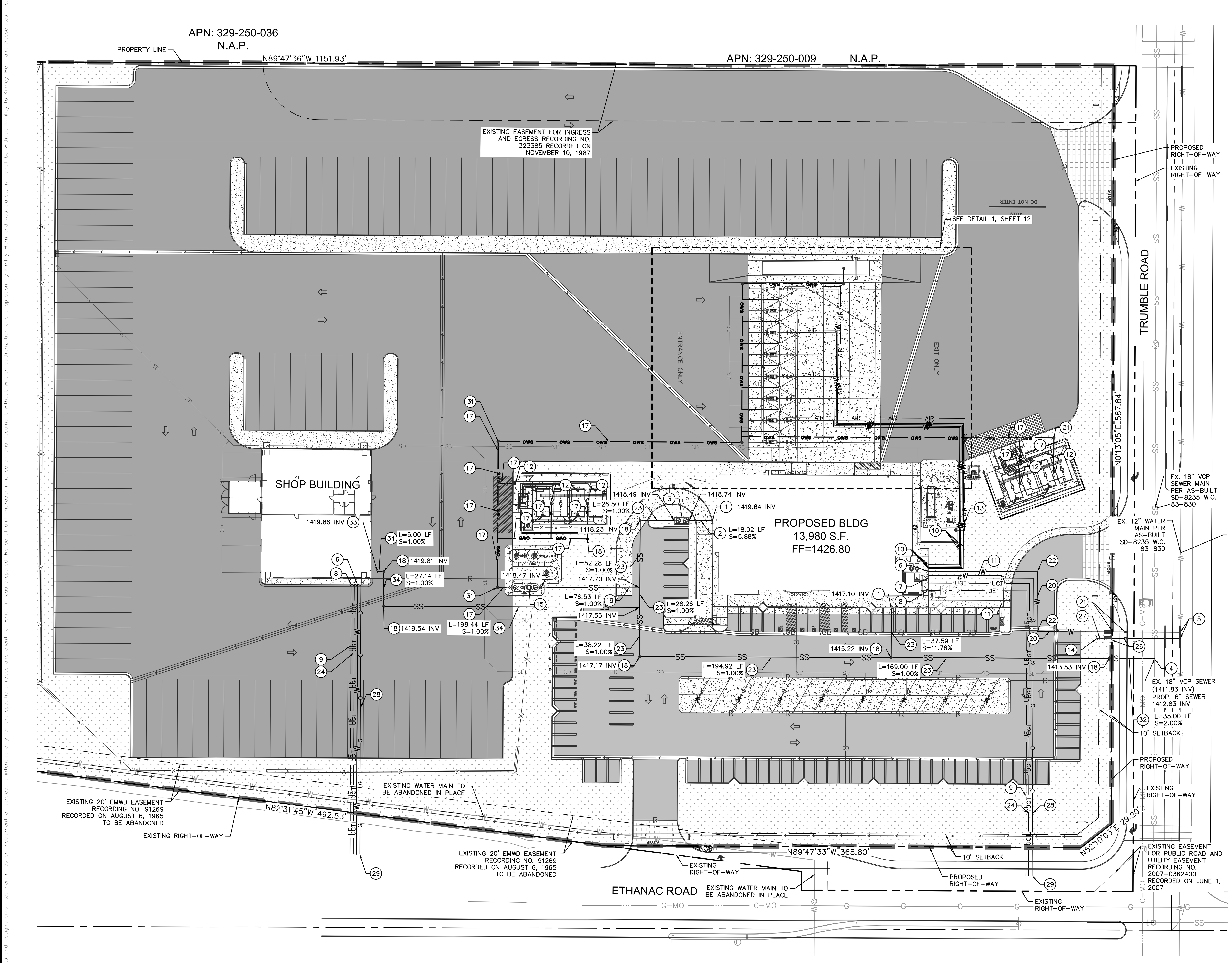

LEGEND

	PROPERTY LINE CIVIL
	LIMITS OF WORK
	CENTER LINE
	SETBACKS
	EASEMENT LINE
SS	PROPOSED SANITARY SEWER
SD	PROPOSED STORM DRAIN PIPE
AIR	PROPOSED AIR
W	PROPOSED WATER PIPE
OWS	PROPOSED OIL WATER SEPARATOR
UGT	PROPOSED TELEPHONE LINE
UE	PROPOSED UNDERGROUND ELECTRIC

UTILITY PLAN CONSTRUCTION NOTES

1. CONTRACTOR TO CONNECT TO 6" BUILDING SANITARY SEWER LINE. (4.00' MIN. BELOW FF)
2. CONTRACTOR TO CONNECT 6" BUILDING SANITARY SEWER LINE FROM BUILDING TO THE GREASE TRAP. INVERT ELEVATION AT THE GREASE TRAP OUTLET PER PLAN.
3. INSTALL GREASE TRAP. REFER TO MEP PLANS FOR MORE INFORMATION.
4. CONNECT INTO EXISTING 18" VCP SEWER MAIN PER EMWD STANDARDS AND SPECIFICATION. GENERAL CONTRACTOR SHALL VERIFY INVERT ELEVATION AT CONNECTION PRIOR TO COMMENCEMENT OF WORK. GENERAL CONTRACTOR TO NOTIFY ENGINEER OF ANY DISCREPANCIES.
5. HOT TAP INTO EXISTING 12" WATER MAIN. CONTRACTOR TO COORDINATE WITH UTILITY SERVICE PROVIDER.
6. CONTRACTOR TO CONNECT TO 2" WATER SERVICE LINE AT THE BUILDING. WATER SERVICE LINE SHALL BE COPPER.
7. CONTRACTOR TO CONNECT TO 3" GAS LINE AT THE BUILDING.
8. CONTRACTOR TO INSTALL ELECTRICAL SERVICE LINE FROM ELECTRICAL TRANSFORMER PAD TO BUILDING ELECTRICAL PANELS.
9. CONTRACTOR TO INSTALL AND/OR COORDINATE ELECTRICAL SERVICE LINE FROM ELECTRICAL TRANSFORMER TO THE LOCATION WHERE THE LOCAL UTILITY BRINGS SERVICE.
10. CONTRACTOR TO INSTALL 3/4" PEX WATER LINES INSIDE OF 2" PVC SLEEVES FROM BUILDING TO TRUCK FREEZE PROOF WATER STAND (FURNISHED AND INSTALLED BY CONTRACTOR) LOCATED AT EVERY OTHER TRUCK FUELING ISLAND. PEX AND PVC SLEEVE TO BE PROVIDED AND INSTALLED BY CONTRACTOR. SEE CIVIL SHEETS FOR DETAILS.
11. CONTRACTOR TO INSTALL 1/2" PEX WATER LINE INSIDE OF 2" PVC SLEEVE FROM BUILDING TO AUTO AIR/WATER STAND (TYP. (1) PLACE). PEX AND SLEEVE TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
12. INSTALL PREFABRICATED TRUCK ISLAND CATCH BASIN 2' BY 2' FOR OIL/WATER SEPARATION.
13. CONTRACTOR TO INSTALL 1/2" COPPER AIR LINE FROM AIR COMPRESSOR IN THE YARD MAINTENANCE BUILDING TO THE TRUCK AIR STAND LOCATED AT EVERY OTHER TRUCK FUELING ISLAND. SEE TC SHEETS FOR DETAILS.
14. REFER TO LANDSCAPE AND IRRIGATION PLANS FOR CONTINUATION.
15. PROPOSED OIL/WATER SEPARATOR.
16. CONTRACTOR TO INSTALL 4" SCHEDULE 40 PVC PIPE AND GLUED FITTINGS FROM THE TRUCK CANOPY PAD CATCH BASIN – TYPICAL AT EACH DRAIN. NO "FERNCO" TYPE FITTINGS ALLOWED AT ANY PART OF THE OWS PIPING SYSTEM.
17. CONTRACTOR TO INSTALL 6" SCHEDULE 40 PVC PIPE AND GLUED FITTINGS FROM 4" PVC CATCH BASIN LINES TO INLET OF OIL/WATER INTERCEPTOR. INVERT ELEVATION AT INTERCEPTOR INLET PER PLAN. NO "FERNCO" TYPE FITTINGS ALLOWED AT ANY PART OF THE OWS PIPING SYSTEM.
18. INSTALL SEWER CLEANOUT PER DETAIL 1, SHEET 12.
19. CONTRACTOR TO FURNISH AND INSTALL 6" SCHEDULE 40 PVC PIPE AND GLUED FITTINGS FROM OIL/WATER SEPARATOR TO THE SEWER PIPE. INVERT ELEVATION AT OIL/WATER SEPARATOR OUTLET PER PLAN. INVERT ELEVATION AT THE STORM POND INLET PER PLAN. NO "FERNCO" TYPE FITTINGS ALLOWED AT ANY PART OF THE OWS PIPING SYSTEM.
20. INSTALL 2-1/2" COPPER WATER SERVICE LINE. MAINTAIN 3' MINIMUM COVER.
21. INSTALL WATER METER AND BACKFLOW PREVENTOR. CONTRACTOR TO COORDINATE WITH UTILITY SERVICE PROVIDER.
22. INSTALL 90° DOMESTIC WATER PIPE BEND.
23. INSTALL 6" SDR-35 PVC AT MINIMUM 1% SLOPE.
24. CONTRACTOR TO INSTALL (2) 4" PVC SCH 40 CONDUIT BURIED TO MIN. DEPTH OF 24" W/200 LB. PULL STRING AND CAPPED ON BOTH ENDS FOR TELEPHONE SERVICE, TO LOCATION WHERE LOCAL UTILITY BRINGS SERVICE. MINIMUM 3 FT. SWEEPING RADIUS (NO RIGHT ANGLES), NO MORE THAN THREE 90 DEGREE TURNS WITHOUT A PULL BOX (12"x12"x18" MINIMUM), AND PATHS LONGER THAN 300 FT. WILL REQUIRE A PULL BOX.
25. CONTRACTOR TO INSTALL 3" PVC FROM TRUCK SCALE SUMP TO 6" TRUNK LINE TO GRIT CHAMBER.
26. INSTALL 1" IRRIGATION METER AND 1.5" BACKFLOW PREVENTOR. CONTRACTOR TO COORDINATE WITH UTILITY SERVICE PURVEYOR.
27. INSTALL 1" IRRIGATION WATER SERVICE LINE. CONTRACTOR TO COORDINATE WITH UTILITY SERVICE PURVEYOR.
28. PROPOSED GAS LINE. COORDINATE WITH GAS UTILITY COMPANY.
29. CONNECT TO EXISTING GAS MAIN BY OTHERS.
30. CONTRACTOR TO MAINTAIN A VERTICAL SEPARATION OF A MINIMUM OF 1-FOOT FOR ALL UTILITY CROSSINGS SHOWN ON THIS PLAN PER DETAIL 2, SHEET 12.
31. CLEANOUT FOR OIL/WATER SEPARATOR. REFER TO MEP PLANS FOR MORE INFORMATION.
32. INSTALL 6" VCP SEWER LATERAL AT MINIMUM 2% SLOPE.
33. CONTRACTOR TO CONNECT TO 4" BUILDING SANITARY SEWER LINE. (4.00' MIN. BELOW FF)
34. INSTALL 4" SDR-35 PVC AT MINIMUM 1% SLOPE.

EXISTING UTILITY NOTES

- THE EXISTING UTILITIES SHOWN ON THE PLAN ARE BASED ON AVAILABLE RECORDS. THE CONTRACTOR MUST FIELD DETERMINE THE LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO ANY CONSTRUCTION. REPORT DISCREPANCIES AND POTENTIAL CONFLICTS WITH PROPOSED UTILITIES TO ENGINEER PRIOR TO INSTALLATION OF ANY PIPING.
- ALL SHUT DOWN OF EXISTING WATER MAIN TO BE DONE BY AND COORDINATED WITH THE CITY UTILITY DIVISION. CONTRACTOR SHALL NOTIFY ALL AFFECTED WATER USERS 72 HOURS IN ADVANCE OF SHUT DOWN.

GENERAL NOTES

1. PRIOR TO ANY WORK PERFORMED IN THE RIGHT-OF-WAY A PERMIT FROM THE CITY OF PERRIS IS REQUIRED.
2. ALL CATCH BASIN COVERS/GRATES AND CLEANOUT/MANHOLE COVERS EXPOSED TO VEHICULAR LOADS SHALL BE TRAFFIC RATED.
3. FOR TRENCHING, PIPE BEDDING & ROADWAY PAVEMENT REPAIRS DETAILS & SPECIFICATIONS, TRENCH AND BACKFILL PER EMWD STANDARDS AND SPECIFICATIONS.
4. STUB POINT OF CONNECTION 5' FROM BUILDING. REFER TO MEP PLAN FOR CONTINUATION OF BUIDING.
5. CONTRACTOR TO MAINTAIN A VERTICAL SEPARATION OF A MINIMUM OF 1-FOOT FOR ALL UTILITY CROSSINGS SHOWN ON THIS PLAN PER DETAIL X, SHEET XX.

WATER AND SEWER UTILITY NOTES

SEE SHEET 2, FOR WATER AND SEWER UTILITY NOTES.

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	ENGINEER			CITY	

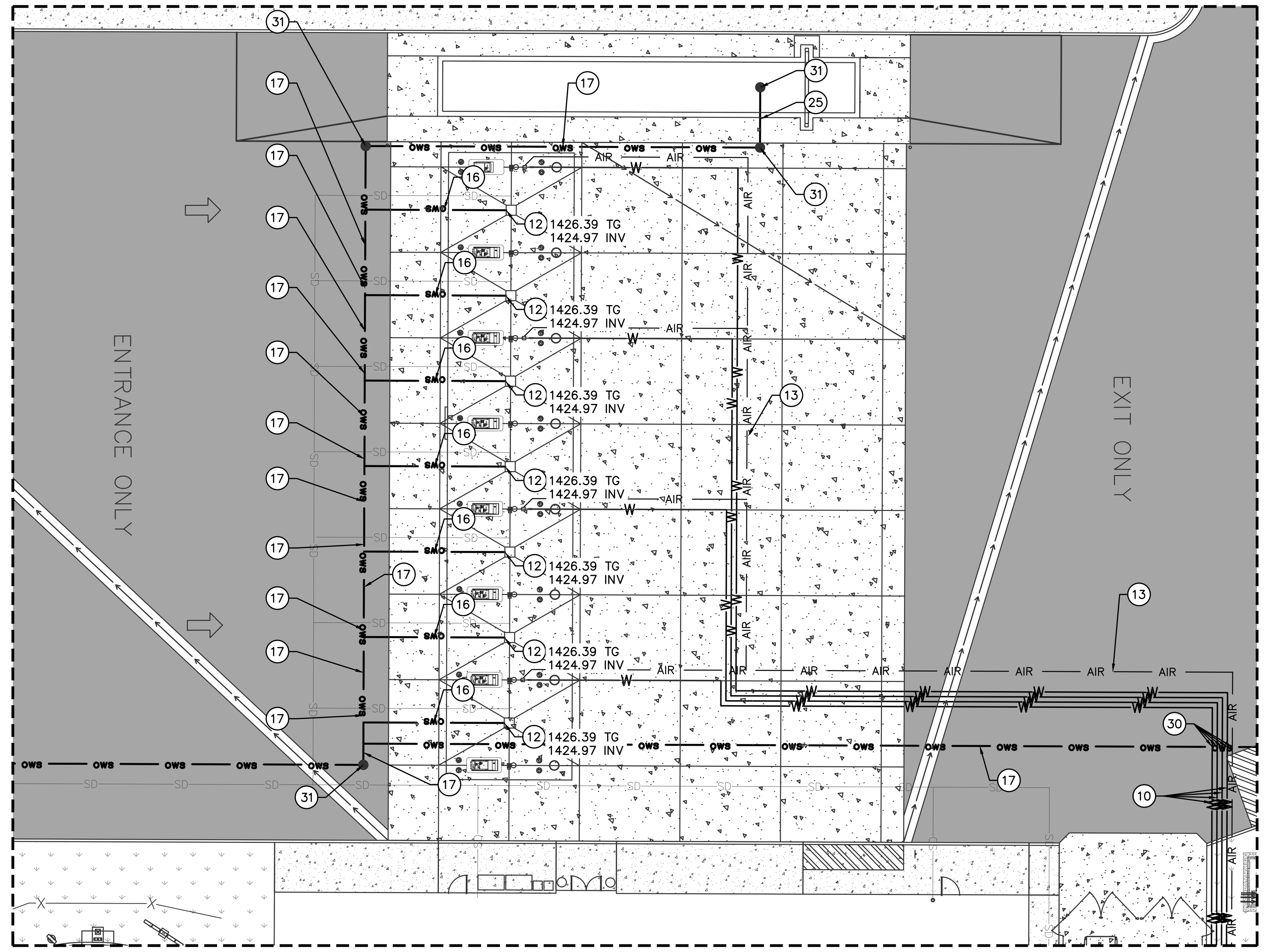
CITY OF PERRIS
APPROVED BY:
CONTRACT CITY ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER SHEA-MICHAEL ANTI RCE NO. 78274 CIVIL STATE OF CALIFORNIA

Kimley»Horn
765 THE CITY DRIVE SUITE 200, ORANGE, CA 92868
PHONE: 714-939-1030
PREPARED BY:
SHEA-MICHAEL ANTI R.C.E 78274 6/8/2022 DATE

UTILITY PLAN
PRELIMINARY PRECISE GRADING PLAN
PILOT PERRIS
ETHANAC ROAD AND TRUMBLE ROAD
APN: 329-250-011 & 329-250-012
PROJECT NUMBER: 095426010

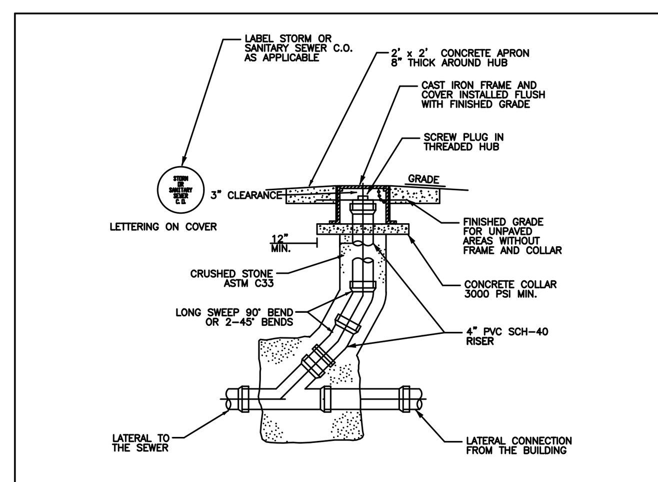
SHEET NO. 11 OF 16 SHTS
FILE NO.:



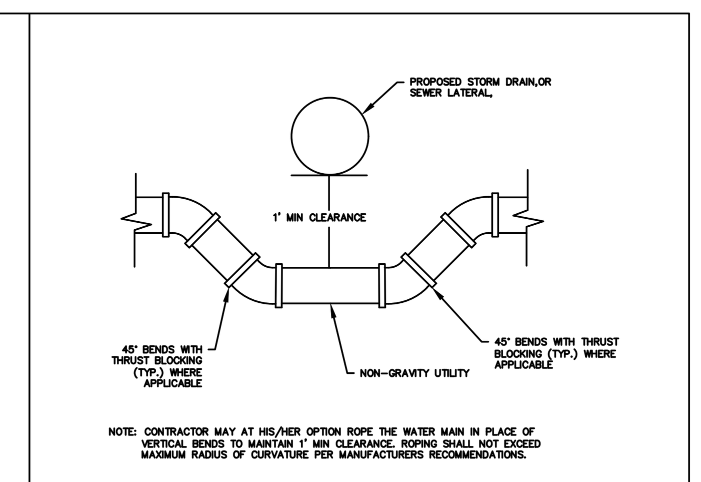
DETAIL 1
1"=20'

LEGEND

	PROPERTY LINE CIVIL
	LIMITS OF WORK
	CENTER LINE
	SETBACKS
	EASEMENT LINE
SS	PROPOSED SANITARY SEWER
SD	PROPOSED STORM DRAIN PIPE
AIR	PROPOSED AIR
W	PROPOSED WATER PIPE
OWS	PROPOSED OIL WATER SEPARATOR
UGT	PROPOSED TELEPHONE LINE
UE	PROPOSED UNDERGROUND ELECTRIC



CLEAN OUT DETAIL 1
N.T.S.



WATER CROSSING DETAIL 2
N.T.S.

DIAL TOLL FREE 811
AT LEAST TWO DAYS BEFORE YOU DIG
Know what's below. Call before you dig.
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

BENCH MARK:
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ETHANAC ROAD AND TRUMBLE ROAD
APN: 329-250-011 & 329-250-012
PROJECT NUMBER: 095426010

SHEET NO. 12 OF 16 SHTS
FILE NO.:

LEGEND

PROPERTY LINE CIVIL	
LIMITS OF WORK	
CENTER LINE	
SETBACKS	
EASEMENT LINE	
SS	PROPOSED SANITARY SEWER
SD	PROPOSED STORM DRAIN PIPE
AIR	PROPOSED AIR
W	PROPOSED WATER PIPE
OWS	PROPOSED OIL WATER SEPARATOR
UGT	PROPOSED TELEPHONE LINE
UE	PROPOSED UNDERGROUND ELECTRIC

STORM DRAIN CONSTRUCTION NOTES

D1 CONTRACTOR TO CONNECT TO 6" BUILDING ROOF DRAIN (1.50' MIN. BELOW FF).

D2 CONTRACTOR TO INSTALL 3" PVC FROM TRUCK CANOPY DRAINS. INVERT ELEVATION AT EACH ISLAND 1.25' BELOW CANOPY PAD FINISH GRADE.

D3 CONTRACTOR TO INSTALL 6" PVC TRUNK LINE FROM 3" PVC CANOPY DRAIN LINES TO STORM WATER DRAINAGE.

D4 CONTRACTOR TO INSTALL 3" PVC FROM AUTO CANOPY DRAINS. INVERT ELEVATION AT EACH ISLAND 1.25' BELOW CANOPY PAD FINISH GRADE.

D5 INSTALL PVC FITTING (TYPE PER PLAN)

D6 INSTALL HDPE FITTING (TYPE PER PLAN)

D7 CONSTRUCT SAND FOREBAY PER DETAIL X ON SHEET X

D8 INSTALL NYLOPLAST 12" DRAIN BASIN WITH SUMP INSERT 2' BY 2' ROAD & HIGHWAY GRATE INLET WITH FLEXSTORM PERMANENT USE PURE INLET PER DETAIL X AND X ON SHEET X

D9 INSTALL 12" HDPE STORM DRAIN PIPE

D10 INSTALL 24" HDPE STORM DRAIN PIPE

D11 PROPOSED OVERFLOW STRUCTURE.

D12 PROPOSED OVERFLOW PIPE.

D13 PROPOSED PUMP.

D14 PROPOSED 6" ROOF DRAIN LINE.

D15 CONTRACTOR TO CONNECT TO 4" ROOF DRAIN (1.5' MN. BELOW FS)

EXISTING UTILITY NOTES

- THE EXISTING UTILITIES SHOWN ON THE PLAN ARE BASED ON AVAILABLE RECORDS. THE CONTRACTOR MUST FIELD DETERMINE THE LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO ANY CONSTRUCTION. REPORT DISCREPANCIES AND POTENTIAL CONFLICTS WITH PROPOSED UTILITIES TO ENGINEER PRIOR TO INSTALLATION OF ANY PIPING.
- ALL SHUT DOWN OF EXISTING WATER MAIN TO BE DONE BY AND COORDINATED WITH THE CITY UTILITY DIVISION. CONTRACTOR SHALL NOTIFY ALL AFFECTED WATER USERS 72 HOURS IN ADVANCE OF SHUT DOWN.

GENERAL NOTES

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3. FOR TRENCHING, PIPE BEDDING & ROADWAY PAVEMENT REPAIRS DETAILS & SPECIFICATIONS, TRENCH AND BACKFILL PER EMWD STANDARDS AND SPECIFICATIONS.
4. STUB POINT OF CONNECTION 5' FROM BUILDING. REFER TO MEP PLAN FOR CONTINUATION OF BUIDING.
5. CONTRACTOR TO MAINTAIN A VERTICAL SEPARATION OF A MINIMUM OF 1-FOOT FOR ALL UTILITY CROSSINGS SHOWN ON THIS PLAN PER DETAIL 2, SHEET 12.

811
Know what's below. Call before you dig.
DIAL TOLL FREE
811
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

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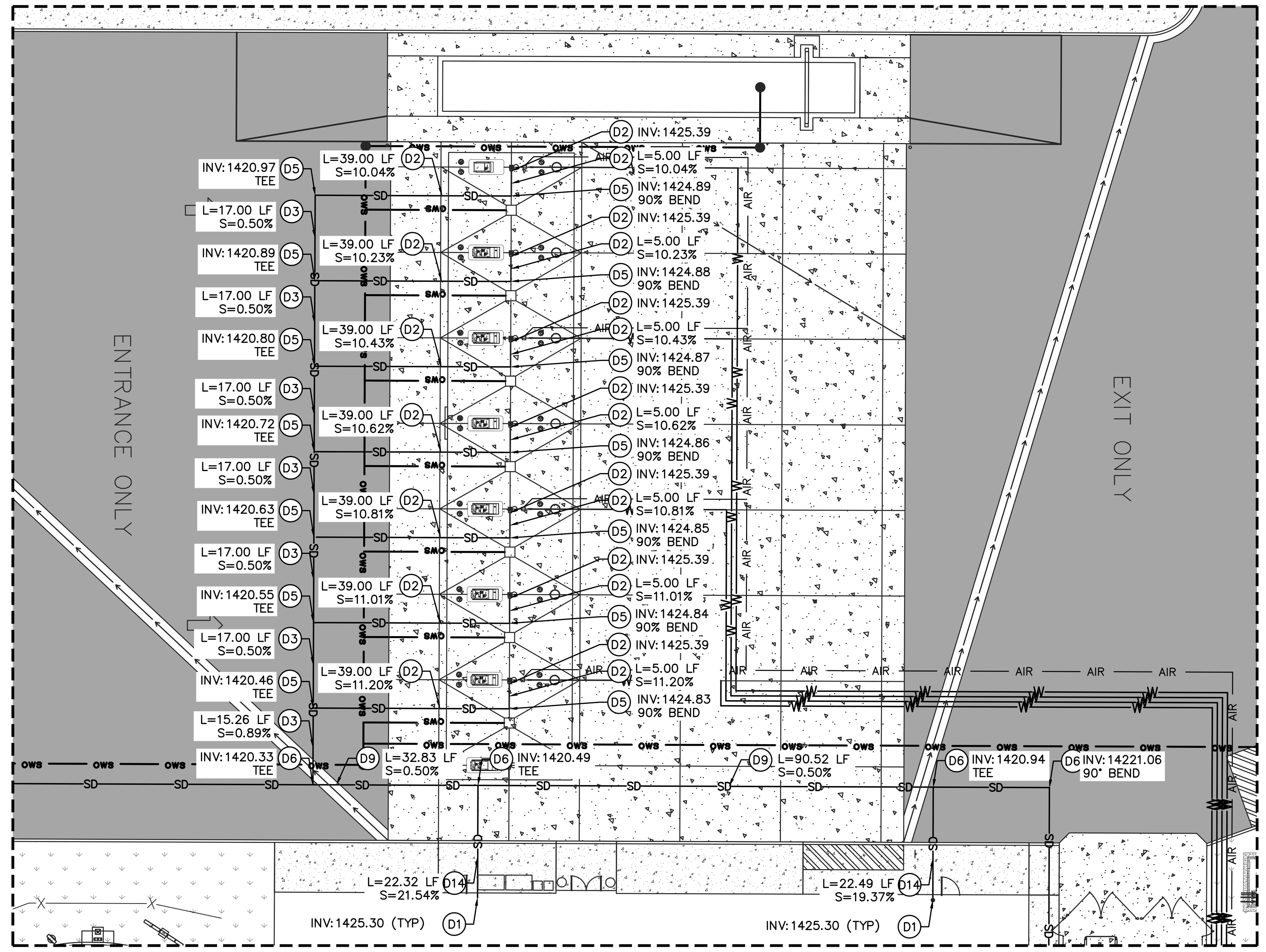
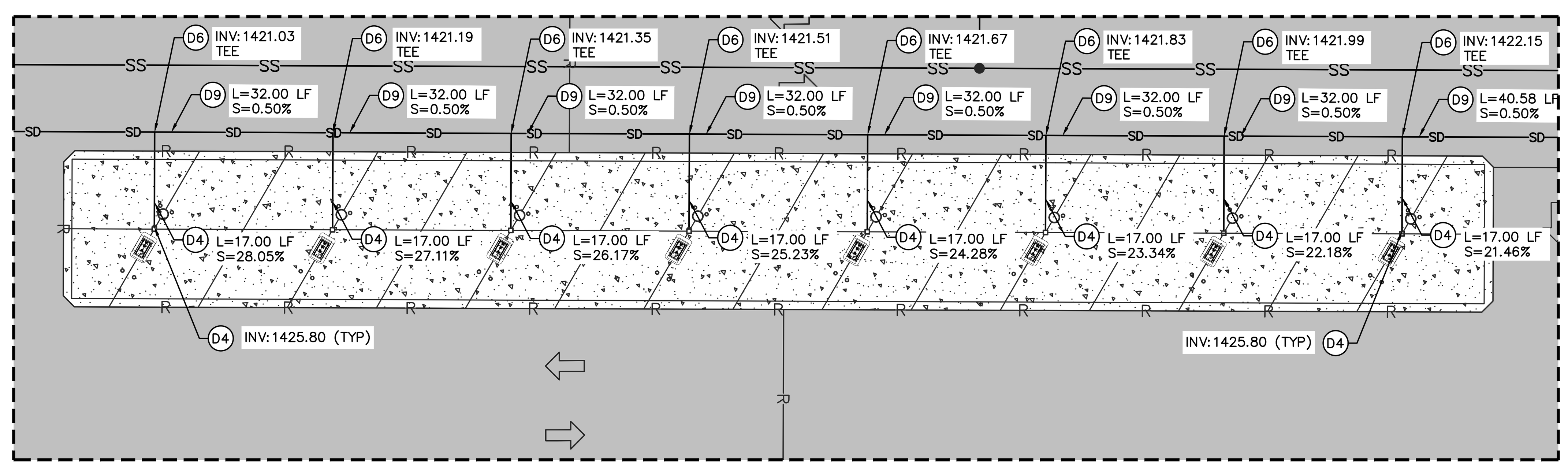


DETAIL 1
1"=20'



DETAIL 2
1"=20'

LEGEND

	PROPERTY LINE CIVIL
	LIMITS OF WORK
	CENTER LINE
	SETBACKS
	EASEMENT LINE
SS	PROPOSED SANITARY SEWER
SD	PROPOSED STORM DRAIN PIPE
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D8 INSTALL NYLOPLAST 12" DRAIN BASIN WITH SUMP INSERT 2' BY 2' ROAD & HIGHWAY GRATE INLET WITH FLEXSTORM PERMANENT USE PURE INLET PER DETAIL X AND X ON SHEET X

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APN: 329-250-011 & 329-250-012

PROJECT NUMBER: 095426010

FILE NO.:

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

WQMP Project Report

County of Riverside Stormwater Program

Santa Ana River Watershed Geodatabase

Monday, August 16, 2021

Note: The information provided in this report and on the Stormwater Geodatabase for the County of Riverside Stormwater Program is intended to provide basic guidance in the preparation of the applicantï¿½s Water Quality Management Plan (WQMP) and should not be relied upon without independent verification.

Project Site Parcel Number(s):	329250012, RW, 329250011, 329250009
Latitude/Longitude:	33.744, -117.1866
Thomas Brothers Page:	
Project Site Acreage:	14.52
Watershed(s):	SANTA ANA
This Project Site Resides in the following Hydrologic Unit(s) (HUC):	**HUC Name** - HUC Number **Perris Valley-San Jacinto River** - 180702020306
The HUCs Contribute stormwater to the following 303d listed water bodies and TMDLs which may include drainage from your proposed Project Site:	**WBID Name** - WBID Number **Canyon Lake (Railroad Canyon Reservoir)** - CAL8021100019990208151525 **Elsinore, Lake** - CAL8023100019990208151100
These 303d listed Water bodies and TMDLs have the following Pollutants of Concern (POC):	**Bacterial Indicators** - Pathogens **Nutrients** - Nutrients, Organic Enrichment/Low Dissolved Oxygen **Other Organics** - PCBs (Polychlorinated biphenyls) **Toxicity** - Sediment Toxicity, Unknown Toxicity
Is the Site subject to Hydromodification:	Yes
Limitations on Infiltration:	**Project Site Onsite Soils Group(s)** - C, D **Known Groundwater Contamination Plumes within 1000'** - No **Adjacent Water Supply Wells(s)** - No information available please contact your local water agency for more information. Your local contact agency is EASTERN MUNICIPAL W.D.. Your local wholesaler contact agency is METROPOLITAN WATER DISTRICT.
Environmentally Sensitive Areas within 200'(Fish and Wildlife Habitat/Species):	None
	None

Environmentally Sensitive Areas within 200'(CVMSHCP):	
Environmentally Sensitive Areas within 200'(WRMSHCP):	Burrowing Owl Survey Required Area
Groundwater elevation from Mean Sea Level:	1360
85th Percentile Design Storm Depth (in):	0.604
Groundwater Basin:	Perris-South
MSHCP/CVMSHCP Criteria Cell (s):	No Data
Retention Ordinance Information:	No Data
Studies and Reports Related to Project Site:	Comprehensive Nutrient Reduction Plan IBI Scores - Southern Cal bulletin118_4-sc water_fact_3_7.11 8039-SAR-Hydromodification Romoland MDP West San Jacinto GW Basin Management Plan Homeland/Romoland ADP Map

United States Department of Agriculture

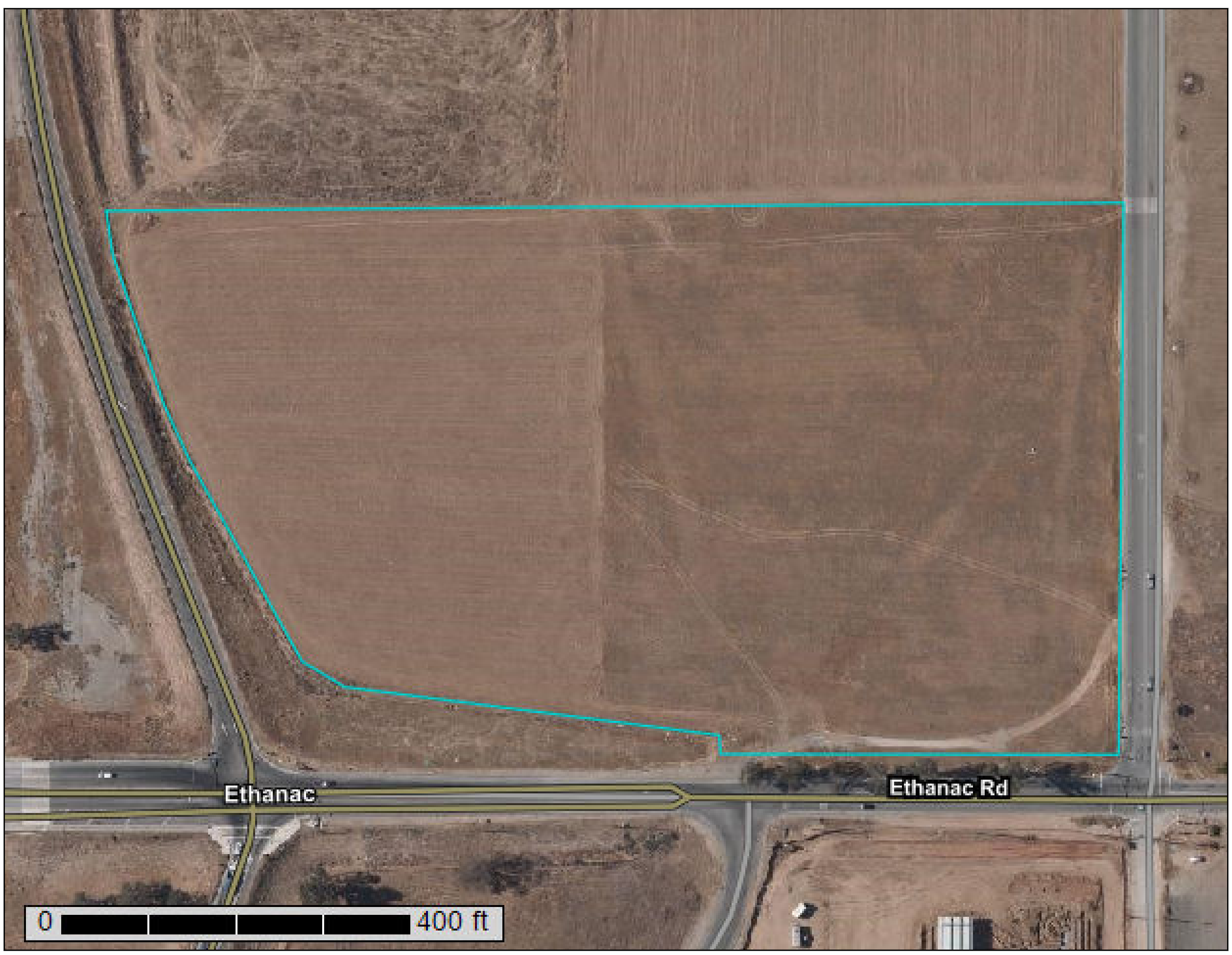
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Western Riverside Area, California



August 16, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:1,950 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 25, 50, 100, 150

Feet: 0, 50, 100, 200, 300

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 13, May 27, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 25, 2019—Jun 25, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
EnA	Exeter sandy loam, 0 to 2 percent slopes	0.5	3.3%
MaA	Madera fine sandy loam, 0 to 2 percent slopes	14.0	96.7%
Totals for Area of Interest		**14.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Western Riverside Area, California

EnA—Exeter sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hctg
Elevation: 20 to 700 feet
Mean annual precipitation: 7 to 20 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 250 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Exeter and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Exeter

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 16 inches: sandy loam
H2 - 16 to 37 inches: sandy clay loam
H3 - 37 to 50 inches: indurated
H4 - 50 to 60 inches: stratified sandy loam to silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 20 to 40 inches to duripan
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: C
Ecological site: R019XD029CA
Hydric soil rating: No

Minor Components

Greenfield

Percent of map unit: 4 percent
Hydric soil rating: No

Ramona

Percent of map unit: 4 percent
Hydric soil rating: No

Monserate

Percent of map unit: 4 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 3 percent
Hydric soil rating: No

MaA—Madera fine sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hcwt
Elevation: 20 to 250 feet
Mean annual precipitation: 14 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 250 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Madera and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Madera

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 19 inches: fine sandy loam
H2 - 19 to 26 inches: clay
H3 - 26 to 37 inches: indurated
H4 - 37 to 62 inches: stratified coarse sandy loam to clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches; 20 to 40 inches to duripan

Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: R019XD061CA
Hydric soil rating: No

Minor Components

Unnamed, ponded

Percent of map unit: 3 percent
Landform: Depressions
Hydric soil rating: Yes

Monserate

Percent of map unit: 3 percent
Hydric soil rating: No

Chino

Percent of map unit: 3 percent
Hydric soil rating: No

Exeter

Percent of map unit: 3 percent
Hydric soil rating: No

Willows

Percent of map unit: 3 percent
Hydric soil rating: No

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GEOTECHNICAL ENGINEERING PERCOLATION / INFILTRATION TEST REPORT

TRAVEL PLAZA
PERRIS

AT

CORNER OF TRUMBLE ROAD & ETHANAC ROAD
PERRIS, CALIFORNIA

PREPARED FOR:

BROADBENT, INC.
8 WEST PACIFIC AVENUE
HENDERSON, NEVADA 89015

PROJECT NO: G-5908-08

JUNE 11, 2021

GEOTECHNICAL SOLUTIONS, INC.
GEOTECHNICAL & ENVIRONMENTAL ENGINEERING

June 11, 2021

Project: G-5908-08

BROADBENT, INC.
8 West Pacific Avenue
Henderson, Nevada 89015

Attention: Mr. Mark E. Kazelskis, PG, CHG, CEM
Principal Geologist

Via Email: mkazelski@broadbentinc.com

Re: Geotechnical Engineering Percolation / Infiltration Report
Travel Plaza - Perris
Corner of Trumble Road & Ethanac Road
Perris, California 92570

Gentlemen:

Per your authorization, we have performed our geotechnical engineering field percolation tests to evaluate the subgrade percolation and infiltration rate at the referenced Travel Plaza - Perris site located at the corner of Trumble Road and Ethanac Road, just west of Trumble Road, Perris, San Bernardino County, California. Proposed development consists of improving or incorporating Storm Water Permanent Best Management Practice (BMP).

The accompanying geotechnical engineering report presents the results of our field borings, sampling of subgrade material, field percolation tests, reviewing site plan, performing laboratory tests, analyzing field and laboratory data and our conclusions and recommendations for the project.

Our services were performed using the standard of care ordinarily exercised in this locality, at the time when the report was prepared.

The investigation was made in accordance with generally accepted geotechnical engineering principles and procedures and included such field and laboratory tests considered necessary in the circumstances.

In the opinion of the undersigned, the accompanying report has been substantiated by data, observations, analysis, and opinions and presents fairly the design information requested by you.

This completes our scope of services for the initial design phase of the project. We have appreciated this opportunity to be of service to you on this project.

Respectfully Submitted,

Geotechnical Solutions, Inc.

Dharma Shakya, PhD, PE, GE
Principal Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
DHARMA R. SHAKYA
No. GE 2773
GEOTECHNICAL
STATE OF CALIFORNIA

Abraham S. Baha, PE, MASCE
Sr. Principal

REGISTERED PROFESSIONAL ENGINEER
ABRAHAM S. BAHA
No. C053067
CIVIL
STATE OF CALIFORNIA

Distribution: (3 +pdf) Addressee

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Introduction

Geotechnical Solutions, Inc. (GSI) has performed field investigations including borings and sampling of earth material and field percolation tests at the proposed locations as shown on Plot Plan & Percolation Tests Location Map (Plate B in Appendix A) at Travel Plaza, Perris, California.

The main purpose of this study is to provide infiltration rates of subgrade material based on field percolation tests so that an appropriate system incorporating Storm Water permanent best management practice (BMP) to manage surface water into the ground and the appropriate infiltration basin or any other approved system may be designed and existing drainage be improved.

Field Exploration

Field exploration consisted of drilling two borings for percolation tests, B-1 (PC-1) and B-2 (PC-2), 8-inches in diameter and extended to 10-feet below existing ground as shown on Plot Plan and Percolation Tests Location Map (Plate B).. The percolation test logs are presented on Plates D-1 and D-2 in Appendix A.

The attached logs tabulate data based on laboratory classification tests and visual observation by the field engineer at the site. During drilling bulk samples of earth material obtained for further laboratory test.

Groundwater

Groundwater was not encountered in any of our borings. Also, in accordance with the available groundwater well maps data, http://wdl.water.ca.gov/water_data_library, historical high groundwater level as shown on Plates C-1 and C-2 presented in Appendix A are much deeper than 50 feet. The potential for ground water to rise to the ground surface in the site area is considered very unlikely.

Laboratory Testing

Laboratory testing was programmed following a review of the field investigation data to be evaluated. Tests included physical testing to determine soil characteristics and selective tests. Test results are presented in Appendix A.

Mechanical Analysis (ASTM D-422)

Mechanical analyses by the hydrometer test method were performed to confirm field classifications. Test results are as follows:

Test Hole No.	Sample Depth (ft)	Sand Percent	Silt Percent	Clay Percent
B-1 (PC-1)	10.0	89	7	4
B-2 (PC-2)	10.0	90	8	2

Field Percolation Tests

We performed field percolation tests at B-1 (PC-1) and B-11 (PC-2) locations as shown on Plot Plan and Percolation Tests Location Map (Plate B). The percolation test procedure performed in accordance with the current acceptable method for shallow percolation test (less than 10 feet) by qualified personnel under the supervision of registered geotechnical engineer as per Technical Guidance Document, Orange County Public Works.

- Borehole diameter was 8 inches.
- Bottom elevation of test holes correspond to bottom elevation of proposed retention basins which are proposed at 10-feet in depth below the ground surface in accordance with the following locations:

B-1 (PC-1) 10 feet below the ground surface

B-11 (PC-2) 10 feet below the ground surface

- The bottom of the test hole was covered with 2 inches of gravel prior to testing.
- Sides of the hole were not smeared after drilling and there was no caving.
- Holes were filled with clear water to appropriate depths from the ground surface (Minimum required is 5 x radius of the hole (5 x 4" = 20 inches) from the bottom.
- On these two locations, two consecutive measurements showed that less than 6 inches of water seeped away in 25 minutes test (Pre-Percolation Data Sheets, Plates 1 and 3 in Appendix B). Thus, pre-soaking overnight for about 24 hours was required.
- The tests were then run the next day for an additional 6-hours duration, measurements being taken every 30 minutes interval (Percolation Test Results).
- The drop that occurs during the final reading is used to calculate the percolation and then infiltration rate.
- Field Percolation Tests for both PC-1 and PC-2 are presented as Plate 2 and 4 in Appendix B.
- Infiltration calculations (Porchet Method) are shown on Plates 5 and 6 and presented in Appendix C.
- Infiltration results using another method, Reduction Factor Method, Rf are presented on Plates 7 and 8 in Appendix D.
- Measurements were taken with a precision of 0.25 inches or better.
- All the field percolation tests are tabulated and are presented in Appendix B.
- The holes were backfilled with soil cuttings.

Percolation Rate Evaluation

To evaluate the percolation rates, testing was performed by filling the borehole with water and observing the rate of water drop from the fixed reference point on the ground surface. The depths of water drop for every 30 minutes intervals were noted and tabulated and plotted as shown on Plates 2 and 4, respectively for PC-1 and PC-2 in Appendix B.

Percolation rate, k can be correlated with the data in the form of the straight line equation as shown below:

$$t/R = b + kt$$

Where, t = average time in minutes

R = Δt / d

Δt = Time Interval, minutes

d = drop in inch = R1 – R2

R1 = Initial Readings, inch

R2 = Final Readings, inch

k = Percolation Rate inch/minute

R = 1/k at equilibrium rate

t/R is plotted against t as shown on the plots (Plates 2 and 6 for B-1 (PC-1) and B-11 (PC-2), respectively) and the regression analyses were performed to interpolate the data obtained in the field. Straight line interpolation gives the slope as a percolation rate, k.

Results of the Tests

The results obtained from the analyses are as follows:

1. Near surface material consisted of mainly Clayey to Silty Sand (SC/SM), dry to slightly moist, firm, light brown in color having dense to very dense in consistency.

2. Around and below 10 feet, the subgrade materials consisted mainly of the sandy material, Sand (SP) with some gravel, slightly moist to moist, dark brown to gray in color having dense to very dense in consistency.

3. Field Percolation tests were performed at 10-feet depth for both B-1 (PC-1) and B-11 (PC-2) and the results are tabulated as shown on the Table-1 below:

TABLE – 1
Percolation Test Results

Location	Coefficient of Permeability, k			
	Inch/minute	Cm/sec	**Inch/hour Average**	**Inch/hr** based on last 30 Minutes Reading
B-1 (PC-1)	**0.0135**	**6.0 x E-04**	**0.81**	**1.0**
B-11 (PC-2)	**0.0206**	**9.0 x E-04**	**1.236**	**1.5**
Average	**0.0171**	**7.5 x E-04**	**1.023**	**1.25**
		Average:	**1.137 inch/hour**	

4. Based on the data presented in this report and the testing information accumulated, it is our judgment that the percolation rate is an average of 1.137 inch per hour. It takes about **53 minutes to percolate 1 inch**. This conclusion regarding percolation rate is based on the results of our field exploration and testing.

5. General range of permeability for some of the subgrade soils are as follows:

Type of Soil	Permeability (Cm/Sec)
Medium to coarse gravel	> 10^{-1}
Coarse sand to fine sand	between $1x10^{-1}$ to $1x10^{-3}$
fine sand and silty sand	between $1x10^{-3}$ to $1x10^{-5}$
silt, clayey silt or silty clay	between $1x10^{-4}$ to $1x10^{-6}$
Clays	$1x10^{-7}$ or less

Since the percolation rate average is **7.5 x E-04 Cm/Sec**, it falls into **fine Sand and silty Sand category** as tabulated above.

As per Technical Guidance Document, Infiltration rate, I_t is calculated based on Percolation Rate Conversion using Porchet Method, aka Inverse Borehole Method.

The bottom of the proposed infiltration basin would be at 10-feet below the existing ground surface. Percolation tests were performed with the depth of the test hole set at the infiltration surface level (bottom of basin).

After the minimum required number of testing intervals, the test was complete. The data collected at the final interval was used to calculate infiltration rates.

The calculations and the results are tabulated and presented on Plates 5 and 6 in Appendix C.

Location	**Percolation Rate inch/hour Based on Average Reading**	**Infiltration Rate Inch/hour Based on Porchet Method aka Inverse Borehole Method**
B-1 (PC-1)	0.810	0.0370

PC-2	1.236	0.0596
Average	**1.137**	**0.0483**

Using factor of safety of 2.0 for uncertainty and bias, **percolation test result is 0.5685 inch per hour** and **Infiltration Rate = 0.0242 "/ hour**, which is less than **0.3"/hour** as per the requirement in accordance with **TGD VII.2.**

Thus, it **does not meet** the standard criteria, hence **FAILED**.

Reduction Factor (R_f) Method

We have used Reduction Factor (R_f) Method which is another acceptable and approved method for calculating Infiltration Rate, I_f.

Infiltration Rates as calculated by this method have been tabulated on Plates 7 and 8 in Appendix D. The results are as follows:

Location	I_f Using (Reduction Factor Method) (inch/hour)
B-1 (PC-1)	0.0559
B-11 (PC-2)	0.0801
AVERAGE:	**0.068**
With FOS = 2	**0.034**
	< 0.3 inch/hour - "FAILED"

Conclusions

The subgrade soils consist entirely of very firm alluvial soils, mainly sand with some gravel, medium to coarse grained, dark brown to gray in color, dry to slightly moist to moist, dense to very dense and hard in consistency. Percolation tests performed at two locations, B-1 (PC-1) and B-11 (PC-2) at 10 feet depth did not meet the prescribed criteria.

Also, since the groundwater is very deep more than 50 feet, there is a room for the basin. However, infiltration rate at both locations indicated that it is much less than the required infiltration rate of 0.3 inch per hour (**TGD VII.2**), hence we conclude that the project is **not feasible.**

Additional Services

This office will be available for further consultation.

Closure

Based on the data presented in this report and the testing information accumulated, it is the judgment of the writers of this report that BMP infiltration system seems to be **not feasible** at these locations. The conclusions presented in this report are based on the results of our field exploration, percolation tests, infiltration tests, and other laboratory tests.

This report has been compiled for the exclusive use on the above referenced site, for the purpose stated above. It should not be transferred to or used by another party, or applied to any other project on this site, other than as described herein, without consent and/or thorough review by this office.

Geotechnical Solutions, Inc.

References

California Building Code, 2019, California Code of Regulations, Title 24, Volume 2 of Part 2.

California Department of Water Resources groundwater well data **http://wdl.water.ca.gov**.

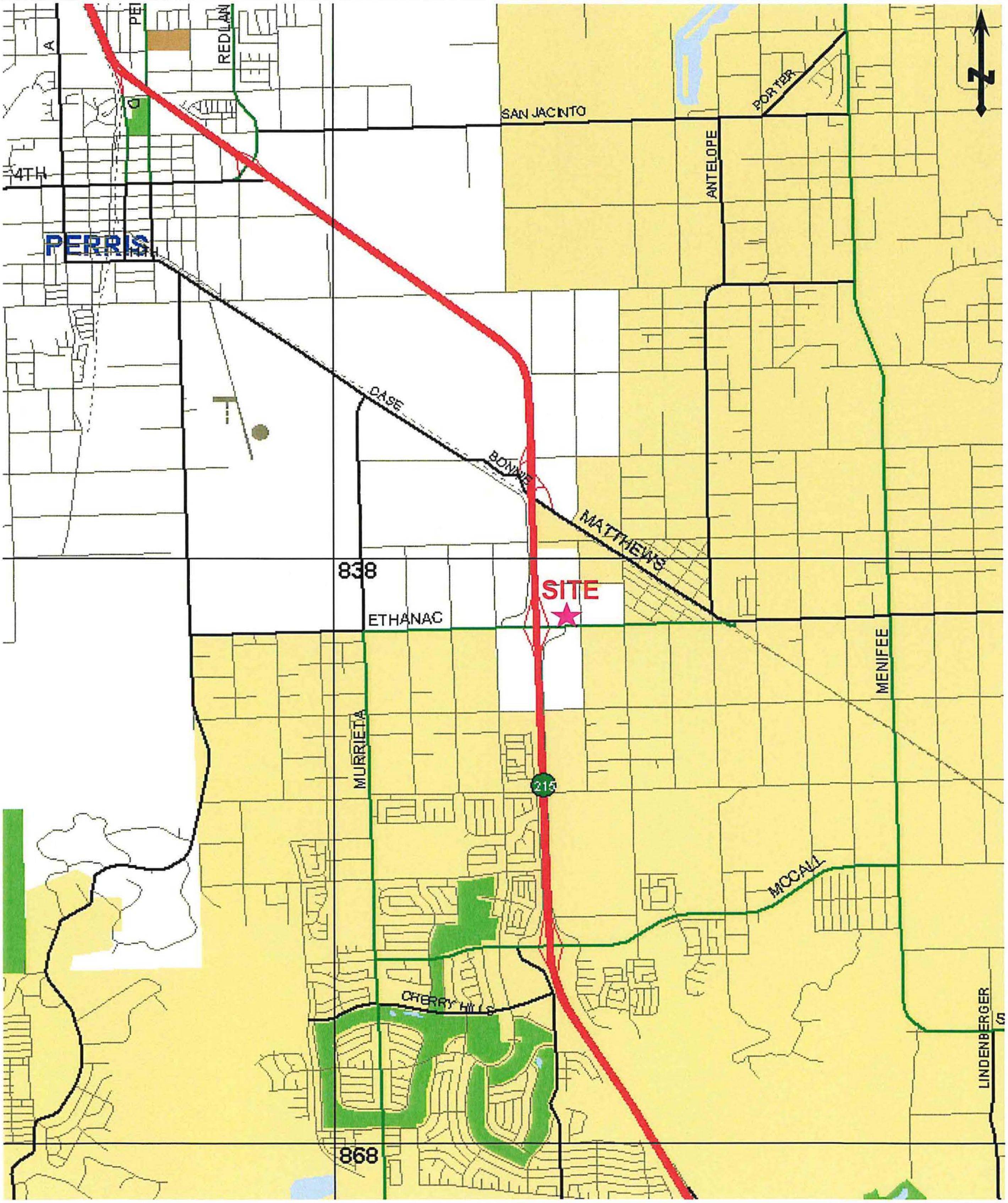
Orange County, Technical Guidance Document (TGD) for the Preparation of Conceptual / Preliminary and/or Project Water Quality Management Plans (WQMPs) dated December, 2013.

Appendix A

Plates:

- Vicinity Map
- Plot Plan & Percolation Tests Location Map
- Groundwater Map (Closest Well Data)
- Groundwater Map – Well Data
- Boring Logs, B-1 (PC-1) & B-11 (PC-2)

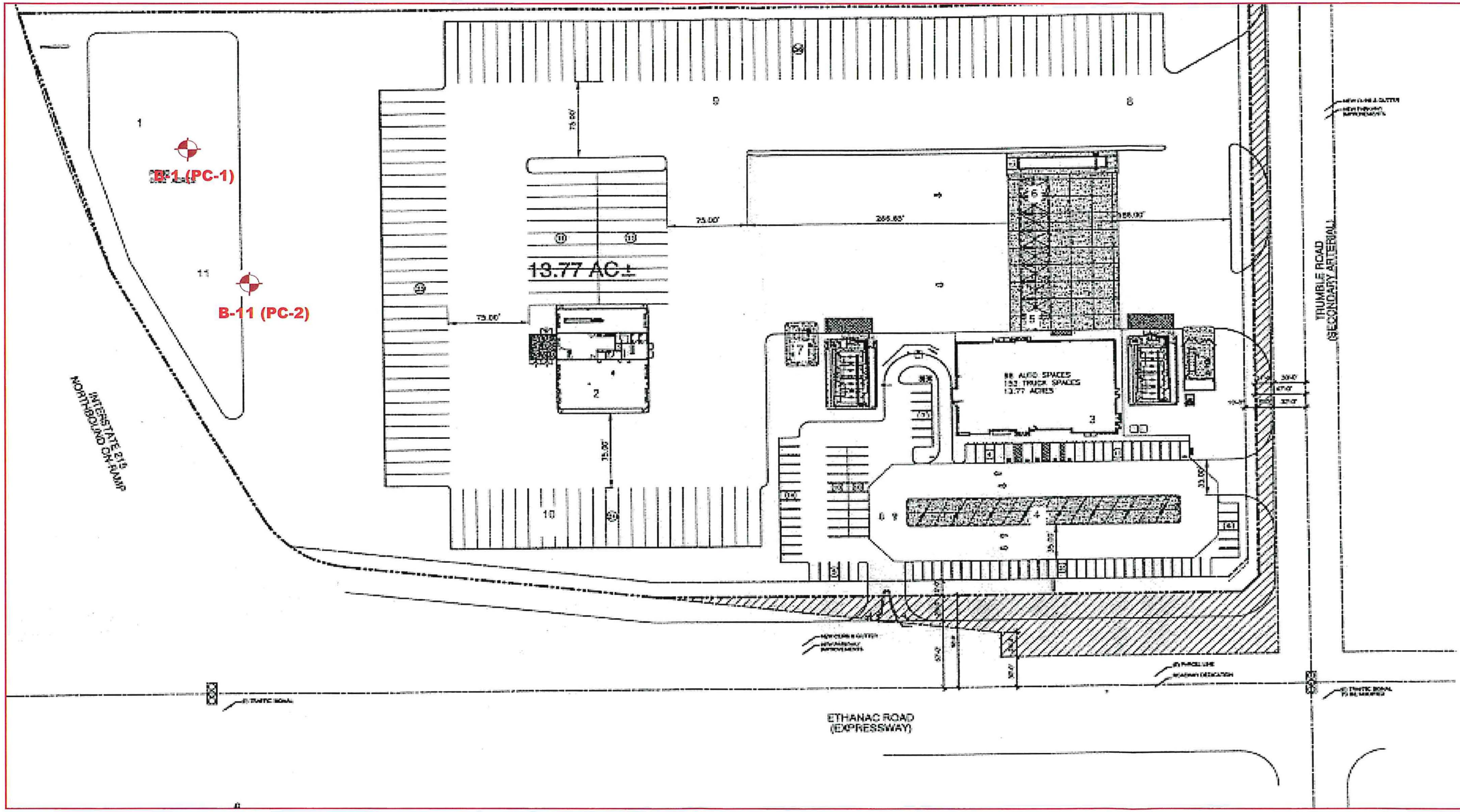
VICINITY MAP



Travel Plaza Perris - Percolation Tests	Project No.	G-5908-08
Corner of Trumble Road and Ethanac Road, Perris, California	Plate:	A

Geotechnical Solutions, Inc.

PLOT PLAN & PERCOLATION TEST LOCATIONS MAP



Percolation Tests

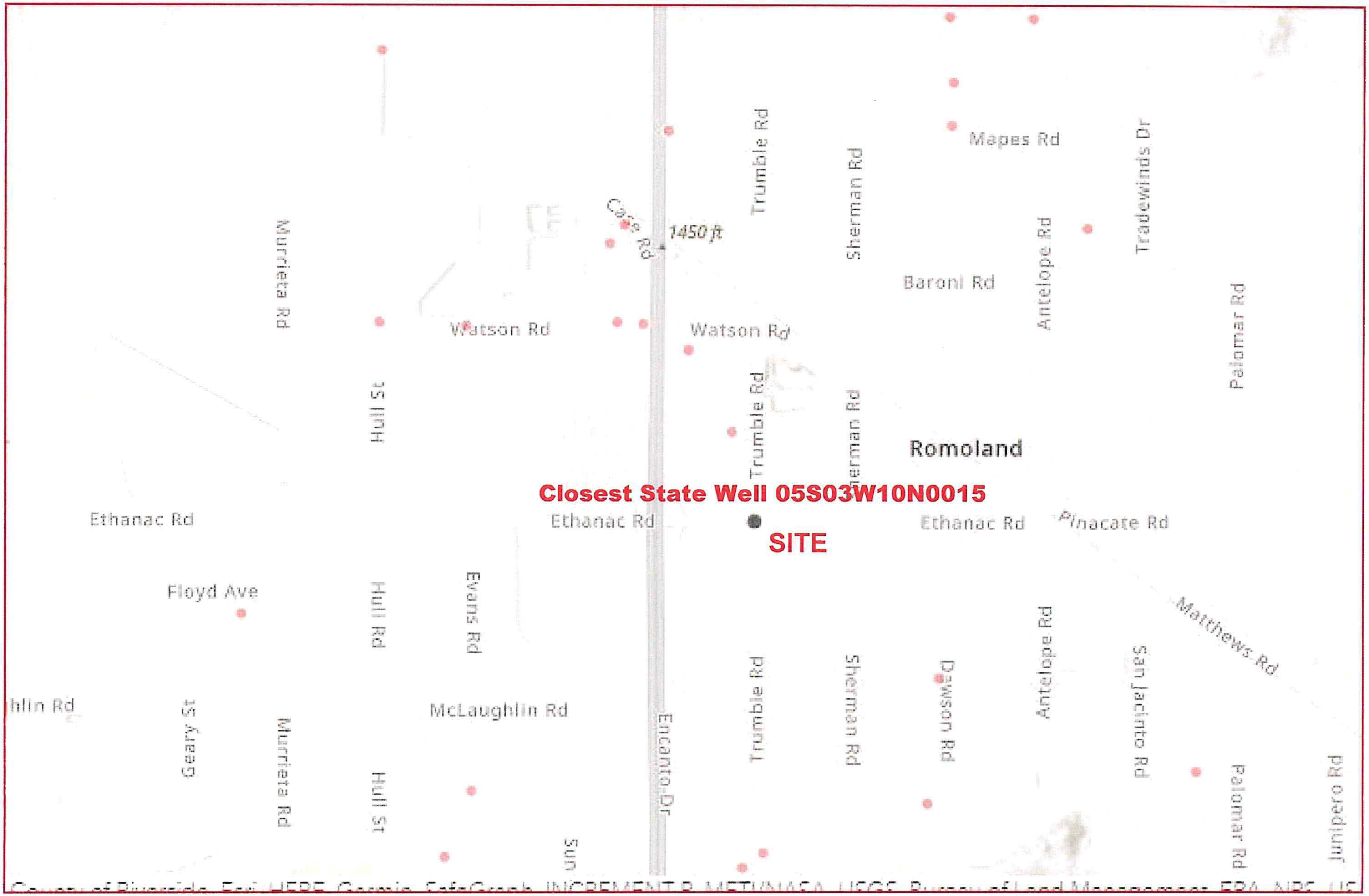
B-11 (PC-2)

Approximate Scale 1" = 100'

Travel Plaza Perris - Percolation Tests	Project No.	G-5908-08
Corner of Trumble Road and Ethanac Road, Perris, California	Plate:	B

Geotechnical Solutions, Inc.

GROUNDWATER MAP - CLOSEST WELL DATA



Travel Plaza - Perris		Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California		Plate:	C-1

Geotechnical Solutions, Inc.

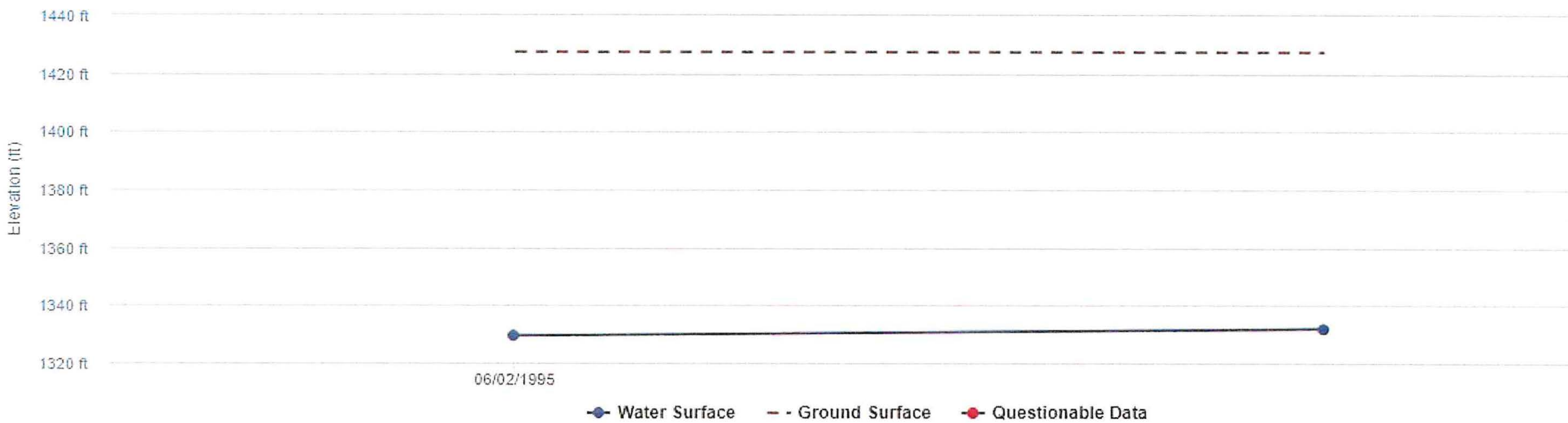
GROUNDWATER MAP - WELL DATA

Groundwater Level Report

Station 337464N1171859W001

Station Data   Groundwater Level Data

Groundwater Levels for Well 337464N1171859W001 **(Site Code)**



Measurement Date (PST)	Reference Point Elevation	Ground Surface Elevation	Distance from RP to WS	Groundwater Elevation	Ground Surface to Water Surface	Measurement Issue	Collecting Agency
06/02/1995 00:00:00	1427.490	1427.490	97.98	1329.51	97.98		Department of Water Resou...
09/13/1995 00:00:00	1427.490	1427.490	95.63	1331.86	95.63		Department of Water Resou...

Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	C-2

Geotechnical Solutions, Inc.

Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No.	B-1 (PC-1)
Project Location :	Corner of Ethanac Road and Trumble Road, Perris, CA		Plate No.	D-1
Project Number :	G-5908-08		Page 1 of	1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	10
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**Covered with dry weeds**				
			Bag #1				Older Alluvium: Silty Sand (SM), light brown, medium dense				
	2		C-1	19-54/6"		> 100	@2': Sand (SP), silty, light brown, slightly moist, very dense	6	127		
1421	5		C-2	20-50/6"		> 100	@5':Sand (SP), poorly graded, very dense, gray, slightly moist, medium to coarse grained	7	122		
1416	10						@10': Same as above			11	HD: 89 (SA) : 7(SI) : 4(CL)
							End of Boring = 10 feet 2" Gravel on Bottom Drilled for Percolation test No groundwater encountered No Caving Backfilled w/Cuttings after percolation test				
1411	15										
1406	20										
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

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Project :	Travel Plaza	LOG OF TEST HOLE	Borehole No. **B-11 (PC-2)**
Project Location :	Corner of Ethanac Road and Trumble Road, Perris, CA		Plate No. D-2
Project Number :	**G-5908-08**		Page 1 of 1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	10
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**Covered with dry grass**				
							Older Alluvium: Clayey Sand (SC), light brown, dry				
	2		C-1	32-50/6"		100	@2': Sand (SP), silty, light brown, slightly moist, very dense	6	122		
1421	5		C-2	31-50/6"		100	@5':Sand (SP), poorly graded, very dense, gray, slightly moist, medium to coarse grained	5	121		
1416	10						@10': Same as above			10	HD: 90 (SA) : 8(SI) : 2(CL)
							End of Boring = 10 feet 2" of Gravel on Bottom Drilled to 10 feet for Percolation Test Backfilled w/ cuttings after the Test				
1411	15										
1406	20										
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

Appendix B

Pre-Test & Percolation Test Results

- Pre-Test Percolation Data Sheet (PC-1)
- Percolation Test Result at Location PC-1
- Pre-Test Percolation Data Sheet (PC-2)
- Percolation Test Result at Location PC-2

PRE- PERCOLATION TEST DATA SHEET

Project:	Travel Plaza - Perris		Project No.:	G-5908-08		Date:	5/24/2021
Test Hole Number:		PC-1	Tested By:	BA/AB			
Depth of Test Hole, DT		10'	USCS Soil Classification:		Sand (SP)		
Test Hole Dimensions (inches)					Length	Width	
Diameter (if Round) =		8"	Sides (if Rectangular) =				
Sandy Soil Criteria Test *							
Trial No.	Start Time	Stop Time	Time Interval (Min)	Initial Depth to Water (in)	Final Depth to Water (in)	Change in Water Level (in)	Greater than or Equal to 6"? y/n
1	8:30 AM	8:55 AM	25	65	66.25	1.3	< 6"
2	8:55 AM	9:20 AM	25	66.25	67.50	1.25	< 6"

* If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute Intervals) with a precision of at least 0.25".

PERCOLATION TEST

Borehole No. **B-1 (PC-1)** Depth **120** inch

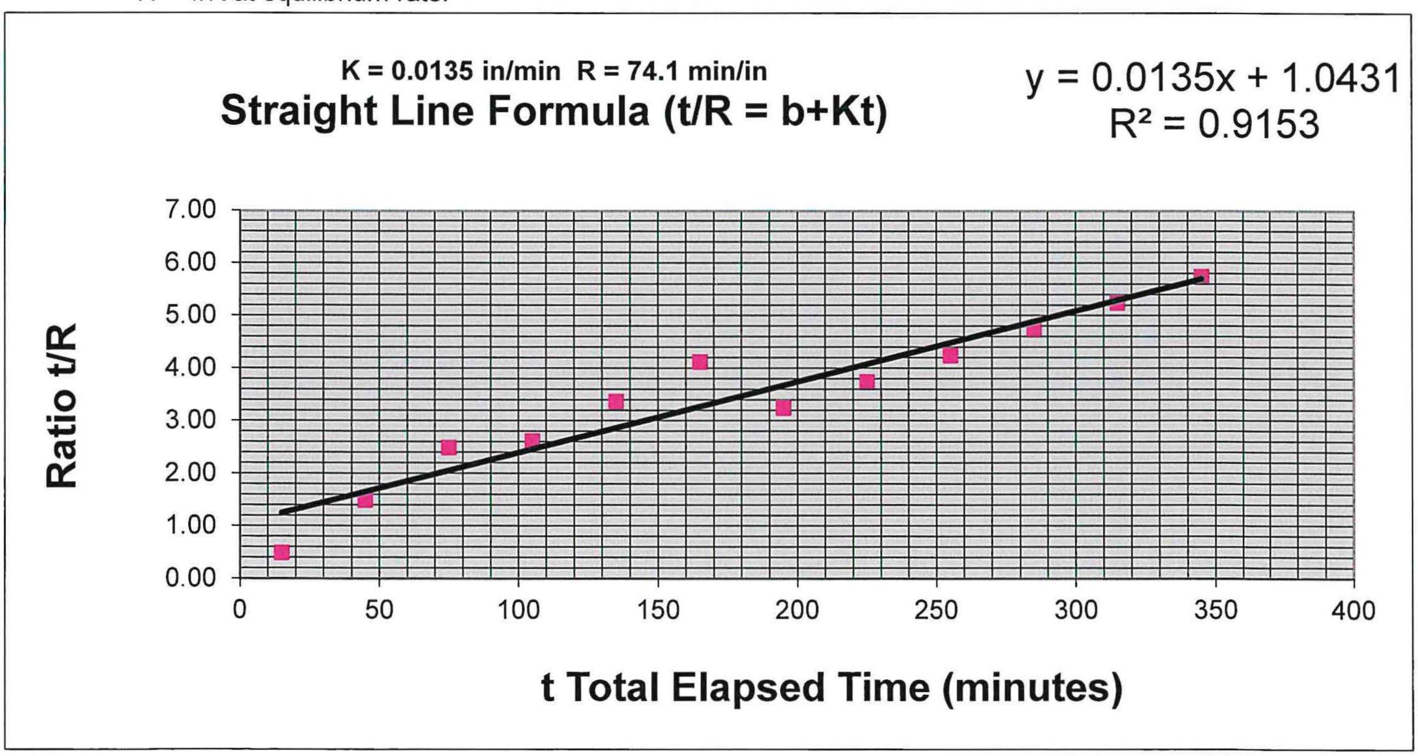
Date	Time of Reading	Δt (min.)	Total Elapsed Time (t)	Average t (minutes)	Reading R_1 (inches)	Reading R_2 (inches)	Drop d (inches)	R=Δt/d (min./in.)	t/R (in.)	k * 1000 (cm/s)
5/25/2021	9:30 AM	0	0							
	10:00 AM	30	30	15	60.00	61.00	1.00	30.00	0.50	1.4
	10:30 AM	30	60	45	61.00	62.00	1.00	30.00	1.50	1.4
	11:00 AM	30	90	75	62.00	63.00	1.00	30.00	2.50	1.4
	11:30 AM	30	120	105	63.00	63.75	0.75	40.00	2.63	1.1
	12:00 PM	30	150	135	63.75	64.50	0.75	40.00	3.38	1.1
	12:30 PM	30	180	165	64.50	65.25	0.75	40.00	4.13	1.1
	1:00 PM	30	210	195	65.25	65.75	0.50	60.00	3.25	0.7
	1:30 PM	30	240	225	65.75	66.25	0.50	60.00	3.75	0.7
	2:00 PM	30	270	255	66.25	66.75	0.50	60.00	4.25	0.7
	2:30 PM	30	300	285	66.75	67.25	0.50	60.00	4.75	0.7
	3:00 PM	30	330	315	67.25	67.75	0.50	60.00	5.25	0.7
	3:30 PM	30	360	345	67.75	68.25	0.50	60.00	5.75	0.7

Plot: t/R as ordinate vs. 't' as abscissa; tanOC = K.

R_1 = Vertical distance from reference point to water level after refilling at beginning of increment period.

R_2 = Vertical distance from reference point to water level at the end of increment period.

R = 1/K at equilibrium rate.



Travel Plaza Perris - Percolation Tests	Project:	G-5908-08
Corner of Trumble Road and Ethanac Road, Perris, California	Plate:	2

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PRE - PERCOLATION TEST DATA SHEET

Project:	Travel Plaza - Perris		Project No.:	G-5908-08		Date:	5/24/2021
Test Hole Number:		PC-2	Tested By:	BA/AB			
Depth of Test Hole, DT		10'	USCS Soil Classification:				
Test Hole Dimensions (inches)					Length	Width	
Diameter (if Round) =		8"	Sides (if Rectangular) =				
Sandy Soil Criteria Test *							
Trial No.	Start Time	Stop Time	Time Interval (Min)	Initial Depth to Water (in)	Final Depth to Water (in)	Change in Water Level (in)	Greater than or Equal to 6"? y/n
1	9:35 AM	10:00 AM	25	65	67.0	2	< 6"
2	10:00 AM	10:25 AM	25	67	69.0	2	< 6"

* If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute Intervals) with a precision of at least 0.25".

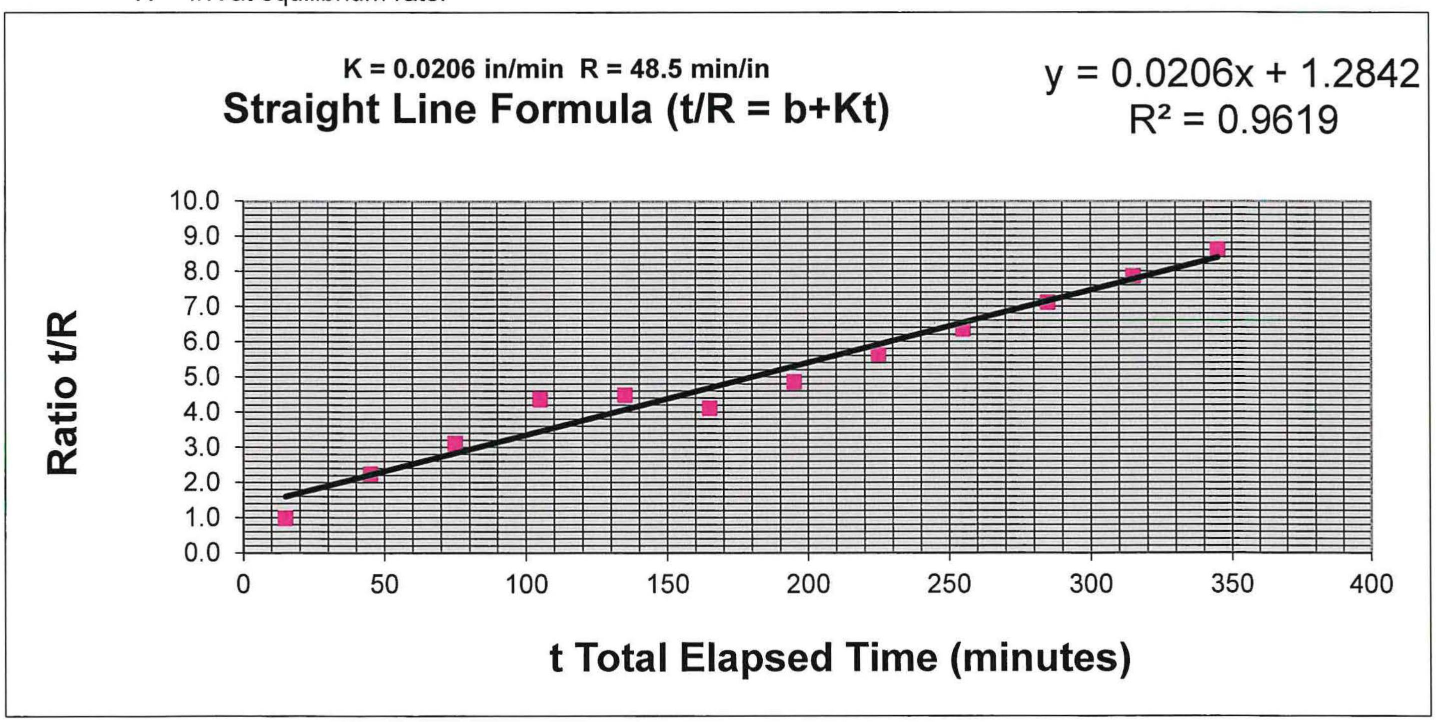
PERCOLATION TEST										
	Borehole No. B-11 (**PC-2**)						Depth	**120**	inch	
Date	Time of Reading	Δt (min.)	Total Elapsed Time (t)	Average t (minutes)	Reading R_1 (inches)	Reading R_2 (inches)	Drop d (inches)	$R=\Delta t/d$ (min./in.)	t/R (in.)	k * 1000 (cm/s)
5/25/2021	9:40 AM	0	0							
	10:10 AM	30	30	15	60.00	62.00	2.00	15.00	1.00	2.8
	10:40 AM	30	60	45	62.00	63.50	1.50	20.00	2.25	2.1
	11:10 AM	30	90	75	63.50	64.75	1.25	24.00	3.13	1.8
	11:40 AM	30	120	105	64.75	66.00	1.25	24.00	4.38	1.8
	12:10 PM	30	150	135	66.00	67.00	1.00	30.00	4.50	1.4
	12:40 PM	30	180	165	67.00	67.75	0.75	40.00	4.13	1.1
	1:10 PM	30	210	195	67.75	68.25	0.75	40.00	4.88	1.1
	1:40 PM	30	240	225	68.25	69.00	0.75	40.00	5.63	1.1
	2:10 PM	30	270	255	69.00	69.75	0.75	40.00	6.38	1.1
	2:40 PM	30	300	285	69.75	70.50	0.75	40.00	7.13	1.1
	3:10 PM	30	330	315	70.50	71.25	0.75	40.00	7.88	1.1
	3:40 PM	30	360	345	71.25	72.00	0.75	40.00	8.63	1.1

Plot: t/R as ordinate vs. 't' as abscissa; tanOC = K.

R_1 = Vertical distance from reference point to water level after refilling at beginning of increment period.

R_2 = Vertical distance from reference point to water level at the end of increment period.

R = 1/K at equilibrium rate.



Travel Plaza Perris - Percolation Tests	Project:	G-5908-08
Corner of Trumble Road and Ethanac Road, Perris, California	Plate:	4
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Appendix C – Infiltration Rates

Infiltration Rate I_f Calculations

- PC-1
- PC-2

Percolation Rate Conversion
Infiltration Rate, I_t
Porchet Method, aka Inverse Borehole Method

Travel Plaza - Perris
Project No: G-5908-08

<u>Percolation Test PC-1</u>

As per Test Result, Average Percolation Rate = 0.0135 inch/Min = 0.81 inch/hour

Data collected at the Final Interval analysed: 1.0 inch/hour

Time Interval, Δt	=	**30**	Minutes	Initial Depth to Water, D_0	=	**67.75**	Inches
Total Depth of Test Hole, D_t	=	**120**	Inches	Final Depth to Water, D_f	=	**68.25**	Inches
Test Hole Radius, r	=	**4**	Inches				

Initial Height of Water at the selected time interval, H_0	=	52.25	Inches	$(D_t - D_0)$
Final Height of Water at the Selected time interval, H_f	=	51.75	Inches	$(D_t - D_f)$
Change in Height over the time interval, ΔH	=	0.5	Inches	$(H_0 - H_f)$
Average Head Height over the time interval, H_{avg}	=	52	Inches	$(H_0 + H_f)/2$

Tested Infiltration Rate, I_t = $\Delta H (60 r) / ((\Delta t)(r + 2 H_{avg}))$ **in/hr**

Therefore, I_t = **0.037037 inch/hour**

I_t = **0.018519 inch/hour** **FS: 2**

< 0.3 inch/hour requirement
FAILED

Percolation Rate Conversion
Infiltration Rate, I_t
Porchet Method, aka Inverse Borehole Method

Travel Plaza - Perris
Project No: G-5908-08

Percolation Test PC-2

As per Test Result, Average Percolation Rate = 0.0206 inch/Min = 1.236 inch/hour

Data collected at the Final Interval analysed: 1.5 inch/hour

Time Interval, Δt	=	**30**	Minutes	Initial Depth to Water, D_0	=	**71.25**	Inches
Total Depth of Test Hole, D_t	=	**120**	Inches	Final Depth to Water, D_f	=	**72.00**	Inches
Test Hole Radius, r	=	**4**	Inches				

Initial Height of Water at the selected time interval, H_0	=	48.75	Inches	$(D_t - D_0)$
Final Height of Water at the Selected time interval, H_f	=	48	Inches	$(D_t - D_f)$
Change in Height over the time interval, ΔH	=	0.75	Inches	$(H_0 - H_f)$
Average Head Height over the time interval, H_{avg}	=	48.375	Inches	$(H_0 + H_f)/2$

Tested Infiltration Rate, I_t = $\Delta H (60 r) / ((\Delta t)(r + 2 H_{avg}))$ **in/hr**

Therefore, I_t = **0.0596 inch/hour**

I_t = **0.029777 inch/hour** **FS: 2**

< 0.3 inch/hour- FAILED

Appendix D

Infiltration Rates Using Reduction Factor Method R_f

- PC-1
- PC-2

REDUCTION FACTOR, R_f							
Project:	Travel Plaza - Perris		Project No.:	G-5908-08		Date:	5/25/2021
Test Hole Number:		PC-1	Tested By:	BA/AB			
Depth of Test Hole, DT		10'	Initial Water Depth (Inches)		67.75		
Test Hole Dimensions (inches)						Length	Width
Diameter (if Round), Dia =		8	Sides (if Rectangular)		=		

Percolation Test	Pre-Adjusted Percolation Rate, in/hr	Initial Depth to Water, **d1** (in)	Water level Drop, Δ**d** (in)	R_f	I_f
PC-1	1	67.75	0.5	17.88	0.0559

The average drop of the stabilized rate over the last three consecutive readings is the pre-adjusted percolation rate at the test location in inches per hour.

The pre-adjusted percolation rate must be reduced to account for the discharge of water from both the sides and bottom of the boring (non-vertical flow).

Use the Formula: Reduction Factor, $R_f = [(2d1 - \Delta d) / Dia] + 1$ where d_1 = Initial water Depth, in

Δd = Water level drop of Final Period or Stabilized Rate (in)

REDUCTION FACTOR, R_f

Project:	Travel Plaza - Perris		Project No.:	G-5908-08	Date:	5/25/2021
Test Hole Number:		PC-2	Tested By:	BA/AB		
Depth of Test Hole, DT		10'	Initial Water Depth (Inches)		71.25	
Test Hole Dimensions (inches)					Length	Width
Diameter (if Round), Dia =		8	Sides (if Rectangular) =			

Percolation Test	Pre-Adjusted Percolation Rate, in/hr	Initial Depth to Water, **d1** (in)	Water level Drop, Δ**d** (in)	R_f	I_f
PC-2	1.5	71.25	0.75	18.72	0.0801

The average drop of the stabilized rate over the last three consecutive readings is the pre-adjusted percolation rate at the test location in inches per hour.

The pre-adjusted percolation rate must be reduced to account for the discharge of water from both the sides and bottom of the boring (non-vertical flow).

Use the Formula: Reduction Factor, $R_f = [(2d1 - \Delta d) / Dia] + 1$ where d_1 = Initial water Depth, in

Δd = Water level drop of Final Period or Stabilized Rate (in)

GEOTECHNICAL EVALUATION REPORT

TRAVEL PLAZA
PERRIS

AT

CORNER OF TRUMBLE ROAD & ETHANAC ROAD
PERRIS, CALIFORNIA

PREPARED FOR:

BROADBENT, INC.
WEST PACIFIC AVENUE
HENDERSON, NEVADA, 89015

PROJECT NO: G-5908-01

JUNE 11, 2021

PREPARED BY:

GEOTECHNICAL SOLUTIONS, INC.
GEOTECHNICAL & ENVIRONMENTAL ENGINEERING

Geotechnical Solutions, Inc.
Geotechnical, Structural & Environmental Engineering

AASHTO ACCREDITED

June 11, 2021

Project No: G-5908-01

Broadbent, Inc.
8 West Pacific Avenue
Henderson, Nevada, 89015

Attention: Mr. Mark E. Kazelskis, PG, CHG, CEM
Principal Geologist

Via Email: mkazelskis@broadbentinc.com

Re: Geotechnical Engineering Evaluation Report
Travel Plaza Perris
Corner of Trumble Road &
Ethanac Road
Perris, California

Gentlemen:

Submitted herewith is the report of the Geotechnical Engineering evaluation study conducted by this office for Perris Travel Plaza at the referenced vacant site.

The project site is located just northwest corner of Trumble Road and Ethanac Road Intersection, and east of Freeway 215 in Perris, San Bernardino County, California as shown on Vicinity Map (Plate A) and Google Map (Plate D).

Based on our study findings, it is our opinion that the site is suitable for the proposed development from a geotechnical-engineering standpoint, provided that the recommendations of this report are successfully implemented.

The closest known active faults capable of producing major earthquakes are the Elsinore (GI) (6.89 Mw) and Elsinore (W + GI) (7.27 Mw) faults, which are located approximately 9.56 miles (15.3 km) away from the project site.

The site does not lie within Alquist-Priolo Earthquake Fault Zone as designated by the California Geological Survey (CGS). The potential for direct surface fault rupture at the site is considered unlikely.

The investigation was made in accordance with generally accepted geotechnical engineering principles and procedures and included such field and laboratory tests considered necessary under the circumstances.

In the opinion of the undersigned, the accompanying report has been substantiated by mathematical and other data and presents fairly the design information requested by your organization.

Respectfully Submitted,

Geotechnical Solutions, Inc.

Dharma Shakya, PhD, PE, GE
Principal Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
DHARMA R. SHAKYA
No. GE 2773
GEOTECHNICAL
STATE OF CALIFORNIA

Abraham S. Baha, PE, M. ASCE
Sr. Principal

REGISTERED PROFESSIONAL ENGINEER
ABRAHAM S. BAHA
No. C053067
CIVIL
STATE OF CALIFORNIA

Distribution: (3+pdf) Addressee

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 Purpose and Scope

The primary objectives of this study were to explore subsurface conditions beneath the project site and evaluate the existing earth materials relative to foundation support and lateral pressure design factors, seismic conditions and earthquake-induced liquefaction potential.

In general, the study objectives were met by a visual reconnaissance of the site and vicinity, review of available tentative development plans, exploratory drilling and sampling of earth materials, laboratory testing, seismic evaluations, geologic hazards study, and engineering analysis. The general scope and objectives of the study were established in collaboration with the client/project team. Items considered in our study relevant to this site included the following:

- Near surface and subsurface soil types,
- Expansion potential,
- Settlement and hydro-collapse potential,
- Bearing capacity and Foundation Design Parameters,
- Slabs-on-grade,
- Lateral earth pressures,
- Drainage considerations,
- Temporary excavation support,
- Corrosion potential,
- Groundwater conditions,
- Likely excavation conditions,
- Seismic Conditions,
- Earthquake induced liquefaction potential,

- Pavements,
- Grading considerations, and
- Construction observation and testing considerations.

To address these, the following scope of work was executed:

1. Review of preliminary project plans, available documents, and coordination with the owner's representatives and project design professionals.
2. Site reconnaissance.
3. Evaluation of seismic conditions for the subject location.
4. Excavator and Backhoe drilling, sampling and logging twelve (11) test holes to investigate subsurface conditions.
5. Laboratory testing of soil samples obtained from subsurface explorations, to determine their physical and engineering properties.
6. Geotechnical analysis of the data obtained.
7. Developing conclusions and recommendations for foundation design.
8. Preparation of this report.

1.2 Project Description

Based on the information provided, the proposed Travel Plaza Perris will have total site area of 14.67 acres including 0.9 acre for the pond area and will consist mainly of constructing the Auto Fueling Island / Canopy, Truck Fueling Island / Canopy, Cat Scale, Aboveground (AST's) and underground (UST's) storage tanks, store building, shop building, pond area, and truck approaches at the location shown on Plot Plan and Boring Location Map (Plate B in Appendix A).

Also, the project consists of heavy-duty asphalt pavement for parking and driveways with some rigid concrete pavement sections to accommodate 98 auto parking and 135 truck parking.

1.3 Site Description and Topography

The project site is located just northwest of Trumble Road and Ethanac Road Intersection and just east of freeway 215 as shown on Vicinity Map (Plate A) and Google Map (Plate D) in Appendix A. At the time of our field exploration, the site was vacant and covered mostly with grass and weeds all around.

The site is relatively flat at an elevation of 1,426 feet above the sea level. No hilly terrain or drainage problems exist at the subject property.

1.4 Site Geologic Setting

The Peninsular Ranges province is one of the largest geomorphic units in western North America. Basically, it extends from the Tranverse Ranges geomorphic province and the Los Angeles Basin, roughly 900 miles south to the tip of Baja California. This province varies in width from about 30 to 100 miles. It is bounded on the west by the Pacific Ocean, on the south by the Gulf of California and on the east by the Colorado Desert Province. The Peninsular Ranges are essentially a series of northwest-southeast oriented fault blocks. Three major fault zones are found in this province. The Elsinore Fault zone and the San Jacinto Fault zones trend northwest-southeast and are found in the near the middle of the province. The San Andreas Fault zone borders the northeasterly margin of the province.

The Perris Block is a large mass of granitic rock generally bounded by the San Jacinto Fault, the Elsinore Fault, the Santa Ana River and a non-defined southeast boundary. The Perris Block has had a history of vertical land movements of several thousand feet due to shifts in the Elsinore and San Jacinto Faults. The primary source of strong seismic ground shaking in the project area is the Elsinore Fault Zone and San Jacinto Fault Zone. Other regional fault zone of significance that could affect the project area is the San Andreas. The Site Regional Geology Map is shown on the enclosed Plate D.

The site is underlain by alluvial soils over Cretaceous aged igneous rocks (Val Verde Tonalite). The materials encountered onsite generally consist of alluvial soils consist of dense to very dense silty sand to sand. The tonalite bedrock is grey in color and moderately weathered and becomes harder with depth. It should be noted that Special handling and coring could be required during the caisson excavation.

The most significant geologic hazard to the project is the potential for moderate to severe ground shaking resulting from earthquakes generated on the faults close to the site. The site is not located in an Alquist-Priolo Special Studies zone for earthquake rupture hazard. The potential for direct surface fault rupture in the project area is considered very low.

1.5 <u>Other Geologic Hazards</u>

Since the site is located in a relatively flat area, we do not consider landslides or other forms of natural slope instability to represent a hazard to the project. The site is not located near any impounded bodies of water therefore tsunamis and seiches are not considered a potential hazard to the project. The proposed project is an area of stable soil conditions with low shrink-swell potential; hence, no impact is anticipated.

In addition to possible strong earthquake ground motion at the site, the secondary effects of earthquake-induced liquefaction, and earthquake-induced landsliding, were considered. Guidelines for evaluating and mitigation seismic hazards in California (CGS, 2008, SP-117A) summarize procedures for evaluating the earthquake-induced landslide and liquefaction potential.

1.5.1 Earthquake-Induced Liquefaction

The site has not been evaluated for earthquake-induced liquefaction potential as per

California Geologic Survey (Plate F, Appendix A). Liquefaction is discussed in more detail in the proceeding sections.

1.5.2 Induced Flooding

The site lies far and/or high enough from the coast or large inland body of water to preclude the hazards of tsunami or seiche waves or inundation from the rupture of an up-gradient reservoir.

1.5.3 Eathquake-Induced Landsliding

The site has not been evaluated by California Geologic Survey (CGS) for earthquake-induced landsliding potential. Since the site is far enough from steep slopes, landsliding will be unlikely.

2.0 FIELD EXPLORATION

2.1 Scope

Hollow Stem auger was used to drill. Eleven (11) borings were drilled to get soil samples from the depths varying from 10- to 51.5-feet below the existing ground level in the proposed development areas. The Boring Logs, B-1 through B-11 are shown on the Plot Plan and Boring Location Map (Plate B) in Appendix A.

2.2 Drilling and Sampling Procedures

A continuous record of the materials encountered during the drilling was made by our field engineer and Log of all the borings are presented on Appendix A The lines designating the interface between soil strata on the log of Test Holes represent approximate boundaries. The transition between strata may be gradual. Undisturbed samples were secured at frequent intervals from various locations for laboratory testing.

Core samples and bulk samples were secured at frequent depth intervals for laboratory examination and testing. Both California standard ring samples (CA) and split spoon samples with Penetration test (SPT) blow counts were obtained for further evaluation. Disturbed bulk samples, representative of the surficial subgrade materials were also obtained.

The relative sampler penetration resistance (SPT) exhibited by the deposits sample is tabulated in the Blow per Foot column of the pertinent test hole log. Recorded blow counts for 12 inches of sampler penetration were generally indicative of medium to high shear resistance (140 pounds hammer at a 30-inch drop).

2.3 Field Tests and Measurements

The drilled holes were examined and logged in the field. Representative samples were obtained to classify the soils. The Unified Soil Classification System (USCS) was used to classify the soils. The soil classification symbols appear on the boring logs and are briefly described in Appendix A. Local and regional geologic characteristics were used to estimate the seismic design criteria.

In addition, relatively undisturbed California ring samples were obtained for laboratory testing. The attached logs tabulate data based on laboratory classification tests and visual observation by the field geologist at the site.

2.4 Standard Penetration Resistance

A sediment is considered to be susceptible to transformation to a fluid mass during a strong seismic event only if the packing of the grains (relative density) is relatively low. Sediments with high relative densities cannot reduce their total volume through the compactive effort induced by the ground shaking.

The number of blows necessary to drive a standard sampler (1½" I.D.)-12 inches into the individual stratum is a measurement of a specific property that has been correlated to relative density. The sampling (penetration) resistance offered by sediment from successive blows delivered by a 140-pound hammer falling 30 inches is counted. The number of blows to drive the standard sampler full 12 inches is recorded as the N-Value.

The on-site material yielded penetration resistance which indicates dense to very dense alluvial soils, fine to coarse grained, dry to slightly moist with trace of silt were encountered within the boring depth. The standard penetration resistances of the on-site materials at 5-feet intervals are presented on the boring logs (Appendix A).

3.0 LABORATORY TESTING AND SUMMARY METHODS

Laboratory testing was programmed following a review of field investigation data and after considering the various foundations, floor slabs, and grading elements to be evaluated. In general, this includes physical testing to establish foundation-bearing characteristics, and classification tests.

A. In-Place Moisture & Density (ASTM D2216 & D2937)

In-situ moisture content and density were determined for all the undisturbed core samples obtained during test boring drilling operations. Test results are tabulated on Plates I-1 through I-11, Log of Test Holes.

B. Mechanical Analysis (ASTM D-422)

The texture composition of a selected typical sample determined by the hydrometer test method was as follows:

Boring No.	Depth (Feet)	Percent Sand	Percent Silt	Percent Clay
B-2	0-3	72	10	18
B-7	0-3	61	17	22
B-8	0-3	56	22	22

B-9		0-3		68		12		20

C. Direct Shear (ASTM D-3080)

Direct shear test was performed on the representative sample of native soil and was considered most pertinent in the design of mat/ spread footings, and moderately deep pier. Tests were performed in the saturated condition at the field density. Individual test results are shown on Plate J.

D. Expansion (ASTM D-4829)

Expansion characteristics were determined by the Expansion Index test on a typical bulk sample considered to be generally representative of the near subgrade soils. Test results were as follows:

Test Boring No.	Moisture Content (%)	Dry Density (pcf)	Expansion Index	Remarks
B-8	8.6	115.2	18	Very Low Expansive

According to the test results, the underlying soils generally exhibit very low expansive potential.

E. Consolidation (ASTM D-2435)

Consolidation (load deformation) tests were performed on undisturbed samples at selected depths. Plotted test results are presented on Plates K, L, and M.

F. Chemical Sulfate Analysis (CAL 417-A Method)

Chemical sulfate analysis was performed on a representative sample by the CAL 417-A method. A soluble sulfate of 390 parts per million was indicated, which is negligible exposure to concrete, however we recommend using Type II Portland cement for the foundation elements in contact with the underlying soil.

G. R-Value Test (ASTM D-2844)

Representative samples of the subgrade soils were obtained and tested to determine the R-value. The material is thought to be typical and presumed to be representative of the subgrade soils. Testing was performed in general accordance with the latest revisions to the Department of Transportation, State of California, Material & Research Test Method No. 301. Pavement design recommendations are based on the latest Traffic Indices (TI's) and recently tested R-value.

An R-Value test was conducted on a representative sample of the near surface soil consisting of clayey sand with trace of silt. The specimens were tested in a state as near to full saturation as possible to simulate the condition the soil might attain at typical field density and under adverse moisture conditions. The R-Value for a representative soil was determined to be 30. Test results are as follows:

The R-Value for a representative soil was determined to be 40. Test results are as follows:

Test Number	Moisture @ Compaction (%)	Density (pcf)	Exudation Pressure (psi)	Stabilometer "R"-Value
a	7.4	120.5	200	37
b	7.1	122.0	350	42
c	6.7	123.8	450	47

* Interpolated 300 psi by Exudation , Rv = 40

4.0 SUBSURFACE DISCUSSION

4.1 General

The recommendations presented are based on entirely upon data derived from a limited number of samples obtained from widely spaced borings. The attached logs, B-1 through

B-11 presented in Appendix A are indicators of subsurface conditions only at the specific locations and times noted. This report assumes the uniformity of the geology and soil structure between the borings, however variations can and often do exist. Whenever there is any deviation, difference or change is encountered or becomes known, we should be contacted.

4.2 Material and Soil Conditions Summary

No appreciable artificial fill was encountered at the boring locations during the exploratory drilling. The upper and underlying natural soils are older alluvium, light brown to dark brown, dry to slightly moist, generally fine to coarse grained, medium dense to very dense, sand with gravel, and some rock fragments as well. A more detailed soil profiles are shown on Plates I-1 through I-11, Log of Test Hole (Appendix A).

4.3 Groundwater

Surface water on this site is the likely result of precipitation or surface run-off from surrounding sites. Overall site drainage is in a north and northwesterly direction. Provisions for surface drainage will need to be accounted for by the project civil engineer.

We recommend that all surface runoff should not be allowed to pond above or flow freely over adjacent slope surfaces. Collected water should be conveyed via a non-erosive device to a suitable storm drain system.

Groundwater was not encountered at a drilled hole depth of 51.5-feet during the field study. No springs or perennial stream flow in local drainages exist based on older topographic maps.

The nearest well, 05S03W10N0015 as shown on Closest Well Groundwater Data (Plate H-1) and groundwater well data (Plate H-2) indicated the highest groundwater elevation to be 1331.86 above mean sea level. The elevation of our project area is about 1,426 feet.

Thus we believe the historic groundwater depth was around 95-feet below the existing ground surface.

Groundwater is not anticipated to affect the site adversely. However, these observations reflect site conditions at the time of the investigation and do not preclude changes in local groundwater conditions, localized seepage due to variations in rainfall, heavy irrigation, damaged structure (pipes, etc.), or altered site drainage pattern(s).

Proper surface drainage is imperative to collect and convey any surface water off site to a suitable storm drain system.

4.4 Faulting and Seismicity

The project site is located in the highly seismic Southern California region within the influence of several fault systems that are considered to be active or potentially active. An active fault is defined by the State of California as a "sufficiently active and well-defined fault" that has exhibited surface displacement within the Holocene time (about the last 11,000 years).

A potentially active fault is defined by the State as a fault with a history of movement within Pleistocene time (between 11,000 and 1.6 million years ago).

No faults have been mapped trending towards or through the site area. The site area does not lie within an Alquist-Priolo Earthquake Fault Zone as designated by the California Geological Survey (CGS) (Hart, 1997). For this reason, the potential for direct surface rupture is considered unlikely.

4.4.1 Faults Close to the Site

USGS National Seismic Hazard Maps for Source parameters interactive query has been used to determine the closest fault to the site within 50 miles and has been tabulated on Table – 1 in Appendix B.

The closest known active faults capable of producing major earthquakes are the Elsinore (GI) and Elsinore (W + GI) Faults, which are both located approximately 9.56 miles (15.3 km) away from the project site. The Elsinore (GI) Fault has been assigned to 6.89 Mw magnitude and slip rate of 5 mm/year and Elsinore (W + GI) Fault has been assigned to 7.27 Mw magnitude and slip rate of N/A.

4.4.2 U.S.G.S. Earthquake Hazard Program

Latest Interactive U.S.G.S. Earthquake Hazard Program using Unified Hazard Tool has been utilized for Conterminous U.S. 2008 (v3.2.x) and peak ground acceleration.

Peak Horizontal Ground Acceleration for 10% probability of exceedance in 50 years i.e. return period of 475 years	0.4423g
Peak Horizontal Ground Acceleration for 5% probability of exceedance in 50 years i.e. return period of 975 years	0.5487g
Peak Horizontal Ground Acceleration for 2% probability of exceedance in 50 years i.e. return period of 2,475 years	0.6906g

Interactive **Hazard Curve** and **Uniform Hazard Response Spectrum** have been plotted and presented in Appendix B.

4.4.3 Seismic Factors

The following are the geotechnical parameters for earthquake design data in accordance with ASCE 7-16 and the latest CBC 2019. The details are presented in Appendix B:

Latitude: **33.7441^0** and Longitude: **-117.1658^0**

NO.	PARAMETERS	VALUES	REFERENCE
1	0.2-Second Mapped Spectral Response Accelerations, S_s **(MCE$_R$ Ground Motion)**	**1.428g**	ASCE 7-16
2	1-Second Mapped Spectral Response Accelerations, S_1 **(MCE$_R$ Ground Motion)**	**0.532g**	ASCE 7-16
3	Site Class	**D**	ASCE 7-16
4	Site Amplification Factor at 0.2 sec, F_a According to Section 11.4.4, F_a should not be less than 1.2	**1.0** **1.2**	ASCE 7-16 Use
5	Site Amplification Factor at 1.0 sec, F_v, however, according to Table 11.4.2, **F_v should be 1.77**	**Null** **1.77**	ASCE 7-16 Use
6	Site Modified Spectral Acceleration Value, S_{MS} $S_{MS} = F_a S_s = 1.2 \times 1.428 = 1.714$	**1.714g** **1.714g**	ASCE 7-16 Use
7	Site Modified Spectral Acceleration Value, S_{M1} $SM_1 = F_v S_1 = 1.77 \times 0.532 = 0.942$	**Null** **0.942g**	ASCE 7-16 Use
8	Numeric Seismic Design value at 0.2 sec SA, $S_{DS} = 2/3$ of $S_{MS} = 2/3 \times 1.714 = 1.143$	**1.143g** **1.143g**	ASCE 7-16 Use
9	Numeric Seismic Design value at 1.0 sec SA, $S_{D1} = 2/3$ of $SM_1 = 2/3 \times 0.942 = 0.628$	**Null** **0.628g**	ASCE 7-16 Use

Other seismic parameters are as follows:

Closest Fault Distance	9.56 miles (15.3 km)
Fault Name	Elsinore (GI) & Elsinore (W + GI) Faults
Earthquake Magnitude	6.89 M_w & 7.27 Mw
Slip Rate (mm/year)	5.0 & N/A
PGA_M Site Modified Peak Ground Acceleration	**0.600g**
5% Damped Design Spectral Acceleration at short period, S_{DS}	**1.143g**
5% Damped Design Spectral Acceleration at 1-sec period, S_{D1}	**0.628g**
Seismic Design Category	D
Risk Category	II
Soil Site Class	D

4.5 Design Values

Representative values were selected from the test data and other sources for design and is tabulated below:

Field Density	120 pcf
Expansion Index	0 & 18
Angle of Internal Friction (Ult/Peak)	32/33 & 34/35 deg.
Cohesion (Ult/Peak) Remolded	200/250 & 200/250 psf
Subgrade K-Value	100 pci

5.0 SITE CONSIDERATIONS

5.1 Site Preparation

5.1.1 General

It is our professional opinion that the proposed construction will not be subject to geologic hazard from settlement, slippage, or landslide, provided the recommendations of this report are incorporated into the proposed construction. It is also our opinion that the proposed construction will not adversely affect the geologic stability of the site or adjacent properties provided the recommendations contained in this report are incorporated into the proposed construction.

The validity of the conclusions contained in this report is based on compliance with the recommendations presented in this section. Any excavating, trenching, or disturbances that occur after completion of the earthwork must be backfilled, compacted and tested in accordance with the recommendations contained herein. If any unobserved and untested earthwork, trenching, or backfilling occurs, then the conclusions and recommendations in this report may not be relied on.

5.1.2 Site Clearing

Prior to grading, all grasses, bushes, shrubs and debris including construction materials should entirely be removed from the site and disposed of off-site. Existing any undesirable materials should also be removed and hauled off-site. Existing utilities (if Any) should be removed and relocated as required. Any construction debris or ant buried or other contaminated exposed during site clearance should be removed and hauled away from the site. The resulting excavation from any removal should be cleared of loose material then backfilled with compacted soil. Oversized rocks greater than 6 inches should be removed.

5.1.3 Excavation

Excavations into the on-site soils may encounter a variety of challenges for example, firm alluvium, gravels, some fragments of rocks etc. Caving on clean sands may be encountered. The contractor should be made responsible for designing and constructing stable, temporary excavations as required to maintain stability of the excavation sides. All excavations should be sloped or shored in the interest of safety following local and federal regulations including current OSHA excavation and trench safety standards.

Heavy equipment for breaking the very dense and firm alluvium may be required for the excavations for shallow foundations, drilled shafts, and utility trenches for the proposed construction. The speed and ease of excavation are dependent on the nature of the deposit, the type of equipment used, and the skill and experience of the equipment operator.

5.1.4 ASTs Pad Preparation

At the locations where Above Ground Storage tanks (ASTs) are located, proof-roll the exposed subgrade to observe for any loose or disturbed soils that may remain. Remove and replace any loose or disturbed soils prior to placing any additional fill materials required to reach the finished subgrade elevation.

5.1.5 Compliance

Recommendations for foundations and slabs-on-grade supported on compacted fills or prepared subgrade depend upon compliance with the **Site Preparation recommendations** and Recommended Earthwork Specifications in Appendix C.

To assess compliance, observation and testing should be performed under the direction of a geotechnical engineer. Please contact us to provide observation and testing services.

5.2 Lateral Earth Pressures

5.2.1 Lateral Passive Resistance

Horizontal forces may be resisted by passive pressure acting on the side and sliding resistance. The passive pressure may be 300 psf per foot of embedment from the lowest adjacent grade up to a maximum of 4,500 psf.

Friction between base of footings and/or floor slabs, and the underlying soils may be assumed to be 40 percent of the dead loads.

The allowable bearing capacity and the allowable resistance of horizontal forces may be increased one-third for transient forces.

Friction and lateral pressure may be combined, but not to exceed two-thirds of the allowable lateral pressure.

5.2.2 Retaining Wall Recommendations (If Any)

The retaining wall structures may be supported by shallow footings bearing on compacted fill or competent subgrade soil. Following bearing values may be used for foundation design.

Shallow footings for the wall and/or secondary structure may be designed for an allowable bearing value of 1,500 pounds per square foot (psf) embedded at least 18 inches, a minimum width of 12 inches, placed over a minimum of 12-inches thick engineered fill compacted to 90% relative density or over a competent subgrade soil. This basic bearing value may be increased by 200 psf for each one-foot increase in depth, and by 100 psf for each additional 12 inches in width to a maximum value of 2,500 psf.

Recommended bearing values are for dead plus live loads and may be increased by one-third for combined dead, live, and transient forces such as wind load and seismic forces.

It is recommended that all foundations be reinforced per structural design, but no less than a minimum reinforcement of 2#5 bars top and 2#5 bars at the bottom.

It is estimated that total settlement will be less than 0.50" and differential settlement will be less than 0.25" over a horizontal distance of 30 feet.

5.2.3 Active Pressure

Recommended active lateral soil pressure values for design of drained retaining wall are as follows:

Surface Slope of Retained Material (Horizontal:Vertical)	Equivalent Fluid Weight (pcf) (Native Backfill)	Allowable Bearing Capacity
Level	35	1,500 psf

A Pipe and gravel drain (4" perforated PVC embedded in at least three cubic feet of gravel per lineal foot of pipe wrapped with Mirafi geofabric 10N or equivalent) should be provided on the retained earth side and near the base of all the retaining walls. Backfill should consist of sand and/or gravel. While all backfills should be compacted to the required degree, care should be taken when working close to the walls to prevent excessive pressure.

5.2.4 At-Rest Earth Pressure (If Any)

Retaining walls (basement walls, underground vault, if applicable) should be designed for at-rest conditions. The recommended earth pressure for at-rest conditions is an equivalent fluid density of 60 pounds per cubic foot without surcharge loading.

Note:

The equivalent fluid pressures presented herein do not include the lateral pressures arising from the presence of the following:

- Hydrostatic conditions, submergence or partial submergence
- Sloping backfill, positively or negatively
- Surcharge loading, permanent or temporary
- Seismic or dynamic conditions

5.2.5 Seismic Force on Wall

Lateral forces on retaining walls (exceeding 6 feet in height) due to earthquake movements in accordance with Section 1803A.5.12 of the 2019 CBC for active and at-rest conditions may be calculated as follows:

Seismic active Force = 13 H^2 pounds/ft of wall (Inverted triangular distribution, acting at 0.6H from bottom).

Seismic at-rest Force = 24 H^2 pounds/ft of wall (Rectangular Distribution, acting at 0.6H from bottom).

Where, H = Height of the retaining wall in feet

5.3 <u>On-Site Fill Soils</u>

5.3.1 Materials

On-site clean sand (after removing rocks, sizes greater than 6 inches), low-expansive potential soils, or imported materials may be used as fill material for the following:

- Foundation Areas
- Interior Slab Areas
- Pavement Areas
- Backfill

Any earth materials imported or excavated on the property may be utilized in the fill provided that each material has been determined to be suitable by the soil engineer. These materials should be free of roots, tree branches, other organic matter or other deleterious materials. Soils of poor gradation, undesirable expansion potential, or substandard strength characteristics may be designated by the consultant as unsuitable and may require blending with other soils to serve as a satisfactory fill material.

Gradation (as per ASTM C136) should be as follows:

Size	% by Weight
6”	100
4”	85-100
¾”	70-100
No 4 Sieve	50-100
No. 200 Sieve	15 (max)

Any import material should have an expansion Index, EI less than 20.

5.3.2 Placement and Compaction

a. Place and compact approved fill material in nearly horizontal layers that when compacted should not exceed 6 inches in thickness.

b. Use appropriate equipment and procedures that will produce recommended densities and water contents throughout the lift. Moisture condition, blending, and mixing of the fill layer should continue until the fill materials have a uniform moisture content at or above optimum moisture.

c. Uncompacted fill lifts should not exceed 8 inches.

d. Materials should be compacted to the following:

- On-site or imported soil, reworked and fill:

	Minimum % (ASTM D-1557 Laboratory Standard)
Subgrade Below Footings	90
Subgrade Below Slab-on Grade	90
Subgrade Below Pavement	90
Crush Rock Below Slab-on-Grade	95
Aggregate Base below pavement	95

5.4 Soil Corrosivity

5.4.1 Corrosion and Sulfate Attack Protection

A major factor in determining soil corrosivity is electrical Resistivity. The electrical Resistivity of a soil is a measure of its resistance to the flow of electrical current. Corrosion of buried metal is an electrochemical process in which the amount of metal loss due to corrosion is directly proportional to the flow of electrical current (DC) from the metal into the soil. Corrosion currents, following Ohm's Law, are inversely proportional to soil Resistivity. Lower electrical resistivities result from higher moisture and chemical contents and indicate corrosive soil. Other soil characteristics that can influence corrosivity toward metals are pH, chemical content, soil types and site drainage.

Based on test results and our past experience at this site, soils are classified as slightly corrosive to ferrous metals and negligible sulfate exposure to concrete. The type of alluvial deposits encountered at this site and in this area in general is known to cause corrosion problems. Ferrous metals and pipes should be properly coated and wrapped. Please be advised that this firm does not practice corrosion engineering; therefore, we recommend that upon completion of precise grading, onsite soils be analyzed by a qualified corrosion engineer to evaluate the impact of chemical activity of these soils on buried metallic pipes and other underground structures. If necessary, more elaborate corrosion protection systems may be considered as may be recommended by a corrosion expert.

5.4.2 Concrete

Concrete for foundation where in contact with the underlying soils should be designed in accordance with the 2019 CBC, ACI 318 Section 4.3, Table 4.3.1 (2005). As the potential for sulfate attack on concrete appears negligible, however, we recommend that the use of type II Portland cement, with a maximum water-cement ratio of 0.50, and a minimum compressive strength of 3,000 psi should be taken into consideration for the foundation elements in contact with the soil.

For all concrete in contact with soil, concrete cover over rebar should be maintained per California Building Code (CBC 2019).

5.5 Building Foundation Recommendations

Based upon results of the field explorations, laboratory testing and engineering analysis, it is concluded that the site is suitable for the proposed development at the subject site. The site is subject to ground shaking typical of the Southern California area, any construction should conform to the current seismic design provision of the California Building Code (2019), and/or other regulatory codes.

Following are more specific recommendations:

5.5.1 Conventional/Spread Foundations

The planned ASTs and the proposed building may be supported by conventional continuous and/or isolated shallow spread pad footings, bearing on certified compacted fill. The foundations should bear on engineered fills achieved by removal and re-compaction of the soils below foundation and slab elements.

Footings placed at least 18 inches below finish subgrade and 3 feet x 3 feet spread footings, 24 inches deep may be designed for an allowable bearing value of 1,500 pounds per square foot (psf). The footing width should be a minimum of 18 inches. An increase of 100 psf and 200 psf are allowed for each additional foot of increase in width and depth, respectively to a maximum value of 2,000 psf.

This allowable bearing value is for dead plus live load and may be increased by one-third for combined dead, live, and transient loads such are wind or seismic forces.

All footings at minimum shall be incorporated with 2#5 bars at top and 2#5 bars at the bottom.

Isolated column footings should be connected to other foundation elements with reinforced grade beams.

Total settlement is estimated to be less than ½ inch for loading of 2 kips per square foot. Differential settlement will be 1/3 of an inch maximum for a horizontal distance of 30 feet. Additional foundation movements could occur if water from any source infiltrates the foundation soils. Therefore, proper drainage should be provided in the final design and during construction.

All footings, stem walls, and masonry walls should be steel-reinforced to reduce the potential for distress caused by differential foundation movements. The use of joints at openings or other discontinuities in masonry walls is recommended.

We recommend that geotechnical engineer, or his representative thereof, observe the footing excavations before reinforcing steel and concrete are placed. This observation is to assess whether the soils exposed are similar to those anticipated based on our exploration. Any soft, loose, or otherwise unacceptable soils should be undercut to suitable materials and backfilled with approved fill materials, or controlled density fill (i.e., lean concrete). Soil backfill should be properly placed and compacted.

5.5.2 Mat Foundation (Alternate Foundation for ASTs)

Alternatively, above ground storage tanks (ASTs) and proposed building may be supported on the mat foundation. The semi-rigid mat foundation should be at least 4-feet or more below the finish grade and may be designed for an allowable bearing capacity of 2,000 pounds per square foot. This basic allowable bearing value is for dead load plus live load and may be increased by one-third for short duration loading, such as wind or seismic forces. Modulus of subgrade reaction, k value may be taken as 150 pci for subgrade soil at 4 feet depth.

For lateral support, an average passive capacity of 300 pounds per square foot per foot to a maximum of 4,500 psf may be used for mat footing.

Minimum thickness of mat footing should be 24 inches. The bottom of excavation at 4 feet below the finish grade should be compacted to 90 % of the maximum density as per ASTM D-1557 Laboratory Standard, certified by the Geotechnical Engineer of record prior to pouring concrete. Other aspects of the design including reinforcement and the thickness of the mat should be determined by the project structural engineer. The mat may be buried and should be backfilled with on-site material compacted to 90 percent.

5.5.3 Drilled Shafts for Canopy Foundation

Proposed truck diesel and gas canopies may be supported by moderately deep cast-in-place concrete caisson bearing into natural subgrade materials. Very hard drilling may be encountered because of the presence of dense to very dense alluvial soils. Heavy-duty equipment may be required.

The lateral forces will be the controlling element in this case depending on the height of the canopies, wind load, and/or seismic loads. Therefore, it is recommended that the minimum pier diameter should be 36 inches and should be extended to a minimum depth of 10 feet into the native material.

The pier may be designed for an allowable end bearing of 3,000 pounds per square foot or for an average frictional resistance of 300 pounds per square foot. Either skin resistance or end bearing or combined will provide adequate foundation support for the proposed canopies. The uppermost length of the drilled shaft foundation equal to the diameter of the shaft should be ignored when evaluating allowable capacities.

For lateral support, a passive capacity of 350 pounds per square foot per foot to a maximum of 5,000 psf may be used.

It is recommended that concrete be placed immediately after drilling. The concrete for the pier should be placed through tremmie or other directional devices. Pier drilling operations should be subject to observation by this office to confirm the conditions encountered are consistent with the conclusions and recommendations of this report and/or to make any appropriate modifications, if necessary. Please note that caving is very likely to be encountered during caisson drilling. The contractor should be ready to provide either casing or other methods to prevent caving. The contractor should bring the heavy duty equipment because very difficult drilling are anticipated due to presence of boulders and rocks.

We anticipate that total settlement of the proposed structures, supported by drilled shaft foundations as recommended, should be less than ½-inch. Additional foundation could occur if water from any source infiltrates the foundation soils. Therefore, proper drainage should be provided in the final design and during construction.

In case, caisson drilling is not feasible for the canopies, mat foundation as explained on 5.5.2 for the support of the canopies may be anticipated.

5.6 Slab Design Recommendation

Based on test results, the underlying surface soils are very low expansive, therefore it is recommended to maintain subgrade soil at near optimum moisture content during precise grading and / or by periodic watering following grading and incorporated slab reinforcement of No. 3 bars 16 inches center to center cross pattern. The slab thickness should be 5 inches minimum. However, the thickness and reinforcement requirements of the slab should be evaluated by the project structural engineer.

It is further recommended that moisture retarder (Stego 15 mil or approved equivalent) be provided over a minimum of 6 inches of ¾" aggregate rock rolled and compacted to 95% relative compaction, with the gradation (90-100% passing on sieve ¾" size, 1-10% passing on No. 4 sieve, and 0-3% passing on No. 100 sieve) over the compacted fill subgrade compacted to 90% relative compaction.

The modulus of subgrade reaction (k) is estimated to be 125 pounds per cubic inch (pci). All concrete placement and curing operations should follow the American Concrete Institute (ACI 318-19) manual recommendations. Improper curing techniques, high slump (high water-cement ratio), or both, could cause excessive shrinkage, cracking, or curling. Concrete slabs should be allowed to cure properly before placing vinyl or other moisture-sensitive floor coverings.

5.7 General Drainage and Moisture Protection

It is recommended to provide positive surface drainage systems consisting of a combination of sloped concrete flatwork, sheet flow gradients, swales, surface area drains (where needed) around the structures. Ground surface should have a minimum gradient of 2 percent away from any building foundations and similar structures. Surface waters should not be allowed to collect or pond against building foundations and within the level areas of the site. Buildings should be provided with gutters and downspouts. Downspouts shall be connected to area drains by pipes.

Planters near the building should be avoided if possible and if used, they should be water proofed. Irrigation should be controlled and an area drain system should be provided to avoid water intrusion beneath the structure.

5.8 Volume Changes

Based on our experience, there is typically a reduction in soil volume when the native soils are excavated and then compacted. Typical shrinkage percentages are usually in the range of 5 to 10 percent when the soils are compacted depending on the native in-place density.

5.9 Underground Utilities

Utility backfill should be placed and compacted by mechanical means as recommended in this report. Testing of the backfill should be conducted to verify conformance to the required specifications. Ponding or water jetting of the backfill should not be conducted.

Exterior trenches adjacent to, and within areas extending below a 1:1 plane projected from the outside bottom edge of the footing, and all trenches beneath hardscape features should be compacted to at least 90% of the laboratory standard. Sand backfill, unless excavated from the trench, should not be used in these backfill areas. Compaction testing and observations, along with probing, should be accomplished to verify the desired results.

All trench excavations should conform to CAL_OSHA and local safety codes.

5.10 Pavement Design

5.10.1 Pavement Section

The pavement sections presented on the following page are based on the R-value data tested, the assumed TI values, and the guidelines presented in the latest revision to the California Department of Transportation "Highway Design Manual," latest edition.

Typical categories of paved areas with corresponding traffic indices are listed as follows:

T.I.	5.0	Parking Stalls
T.I.	6.0	Driveways
T.I.	8.0	Trucks Route, Fire Lane, Truck Parking

The recommended pavement sections provided below are intended as a minimum guideline. If thinner or highly variable pavement sections are constructed, increased maintenance and repair could be expected.

If the ADT (average daily traffic) or ADTT (average daily truck traffic) increases beyond that intended, as reflected by the TI used for design, increased maintenance and repair could be required for the pavement sections.

Consideration should be given to the increased potential for distress from overuse of paved areas by heavy equipment and/or construction related traffic (e.g., concrete trucks, loaded supply trucks, etc.), particularly when the final section is not in place (i.e., topcoat). Best management construction practices should be followed at all times, especially during inclement weather.

Based on an "R" Value of 40, the following thickness of aggregate base was determined for vehicular and non-vehicular areas.

Asphalt Concrete Pavement Section Design Table

Pavement Areas	Traffic Index, TI	Asphalt Concrete AC (inch)	Aggregate Base AB (inch)
Truck Route, Fire lane Truck Parking	8	4"	12"
Driveway/Under Canopy	6	4"	8"
Parking Stall	5	4"	6"

Rigid Concrete Pavement Section Design Table

Pavement Areas	Traffic Index, TI	Concrete (inch)	Aggregate Base AB (inch)
Heavy Truck Vehicular Areas	6	6"	10"
Walkways	-	4"	4"

For concrete section, #4 reinforcement 12-inch center to center each way cross pattern are recommended. However structural design by structural engineer will suffix.

5.10.2 Pavement Grading Recommendations

5.10.3 General

A representative of Geotechnical Solutions, Inc. (GSI) should be present for the preparation of subgrade, aggregate base, and asphalt concrete for flexible pavement and concrete for rigid pavement.

5.10.4 Subgrade Preparation

After removing the existing deleterious materials on the pavement areas and hauled offsite, all surficial deposits of loose soil material should be removed and excavate 12 inches below the base and recompacted as recommended. The bottom is further scarified to a depth of at least 6 inches; moisture conditioned as necessary and compacted to 90 percent of the maximum laboratory density as determined by ASTM Test Method D-1557.

Deleterious material, grass/weeds, excessively wet or dry pockets, concentrated zones of oversized rock fragments, and any other unsuitable materials encountered during excavation or grading should be removed. The compacted fill material should then be brought to the elevation of the proposed subgrade for the pavement.

The subgrade should be proof-rolled in order to ensure a uniform, firm and unyielding surface. All grading and fill placement should be observed by the project soils engineer and/or his representative.

5.10.5 Aggregate Base

Compaction and rolling are required for the recommended base section. Minimum relative compaction required will be 95 percent of the laboratory maximum density as determined by ASTM Test Designation D-1557. Aggregate base should be in accordance with Crush Rock Class II aggregate base (minimum R-value=78) and sample should be brought for testing and approval prior to delivery to the site. Please note that crush miscellaneous base is not allowed.

5.10.6 Asphalt Concrete Pavement

Asphalt concrete pavement should be Performance Grade PG 64-10 1/2" maximum aggregate size and should be placed and compacted in two layers. Asphalt concrete shall be compacted to 95 percent of the Hveem Laboratory Standard.

5.10.7 Concrete Pavement Areas:

Concrete flatwork including sidewalks, patio-type slabs and concrete sub-slabs to be covered with decorative pavers should be at least 4 inches thick and provided with construction joints or expansion joints every 6 feet or less.

Concrete driveway slabs should be at least 6 inches thick over 6 inches of aggregate base or native base (for vehicular areas) and 4" of concrete over 4" of aggregate base or native base (Non-vehicular areas) over approved subgrade, providing #4 reinforcement 12" center to center each way cross pattern and provided with construction joints or expansion joints every 10 feet or less.

At the driveway areas, the top 12 inches of subgrade should be excavated; moisture conditioned and recompacted with minimum 90% compaction immediately prior to placing the rock base and asphalt concrete. Rock-base material shall be class II aggregate base and to be compacted to 95 percent minimum.

Design section must be verified during site grading, based on R value test and appropriate modifications shall be made, if required.

5.11 <u>Exterior Concrete Flatwork</u>

In order to reduce the potential for unsightly cracking, concrete sidewalks, deck and patio slabs and concrete sub-slabs to be covered with decorative pavers should be at least 4 inches thick and provided with construction joints or expansion joints every 6 feet or less. Concrete driveway slabs should be at least 5 inches thick and provided with construction joints or expansion joints every 10 feet or less.

5.12 Temporary Excavations

Temporary excavations may not be required but in case it is needed then the Contractor should be made fully responsible for adequate support of the excavation at all times. Temporary support of excavation structures plans should be designed by a Professional Engineer licensed in the State of California and experienced in such work and these plans should be reviewed by us and approved by the City of Perris, if necessary.

Since the site has adequate room to lay back with temporary excavation slopes, shoring may not be needed, but this should be evaluated based on field conditions.

The stability of temporary excavations depends on many factors, including the slope angle, the shearing strength of the existing material, orientation and inclination of geologic structure, the height of the slope and the length of time the excavation remains unsupported and exposed to equipment vibrations and rainfall. All excavations should be observed by the engineering geologist during excavation.

The possibility of temporary excavations failing may be minimized by: 1) keeping the time between cutting and filling operations to a minimum; 2) limiting excavation length exposed at any one time; and, 3) cutting no steeper than a 1:1 (horizontal to vertical [h:v]) inclination and no steeper for false cuts along the toe for key excavations, cleanouts, etc.

Following is the temporary excavation recommendation, subject to field verification by the geotechnical consultant.

Excavation up to 4 feet	Vertical
Excavation over 4' but not to exceed 10'	1:1 (H: V)
Excavation from 10' to 20'	1½:1 (H: V)

6.0 GENERAL COMMENTS AND LIMITATIONS

6.1 Plan Review

Final project plans should be reviewed by this office prior to construction, so that construction is in accordance with the conclusions and recommendations of this report. Based on our review, supplemental recommendations and/or further geotechnical studies may be warranted.

6.2 Geotechnical Observation and Testing

All footing trenches for the proposed structure should be observed by a representative of this firm to verify that they were excavated into competent bearing soils per the recommendations of this report as well as to the minimum depths recommended above. These observations should be performed prior to the placement of forms or reinforcement. The excavations should be trimmed neat, level and square. All loose, sloughed or moisture softened soil should be removed prior to placing concrete.

6.3 Construction Verification Procedure

Construction of foundations and placement of engineered fill should be done under the observation and documentation of a representative of the project Geotechnical Engineer. The following are noted as items requiring verification during construction.

Pre-Grading Meeting:

A pre-grading meeting should be held prior to the start of any grading activities. Attendees of this meeting should include the Owner, the Architect, the Geotechnical Engineer, and the Contractor, to review procedures and scheduling.

Footing Observations:

Construction of foundation and slab should be performed under inspection of the Geotechnical Engineer. Footings should be observed and certified by Geotechnical Engineer of Record after excavation and prior to placement of reinforcing bars.

Earthwork Observations:

Relative compaction of all fill materials placed on site should be tested in accordance with ASTM D6938. All new fill shall be brought to near optimum moisture, placed in layers not exceeding six inches in thickness, and compacted to at least 90 percent relative compaction for subgrade and 95 percent relative compaction for aggregate base. No jetting or water tamping of fill soils shall be permitted. All imported soil for engineered fill should be pre-approved by the Geotechnical Engineer and consist of clean, granular, non-expansive soil, free of vegetation and other debris with an Expansion Index of 20 or less.

At all times, the contractor should have a responsible field superintendent on the project in full charge of the work, with authority to make decisions. He should cooperate fully with the Geotechnical Engineer in carrying out the work.

All footing trenches for continuous and spread footings and subgrade for the slab areas should be observed by the project Geotechnical Engineer to verify that over-excavation and re-compaction operations of adequate depth, thickness, and compaction have been performed as specified. All footing excavations should be trimmed neat, level and square. All loose, sloughed or moisture softened soil should be removed and replaced with properly compacted soil.

6.4 Recommendations for Construction

Surveying: The contractor shall set necessary stakes to verify lines and grades as shown on the plan.

Changed Conditions: Any changed conditions not found during exploration should be brought to the attention of the soil engineer. As a result of the changed conditions, the soil engineer will provide further recommendations.

Site Drainage: The site should be sloped to direct water away from all structures and divert to a positive drainage device at the street. Roof gutters and down spouts shall be provided for roof drainage. Down spouts shall be connected to the positive area drains.

Footing and Utilities Trenches. All the Footing excavations as well as utility trenches should be observed by a representative of Geotechnical Solutions, prior to placement of steel.

6.5 Limitations

This report is issued with the understanding that it is the responsibility of the owner or his representative to see that the information and recommendations contained herein are called to the attention of the other members of the design team for the project and that the applicable information is incorporated into the plans, and that the necessary steps are taken to see that the contractors and the subcontractors carry out such recommendations. The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether due to natural processes or to the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated, wholly or in part, by changes outside of our control. The validity of the recommendations of this report assumes that Geotechnical Solutions, Inc. will be retained to provide construction monitoring services. The scope of our services did not include any investigation for the presence or absence of hazardous or toxic materials.

6.6 Closure

The Conclusions and recommendations contained herein are based on the findings and observations made at the test boring locations. It is not unusual to find conditions between and beyond such locations, which differ from the conditions encountered. If conditions are encountered during construction, which appear to differ from those previously disclosed, this office should be notified so as to consider the need for modifications. On-site construction observations and wherever appropriate, tests should be performed during the course of construction by a representative of this office to evaluate compliance with the design concepts, specifications, and recommendations contained herein.

This report has been compiled for the exclusive use of our client, it shall not be transferred to, or used by, other parties, or applied to any project on this site other than described herein without consent and /or thorough review by this office.

Geotechnical Solutions, Inc.

References

California Department of Water Resources groundwater well data
http://wdl.water.ca.gov.

California Division of Mines and Geology, 1997, Fault-Rupture Hazard Zones in California, Special Publication 42.

California, Division of Mines and Geology, 2008, Special Publication 117A, Guidelines for Evaluating and Mitigating Seismic Hazards.

International Conference of Building Officials (ICBO), 2019, California Building Code, California Code of Regulations, Title 24, Part 2, Volume 2.

Jennings, C.W., 1994, Preliminary Fault Activity Map of California, Scale 1:750,000, DMG Open File Report 92-03.

Morton, D.M. and F.K. Miller, 2006, "Geologic Map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California: U.S. Geological Survey, Open-File Report OF-2006-1217, Scale 1:100,000.

Thomas W. Dibblee, Jr., 2003," Geologic Map of the Devore Quadrangle, San Bernardino County, California", Edited by John A. Minch.

U.S. Seismic Design Maps Summary & Detailed Report (SEAOC/OSHPOD)

2008 National Seismic Hazard Maps – Source Parameters.
https://earthquake.usgs.gov/cfusion/hazfaults_2008_search/query_results.cfm

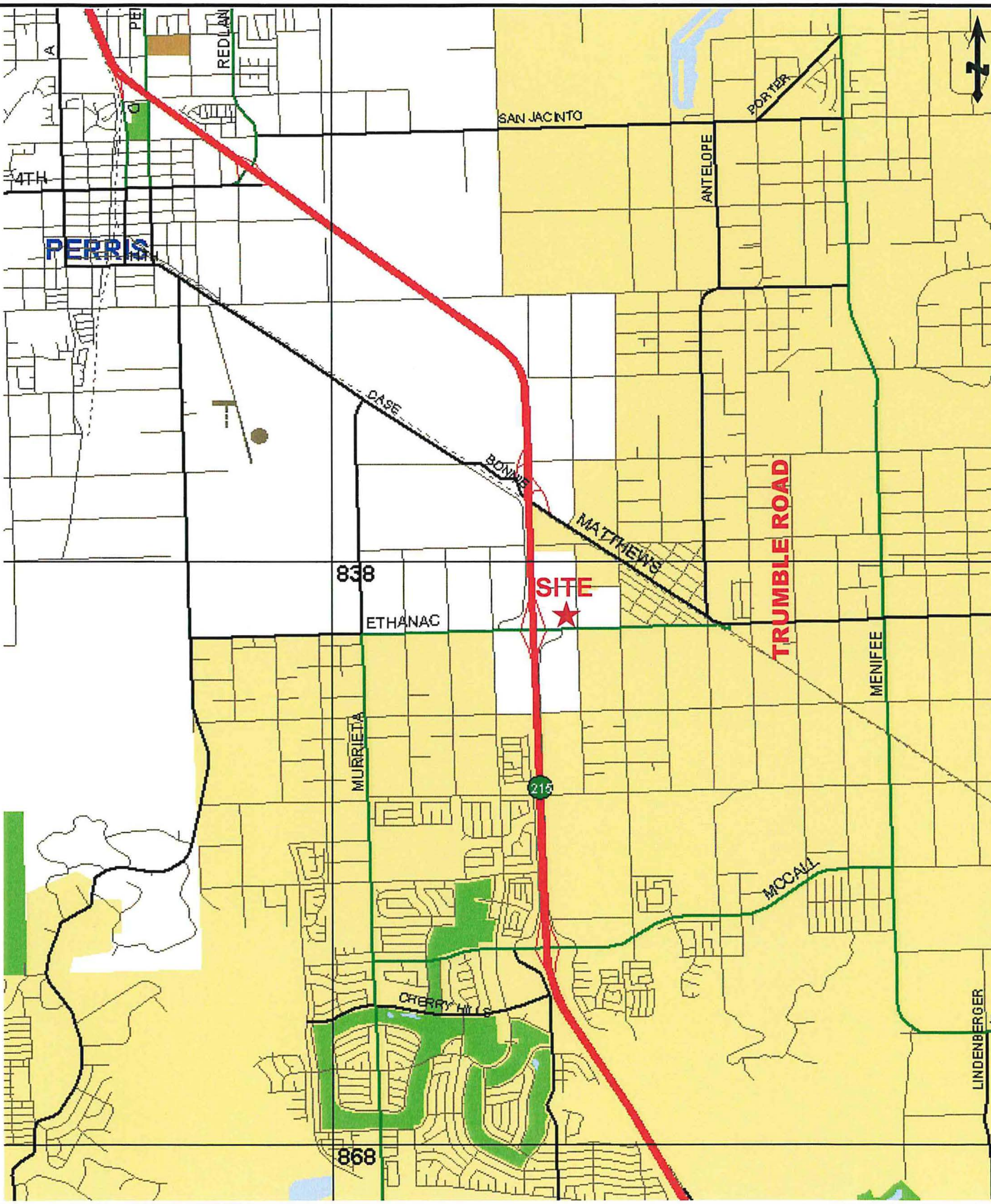
U.S.G.S., Earthquake Hazards Program, Unified Hazard Tool – Interactive Hazard Curve and Interactive Deaggregation web Site.
https://earthquake.usgs.gov/hazards/interactive/

Appendix A

Plates:

- Vicinity Map
- Plot Plan and Boring Location Map
- Topographic Map
- Google Map
- Site Regional Geology Map
- Seismic Hazard Map – CGS
- Fault, Liquefaction and Flood Zones
- Groundwater Closest Well Data
- Groundwater Map – Well Data
- Log of Test Borings
- Direct Shear Tests
- Consolidation Tests

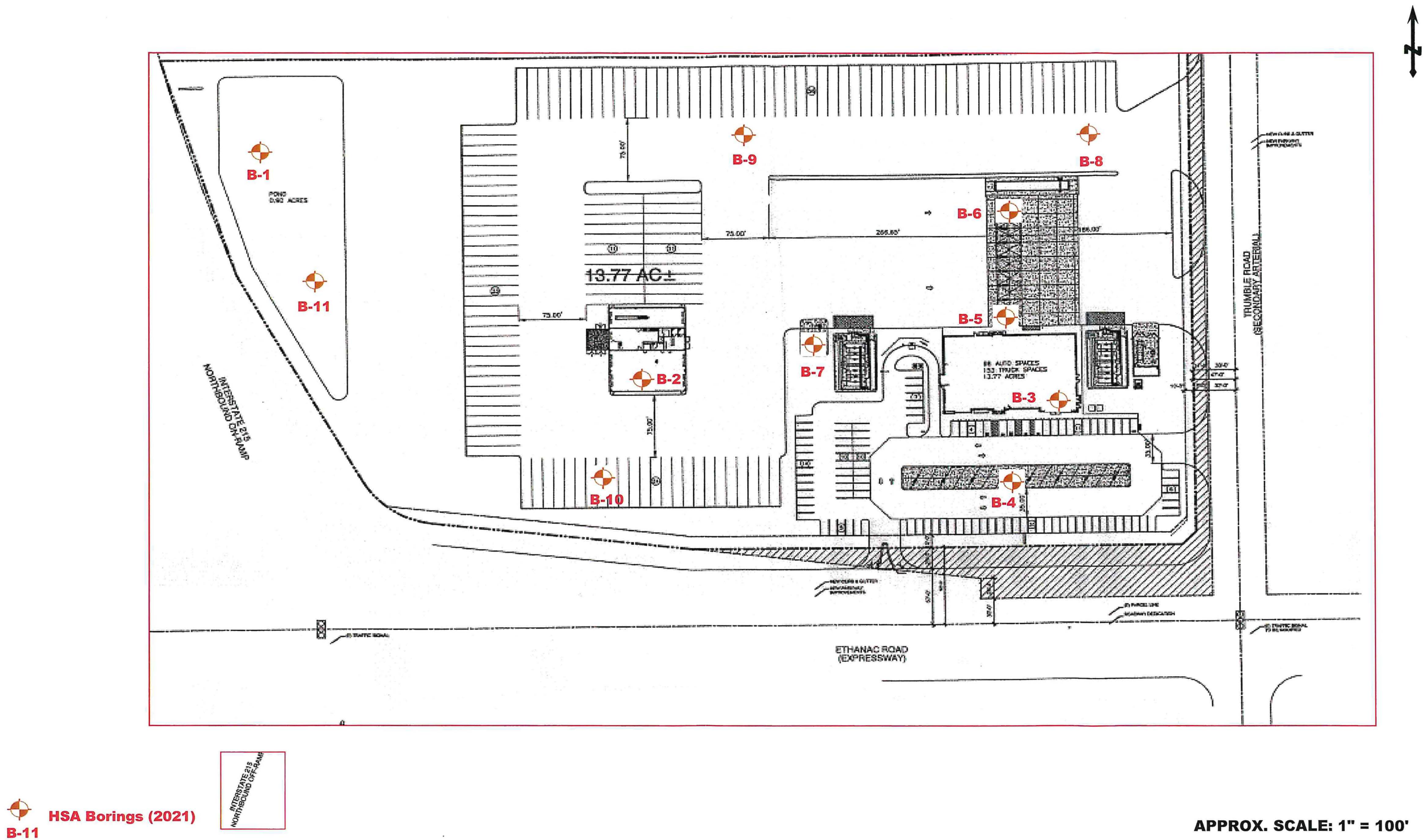
VICINITY MAP



Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	A

Geotechnical Solutions, Inc.

PLOT PLAN & BORING LOCATION MAP

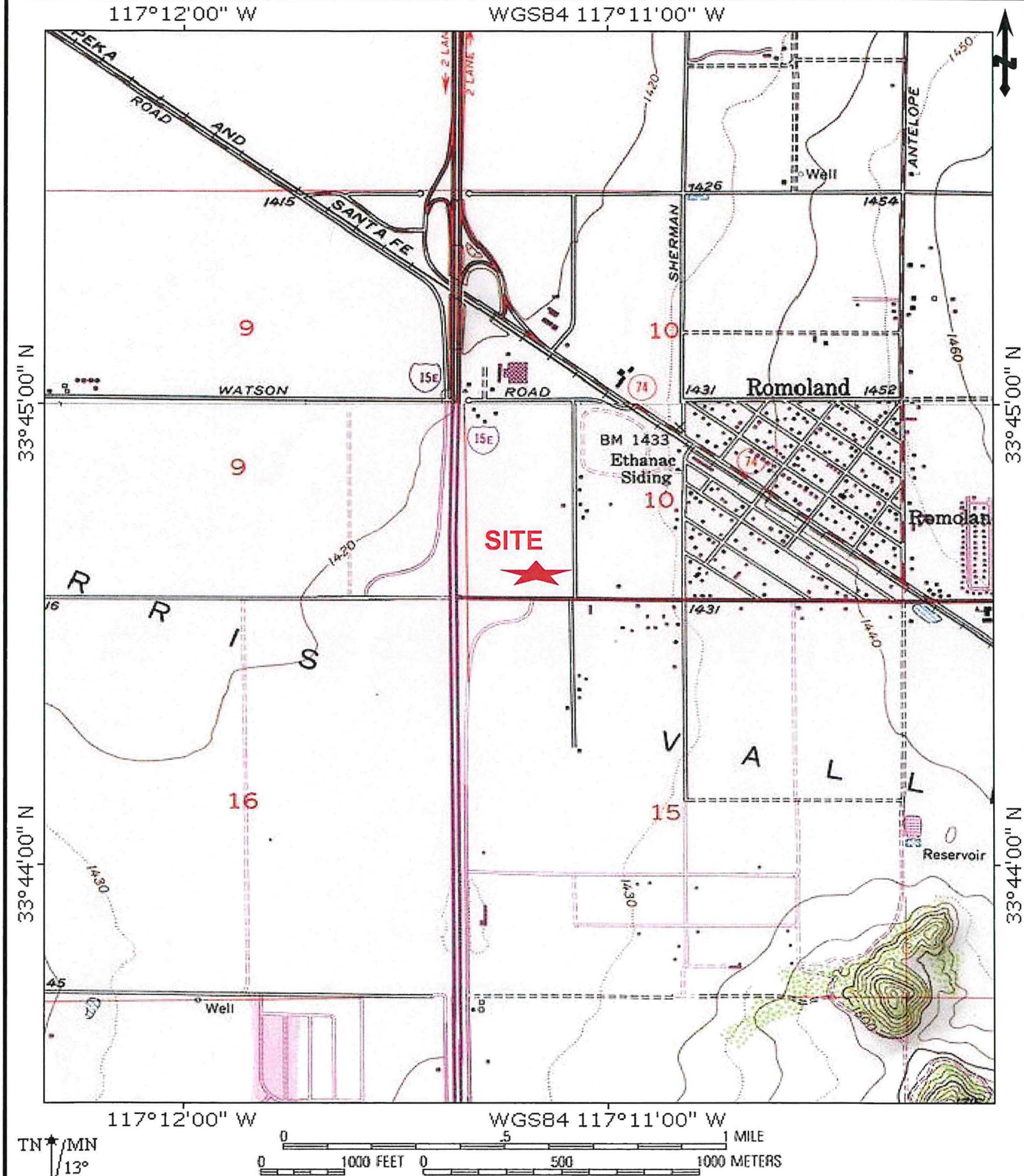


APPROX. SCALE: 1" = 100'

Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	B

Geotechnical Solutions, Inc.

TOPOGRAPHIC MAP



Printed from TOPO! ©2000 National Geographic Holdings (www.topo.com)

Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	C

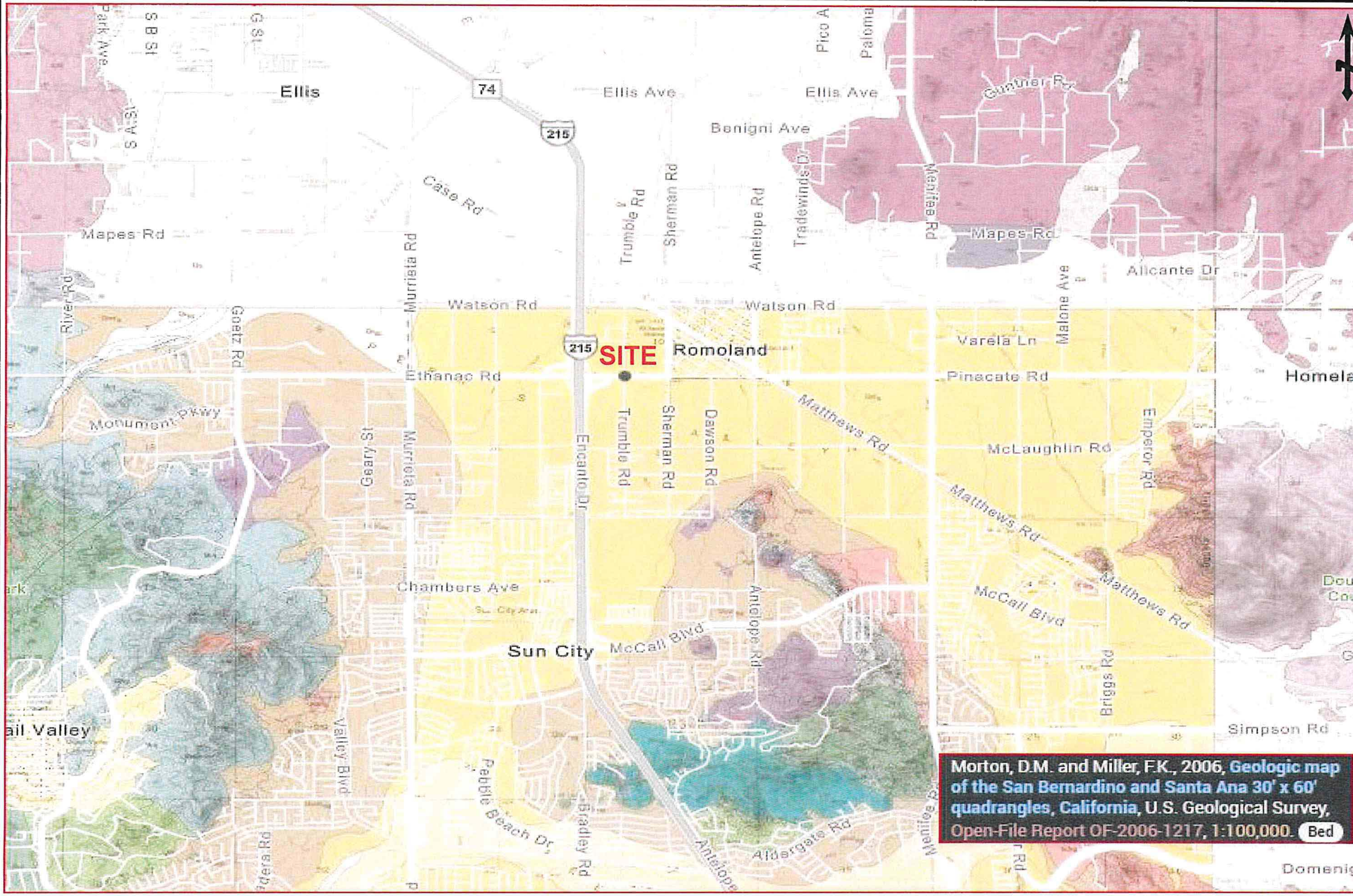
Geotechnical Solutions, Inc.

GOOGLE MAP

Travel Plaza - Perris		Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California		Plate:	D

Geotechnical Solutions, Inc.

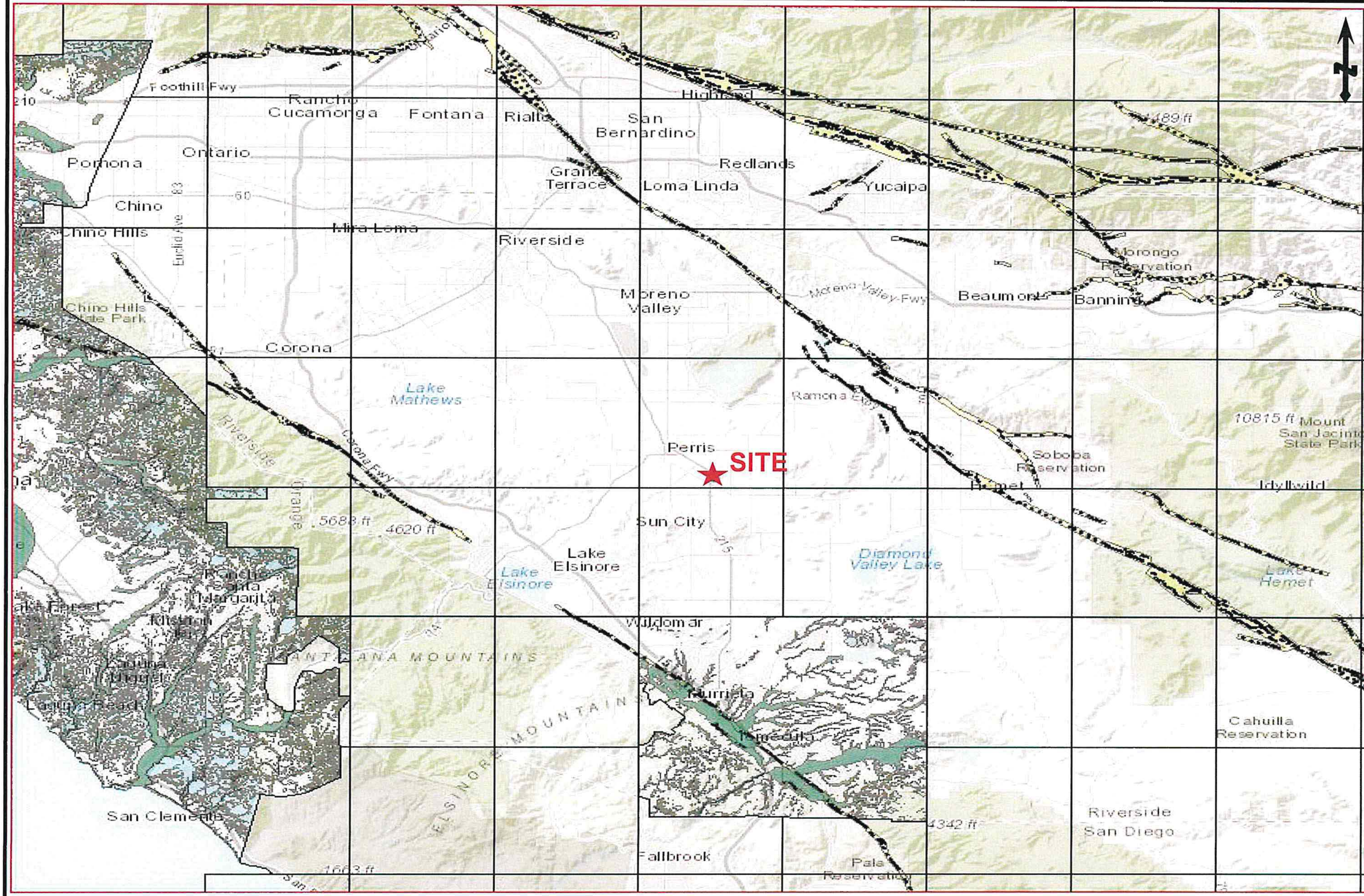
Site Regional Geologic Map



Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	E

Geotechnical Solutions, Inc.

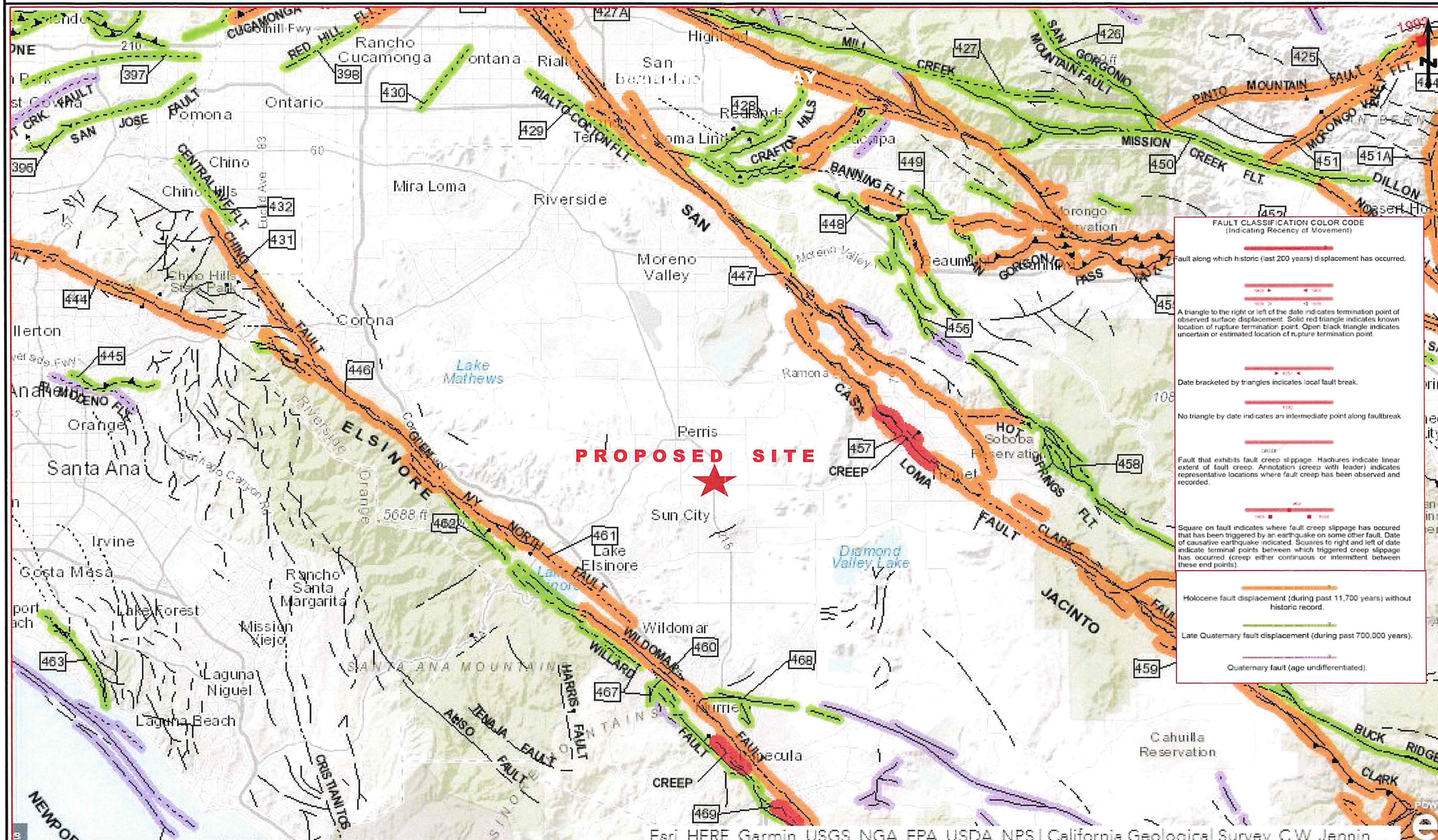
Seismic Hazard Map



Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	F

Geotechnical Solutions, Inc.

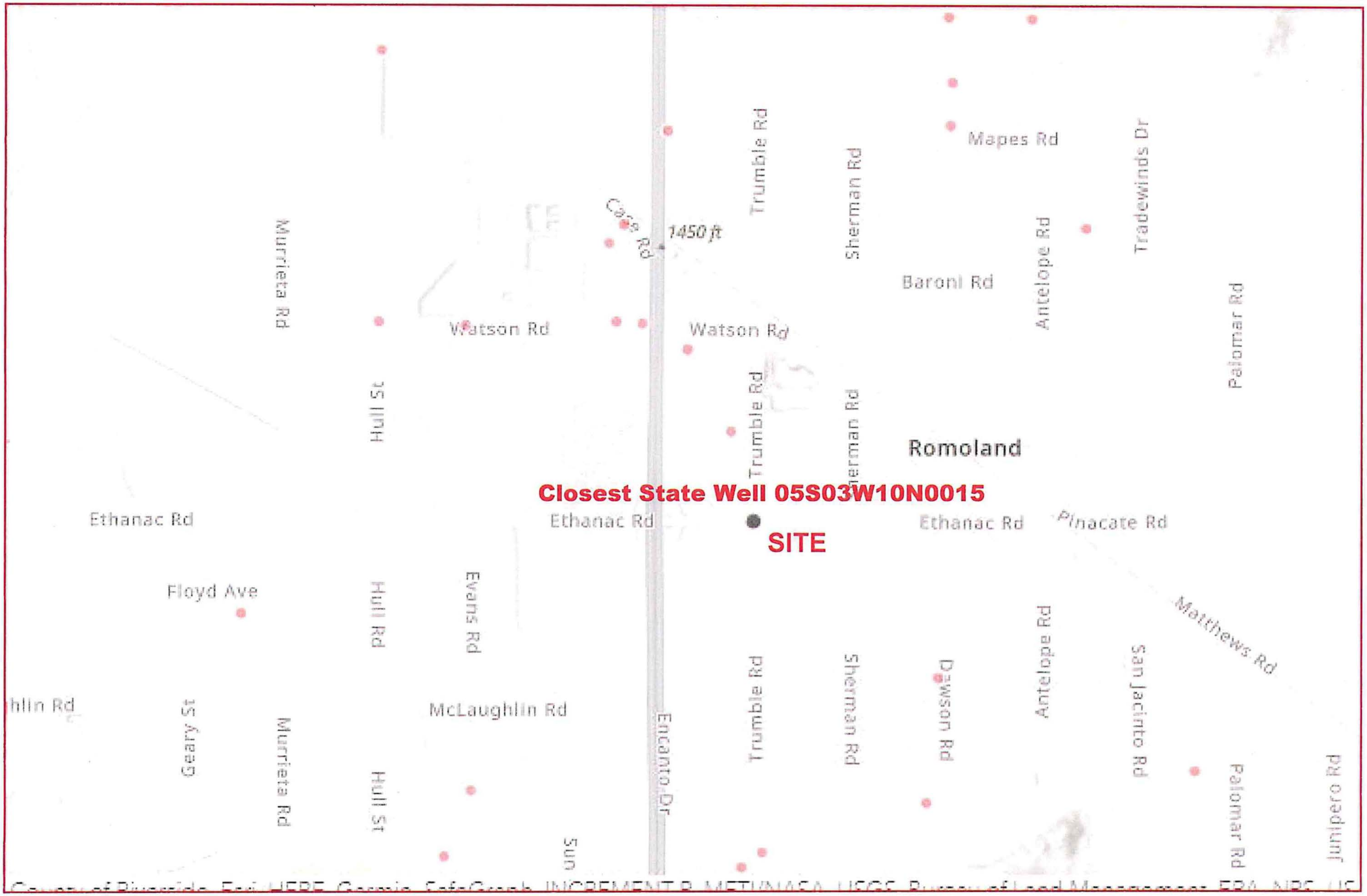
FAULT, LIQUEFACTION, FLOOD ZONES



Travel Plaza - Perris		Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California		Plate:	G

Geotechnical Solutions, Inc.

GROUNDWATER MAP - CLOSEST WELL DATA



Travel Plaza - Perris		Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California		Plate:	H-1

Geotechnical Solutions, Inc.

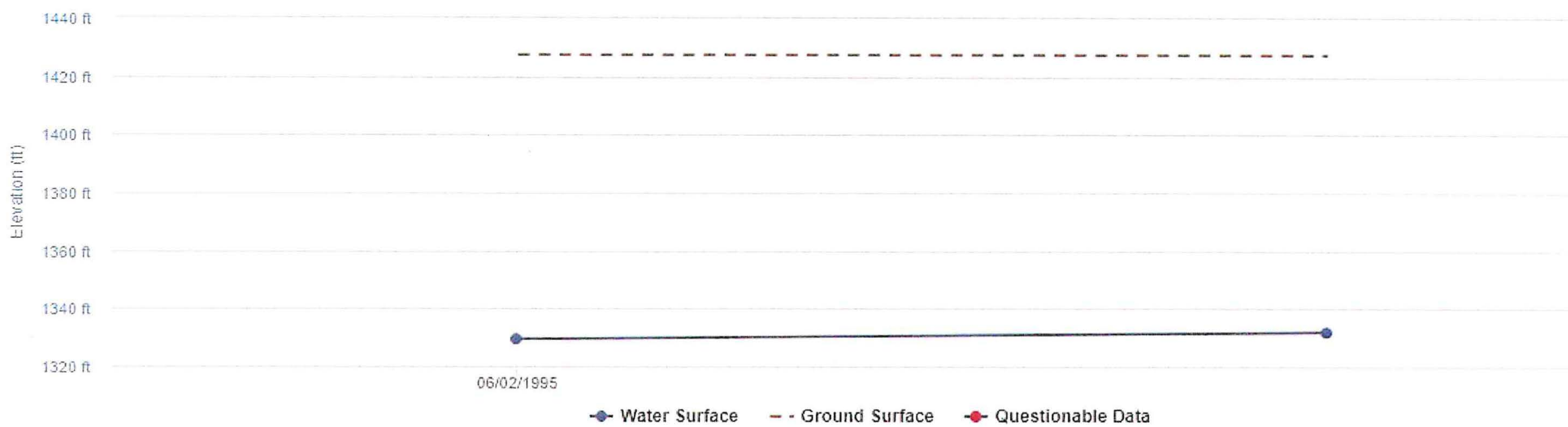
GROUNDWATER MAP - WELL DATA

Groundwater Level Report

Station 337464N1171859W001

Station Data | Groundwater Level Data

Groundwater Levels for Well 337464N1171859W001 (Site Code)



Measurement Date (PST)	Reference Point Elevation	Ground Surface Elevation	Distance from RP to WS	Groundwater Elevation	Ground Surface to Water Surface	Measurement Issue	Collecting Agency	W M C
06/02/1995 00:00:00	1427.490	1427.490	97.98	1329.51	97.98		Department of Water Resou...	
09/13/1995 00:00:00	1427.490	1427.490	95.63	1331.86	95.63		Department of Water Resou...	

Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	H-2

Geotechnical Solutions, Inc.

Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No.	B-1
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No.	I-1
Project Number :	G-5908-01		Page 1 of	1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	10
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**Covered with dry weeds**				
			Bag #1				Older Alluvium: Silty Sand (SM), light brown, medium dense				
	2		C-1	19-54/6"		> 100	@2': Sand (SP), silty, light brown, slightly moist, very dense	6	127		
1421	5		C-2	20-50/6"		> 100	@5':Sand (SP), poorly graded, very dense, gray, slightly moist, medium to coarse grained	7	122		
1416	10									11	HD: 89(SA) :7(SI) : 4(CL)
							End of Boring = 10 feet 2" Gravel on Bottom Drilled for Percolation test No groundwater encountered No Caving Backfilled w/Cuttings after percolation test				
1411	15										
1406	20										
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

Geotechnical Solutions, Inc.

Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No. B-2
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No. I-2a
Project Number :	G-5908-01		Page 1 of 2

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	51.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						Bareground				
			Bag #1				Older Alluvium: Clayey Sand (SC), light brown, medium dense			28	HD:72 SA:10 SI: 18 CL
	2		C-1	50/6"		100	@2': Sand (SP), Silty, light brown, slightly moist, very dense	7	121		
1421	5		C-2	18-37-44		81	@5':Sand (SP), poorly graded, very dense, gray, moist, medium to coarse grained	10	126		
1416	10		C-3	17-32-34		66	@10':Sand (SP), variety of color, moist, very dense, medium to coarse grained	9	95		DS: P=Peak / Ult=Ultimate $\phi = 34^0$, c =250 psf (P) $\phi = 33^0$, c = 200 psf (Ult)
1411	15		S-1	14-28-33		61	@15': Sand (SP), hard to drill, slightly moist, dark gray	5	-		
1406	20		S-2	15-34-39		73	@20': Same as above	5	-		
1401	25		S-3	19-31-37		68	@25': Same as above	5	-		
1396	30		S-4	14-19-27		46	@ 30': Same as above	4	-		
1391	35		S-5	11-18-26		44	@ 35': Sand(SP), poorly graded, dark gray, moist, dense, medium to coarse grained	11	-		
1386	40		S-6	20-27-39		66	@40': Sand(SP), poorly graded, dark gray, slightly moist, very dense, medium to coarse grained	3	-		
1381	45										

Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No.	B-2
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No.	I-2b
Project Number :	G-5908-01		Page 2 of	2

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	51.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1381	45										
			S-7	21-29-48		77	@45': Sand (SP), poorly graded, dark gray, slightly moist, very dense, coarse grained	4	-		
1376	50										
			S-8	24-30-61		91	@ 50':Same as above,	3	-		
							End of Boring = 51.5 feet No groundwater encountered No Caving Backfilled w/Cuttings				
1371	55										
1366	15										
1361	20										
1356	25										
1351	30										
1346	35										
1341	40										
1336	45										

Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No.	B-3
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No.	I-3
Project Number :	G-5908-01		Page 1 of	1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	16.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**Bareground**				
			Bag #1				Older Alluvium: Silty Sand/ Sand (SM/SP), dark brown, dry				
	2		C-1	50/6"		100	@2': Sand (SP), silty, dark brown, slightly moist, very dense fine to coarse grained	6	127		
1421	5		C-2	20-50/6"		100	@5':Sand (SP), poorly graded, very dense, dark brown, moist, medium to coarse grained	7	122		
1416	10		C-3	8-10-33		43	@10':Same as above, slightly moist	3	-		
1411	15		S-1	10-20-40		60	@10':Same as above	3	-		
1406	20						End of Boring = 16.5 feet No groundwater encountered No Caving Backfilled w/Cuttings				
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No.	B-4
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No.	I-4
Project Number :	G-5908-01		Page 1 of	1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	21.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**Bareground**				
			Bag #1				Older Alluvium: Silty Sand (SM), light brown, dry				
	2		C-1	28-50/6"		100	@2': Sand (SP), Silty, light brown, slightly moist, very dense	8	117		
1421	5		C-2	9-13-16		29	@5':Silty Sand (SM), medium dense, brown, moist, medium to coarse grained	6	113		
1416	10		C-3	10-12-18		30	@10':Silty Sand/Sand (SM/SP), dark brown, moist, medium dense, medium to coarse grained	3	103		
1411	15		S-1	16-26-39		65	@15': Sand (SP), dark brown, slightly moist, very dense, coarse grained	3	-		
1406	20		S-2	20-27-43		70	@20': Same as above	3	-		
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No.	B-5
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No.	I-5
Project Number :	G-5908-01		Page 1 of	1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	21.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**covered with dry grass**				
			Bag #1				Older Alluvium: Silty Sand (SM), light brown, dry				
	2		C-1	51-50/1"		>100	@2': Sand (SP), trace Silt, light brown, slightly moist, very dense, medium to coarse grained	10	111		
1421	5		C-2	26-50/5"		>100	@5':Same as Above	11	103		
1416	10		C-3	37-50/4"		>100	@10':Same as above	8	119		
1411	15		S-1	29-36-44		80	@15': Sand (SP), dark brown, slightly moist, very dense, coarse grained	5	-		
1406	20		S-2	30-35-47		82	@20': Same as above	5	-		
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No. B-6
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No. I-6
Project Number :	G-5908-01		Page 1 of 1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	11.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES: Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**Dry grass**				
			Bag #1				Older Alluvium: Silty Sand / Sand (SM/SP), light brown, medium dense				
	2		C-1	26-50/4"		> 100	@2': Sand (SP), silty, light brown, slightly moist, very dense	6	123		
1421	5										DS: P=Peak / Ult=Ultimate
			C-2	28-50/5"		> 100	@5':Sand (SP), very dense, gray, moist, medium to coarse grained	8	129		$\phi = 33^0$, c =250 psf (P) $\phi = 32^0$, c = 200 psf (Ult)
1416	10										
			S-1	15-25-30		55	@10':Sand/Silty Sand (SP/SM), light gray, slightly moist, very dense, coarse grained	3	-		
1411	15						End of Boring = 11.5 feet No groundwater encountered No Caving but possible Backfilled w/Cuttings				
1406	20										
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No.	B-7
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No.	I-7
Project Number :	G-5908-01		Page 1 of	1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	21.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**covered with dry grass**				
			Bag #1				Older Alluvium: Clayey Sand (SC), light brown, dry			39	HD: 61 SA:17 SI: 22 CL
	2		C-1	50/4"		>100	@2': Clayey Sand (SC), trace Silt, light brown, very moist, very dense, medium to coarse grained	18	95		
1421	5		C-2	24-50/5"		>100	@5':Sand (SP), dark brown, very dense, moist, medium to coarse grained	6	127		
1416	10		C-3	18-24-32		56	@10':Sand with Silt (SP/SM), dense, brown, very moist,	14	114		
1411	15		S-1	15-18-18		36	@15': Sand (SP), dark brown, slightly moist, dense, coarse grained	5	-		
1406	20		S-2	20-20-23		43	@20': Same as above	4	-		
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

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Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No.	B-8	
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No.	I-8	
Project Number :	G-5908-01		Page 1 of	1	

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	11.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES: Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**Covered with dry weeds**				
			Bag #1				Older Alluvium: Clayey Sand (SC), light brown, dry			43	HD: 57 SA:21 SI: 22 CL
	2		C-1	22-50/6"		> 100	@2': Sand (SP), silty, light brown, slightly moist, very dense	5	120		
1421	5		C-2	25-50/6"		> 100	@5':Sand (SP), poorly graded, very dense, gray, slightly moist, medium to coarse grained	4	118		
1416	10		S-1	15-21-26		47	@10':Sand/Silty Sand (SP/SM), light gray, slightly moist, dense	3	-		
1411	15						End of Boring = 11.5 feet No groundwater encountered No Caving but possible Backfilled w/Cuttings				
1406	20										
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

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Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No.	B-9
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No.	I-9
Project Number :	G-5908-01		Page 1 of	1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	11.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						Covered with dry weeds				
			Bag #1				Older Alluvium: Clayey Sand (SC), light brown, dry			32	HD: 68 SA :12 SI : 20 CL
	2		C-1	24-50/6"		> 100	@2': Sand (SP), silty, light brown, slightly moist, very dense	4	118		
1421	5		C-2	27-50/6"		> 100	@5':Sand (SP), poorly graded, very dense, gray, slightly moist, medium to coarse grained	3	116		
1416	10		S-1	15-18-21		39	@10':Sand/Silty Sand (SP/SM), light gray, slightly moist, dense	3	-		
1411	15						End of Boring = 11.5 feet No groundwater encountered No Caving but possible Backfilled w/Cuttings				
1406	20										
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

Project :	Travel Plaza - Perris	LOG OF TEST HOLE	Borehole No.	B-10
Project Location :	Corner of Trumble Road and Ethanac, Perris, California		Plate No.	I-10
Project Number :	G-5908-01		Page 1 of	1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	11.5
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

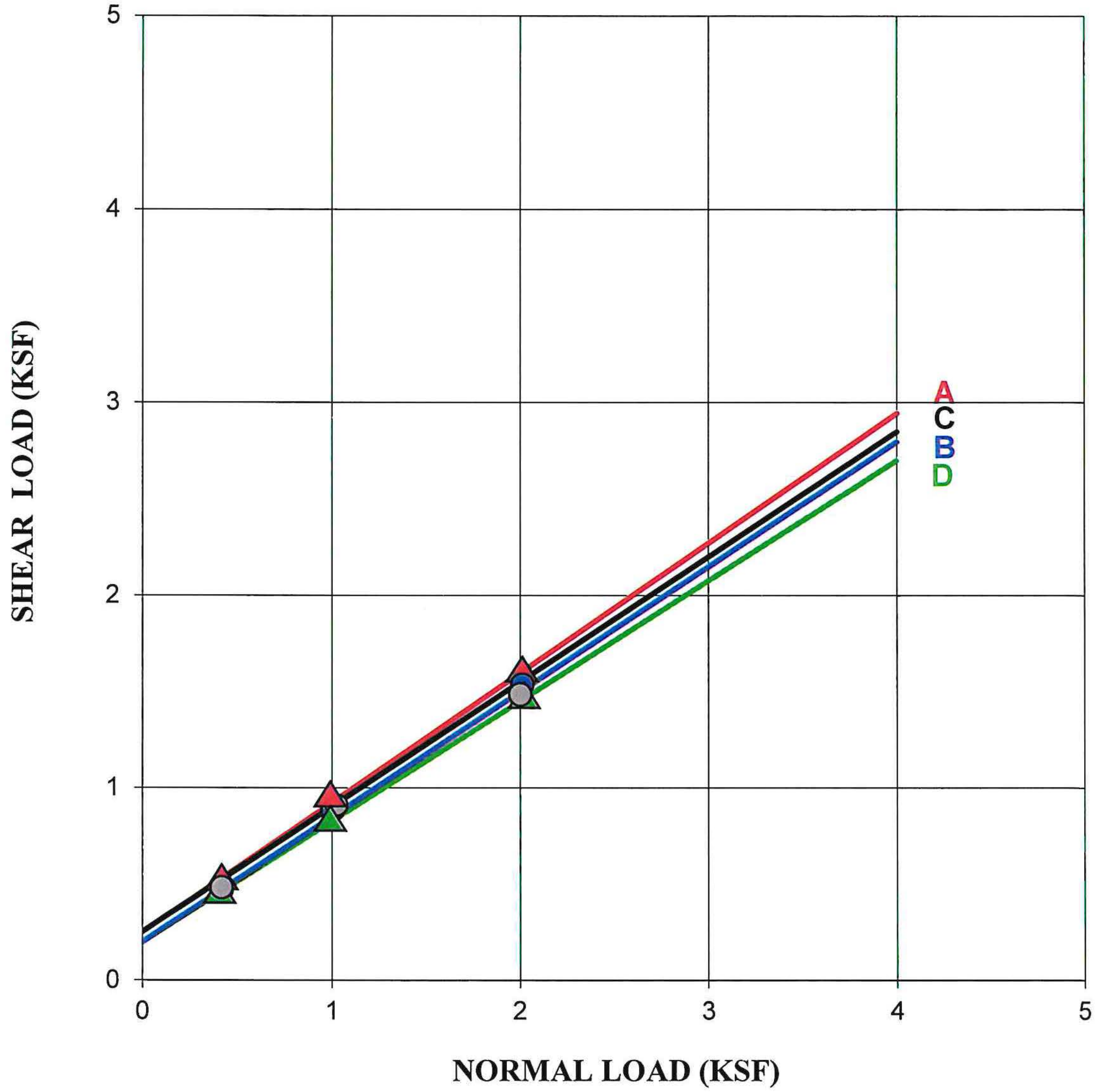
Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Penetration Resistance, Blows / 6"	SAMPLES Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**Covered with dry weeds**				
			Bag #1				Older Alluvium: Clayey Sand (SC), light brown, dry				
	2		C-1	30-50/6"		100	@2': Sand (SP), silty, light brown, slightly moist, very dense	7	121		
1421	5		C-2	29-50/6"		100	@5':Sand (SP), poorly graded, very dense, gray, slightly moist, medium to coarse grained	6	120		
1416	10		S-1	165-19-23		42	@10':Sand/Silty Sand (SP/SM), light gray, slightly moist, dense	4	-		
1411	15						End of Boring = 11.5 feet No groundwater encountered No Caving but possible Backfilled w/Cuttings				
1406	20										
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

Project :	Travel Plaza - Perris		LOG OF TEST HOLE	Borehole No.	B-11
Project Location :	Corner of Trumble Road and Ethanac, Perris, California			Plate No.	I-11
Project Number :	G-5908-01			Page 1 of	1

Date(s) Drilled :	May 24, 2021	Logged By :	BA/AB	Checked By :	DXS
Drilling Method :	Hollow Stem Auger	Drill Bit Size / Type :	8-inch	Total Depth of Borehole, feet :	10
Drill Rig Type :	B-61	Drilling Contractor :	Whitecomb Drilling	Approx. Surface Elevation, feet :	1426 feet MSL
Groundwater Level and Date Measured:	No Water encountered at the time of drilling	Sampling Method :	California (ring), bulk, SPT	Hammer Data :	140 lbs dropping 30 inches
Borehole Backfill :	Drill cuttings	Comments :	Refer to plot plan for location;		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	Graphics	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
1426	0						**Covered with dry grass**				
							Older Alluvium: Clayey Sand (SC), light brown, dry				
	2		C-1	32-50/6"		100	@2': Sand (SP), silty, light brown, slightly moist, very dense	6	122		
1421	5		C-2	31-50/6"		100	@5':Sand (SP), poorly graded, very dense, gray, slightly moist, medium to coarse grained	5	121		
1416	10						@10': Same as above			10	HD: 90(SA) : 8(SI) : 2(CL)
							End of Boring = 10 feet 2" of Gravel on Bottom Drilled to 10 feet for Percolation Test Backfilled w/ cuttings after the Test				
1411	15										
1406	20										
1401	25										
1396	30										
1391	35										
1386	40										
1381	45										

DIRECT SHEAR



SYMBOL	LOCATION	DEPTH (FT)	TEST CONDITION		COHESION (PSF)	FRICTION (DEG)
A	B-2	10'	Saturated - Drained	Peak	250	34
B	B-2	10'	Saturated - Drained	Ultimate	200	33
C	B-6	5'	Saturated - Drained	Peak	250	33
D	B-6	5'	Saturated - Drained	Ultimate	200	32

Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	J

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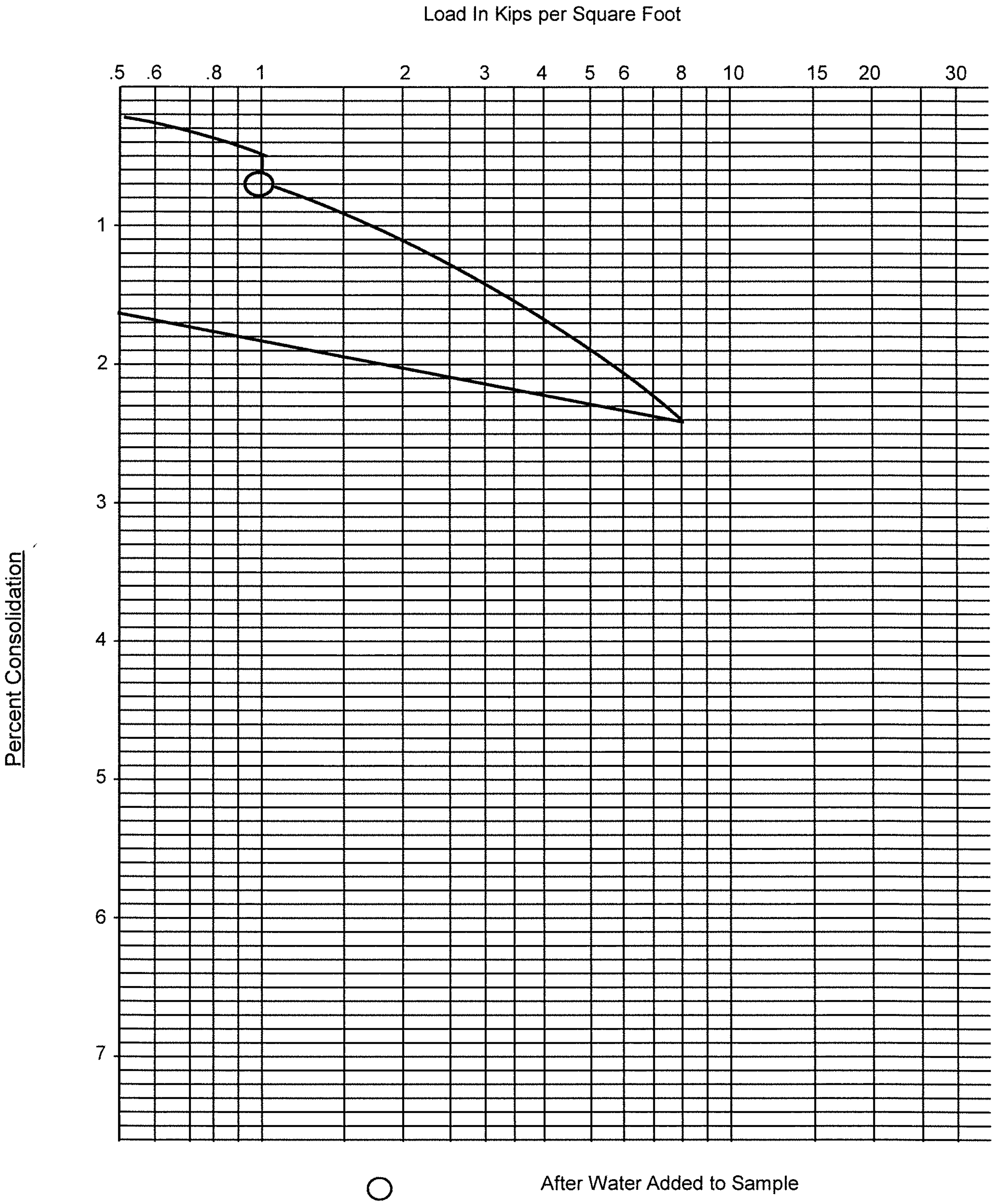
CONSOLIDATION



B-2 @ 10'

Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	K

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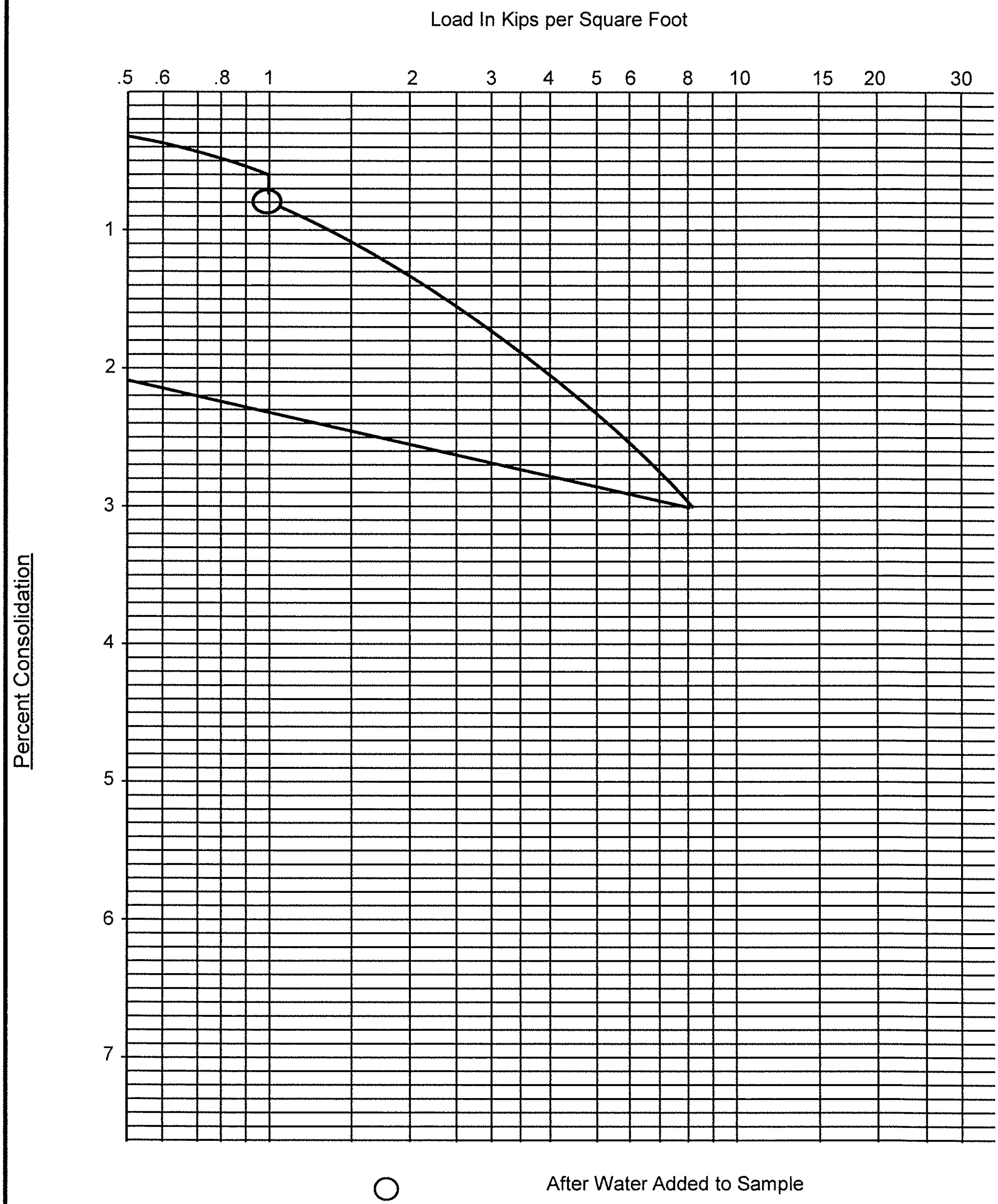

B-6 @ 5'

Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	L

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Appendix B

Seismic Data

- Table 1 - Faults Table
- Unified Hazard Tool – Hazard Curve
- U.S. Seismic Design Maps Summary & Detailed Report (SEAOC / OSHPD)

Table - 1
2008 National Seismic Hazard Maps - Source Parameters
Travel Plaza - Perris

Distance in Miles	Name	State	Pref Slip Rate (mm/yr)	Dip (degrees)	Dip Dir	Slip Sense	Rupture Top (km)	Rupture Bottom (km)	Length (km)
9.56	Elsinore;GI	CA	5	90	V	strike slip	0	13	37
9.56	Elsinore;W+GI	CA	n/a	81	NE	strike slip	0	14	83
10.22	San Jacinto;A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	178
10.22	San Jacinto;A+CC+B	CA	n/a	90	V	strike slip	0.1	15	152
10.22	San Jacinto;A+C	CA	n/a	90	V	strike slip	0	17	118
10.22	San Jacinto;A	CA	9	90	V	strike slip	0	17	71
10.22	San Jacinto;A+CC	CA	n/a	90	V	strike slip	0	16	118
10.37	Elsinore;GI+T+J+CM	CA	n/a	86	NE	strike slip	0	16	195
10.37	Elsinore;W+GI+T+J+CM	CA	n/a	84	NE	strike slip	0	16	241
10.37	Elsinore;GI+T	CA	5	90	V	strike slip	0	14	78
10.37	Elsinore;W+GI+T+J	CA	n/a	84	NE	strike slip	0	16	199
10.37	Elsinore;W+GI+T	CA	n/a	84	NE	strike slip	0	14	124
10.37	Elsinore;GI+T+J	CA	n/a	86	NE	strike slip	0	17	153
10.63	Elsinore;T+J	CA	n/a	86	NE	strike slip	0	17	127
10.63	Elsinore;T+J+CM	CA	n/a	85	NE	strike slip	0	16	169
10.63	Elsinore;T	CA	5	90	V	strike slip	0	14	52
11.45	San Jacinto;SBV+SJV+A+CC	CA	n/a	90	V	strike slip	0	16	181
11.45	San Jacinto;SBV+SJV+A+C	CA	n/a	90	V	strike slip	0	17	181
11.45	San Jacinto;SBV+SJV+A	CA	n/a	90	V	strike slip	0	16	134
11.45	San Jacinto;SJV+A+CC	CA	n/a	90	V	strike slip	0	16	136
11.45	San Jacinto;SJV+A+C	CA	n/a	90	V	strike slip	0	17	136
11.45	San Jacinto;SJV+A	CA	n/a	90	V	strike slip	0	17	89
11.45	San Jacinto;SBV+SJV+A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	241
11.45	San Jacinto;SBV+SJV+A+CC+B	CA	n/a	90	V	strike slip	0.1	15	215
11.45	San Jacinto;SJV+A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	196

11.45	San Jacinto;SJV+A+CC+B	CA	n/a	90	V	strike slip	0.1	15	170
12.01	San Jacinto;SJV	CA	18	90	V	strike slip	0	16	43
12.01	San Jacinto;SBV+SJV	CA	n/a	90	V	strike slip	0	16	88
19.04	San Jacinto;SBV	CA	6	90	V	strike slip	0	16	45
22.54	Chino, alt 2	CA	1	65	SW	strike slip	0	14	29
23.98	Elsinore;W	CA	2.5	75	NE	strike slip	0	14	46
24.79	S. San Andreas;NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	13	213
24.79	Chino, alt 1	CA	1	50	SW	strike slip	0	9	24
24.79	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	512
24.79	S. San Andreas;SSB+BG	CA	n/a	71		strike slip	0	13	101
24.79	S. San Andreas;NSB+SSB+BG+CO	CA	n/a	79		strike slip	0.2	12	206
24.79	S. San Andreas;CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	322
24.79	S. San Andreas;CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	85		strike slip	0	14	380
24.79	S. San Andreas;CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	449
24.79	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	384
24.79	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	86		strike slip	0	14	442
24.79	S. San Andreas;NM+SM+NSB+SSB+BG	CA	n/a	83		strike slip	0	14	271
24.79	S. San Andreas;NM+SM+NSB+SSB+BG+CO	CA	n/a	84		strike slip	0.1	13	340
24.79	S. San Andreas;NSB+SSB	CA	n/a	90	V	strike slip	0	13	79
24.79	S. San Andreas;NSB+SSB+BG	CA	n/a	75		strike slip	0	14	136

24.79	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0.1	13	421
24.79	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	86		strike slip	0.1	13	479
24.79	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	548
24.79	S. San Andreas;SM+NSB+SSB	CA	n/a	90	V	strike slip	0	13	176
24.79	S. San Andreas;SM+NSB+SSB+BG	CA	n/a	81		strike slip	0	13	234
24.79	S. San Andreas;SM+NSB+SSB+BG+CO	CA	n/a	83		strike slip	0.1	13	303
24.79	S. San Andreas;SSB	CA	16	90	V	strike slip	0	13	43
24.79	S. San Andreas;SSB+BG+CO	CA	n/a	77		strike slip	0.2	12	170
24.79	S. San Andreas;BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	263
24.79	S. San Andreas;BB+NM+SM+NSB+SSB+BG	CA	n/a	84		strike slip	0	14	321
24.79	S. San Andreas;BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	85		strike slip	0.1	13	390
26.4	S. San Andreas;BG+CO	CA	n/a	72		strike slip	0.3	12	125
26.4	S. San Andreas;BG	CA	n/a	58		strike slip	0	13	56
28.06	S. San Andreas;BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	220
28.06	S. San Andreas;CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	279
28.06	S. San Andreas;NSB	CA	22	90	V	strike slip	0	13	35
28.06	S. San Andreas;SM+NSB	CA	n/a	90	V	strike slip	0	13	133
28.06	S. San Andreas;CH+CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	341
28.06	S. San Andreas;NM+SM+NSB	CA	n/a	90	V	strike slip	0	13	170

28.06	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0.1	13	377
29.62	Elsinore;J	CA	3	84	NE	strike slip	0	19	75
29.62	Elsinore;J+CM	CA	3	84	NE	strike slip	0	17	118
29.9	San Joaquin Hills	CA	0.5	23	SW	thrust	2	13	27
33.36	Cucamonga	CA	5	45	N	thrust	0	8	28
34.27	Pinto Mtn	CA	2.5	90	V	strike slip	0	16	74
36.79	Cleghorn	CA	3	90	V	strike slip	0	16	25
37.33	Newport-Inglewood (Offshore)	CA	1.5	90	V	strike slip	0	10	66
37.33	Newport Inglewood Connected alt 1	CA	1.3	89		strike slip	0	11	208
37.33	Newport Inglewood Connected alt 2	CA	1.3	90	V	strike slip	0	11	208
38.59	San Jose	CA	0.5	74	NW	strike slip	0	15	20
39.78	North Frontal (West)	CA	1	49	S	reverse	0	16	50
40.6	Puente Hills (Coyote Hills)	CA	0.7	26	N	thrust	2.8	15	17
41.18	Sierra Madre	CA	2	53	N	reverse	0	14	57
41.18	Sierra Madre Connected	CA	2	51		reverse	0	14	76
41.65	San Jacinto;CC+B	CA	n/a	90	V	strike slip	0.2	14	77
41.65	San Jacinto;CC+B+SM	CA	n/a	90	V	strike slip	0.2	14	103
41.65	San Jacinto;CC	CA	4	90	V	strike slip	0	16	43
42.56	San Jacinto;C	CA	14	90	V	strike slip	0	17	47
44.04	Newport-Inglewood, alt 1	CA	1	88		strike slip	0	15	65
44.6	S. San Andreas;NM+SM	CA	n/a	90	V	strike slip	0	14	134
44.6	S. San Andreas;PK+CH+CC+BB+NM+SM	CA	n/a	90	V	strike slip	0.1	13	342
44.6	S. San Andreas;BB+NM+SM	CA	n/a	90	V	strike slip	0	14	184
44.6	S. San Andreas;CH+CC+BB+NM+SM	CA	n/a	90	V	strike slip	0	14	306
44.6	S. San Andreas;SM	CA	29	90	V	strike slip	0	13	98
44.6	S. San Andreas;CC+BB+NM+SM	CA	n/a	90	V	strike slip	0	14	243
44.97	Rose Canyon	CA	1.5	90	V	strike slip	0	8	70
45.34	Helendale-So Lockhart	CA	0.6	90	V	strike slip	0	13	114
46.48	North Frontal (East)	CA	0.5	41	S	thrust	0	16	27

47.6	Burnt Mtn	CA	0.6	67	W	strike slip	0	16	21
49.55	Puente Hills (Santa Fe Springs)	CA	0.7	29	N	thrust	2.8	15	11

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

^ Input

Edition

Conterminous U.S. 2008 (v3.2.x)

Spectral Period

Peak Ground Acceleration

Latitude

Decimal degrees

33.7441

Time Horizon

Return period in years

475 Travel Plaza Perris

Longitude

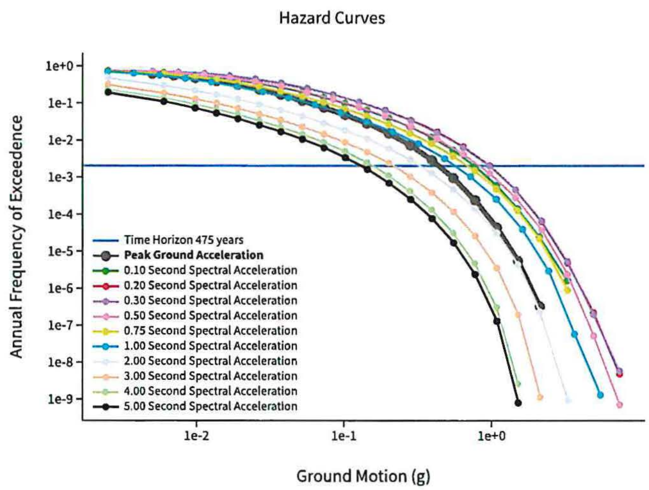
Decimal degrees, negative values for western longitudes

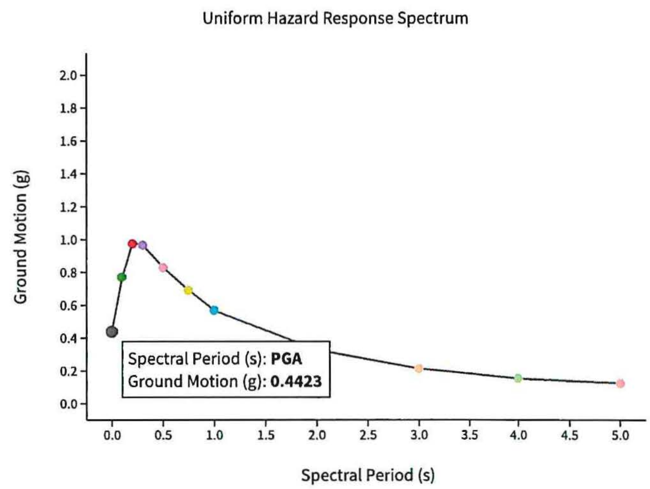
-117.1868

Site Class

259 m/s (Site class D)

Hazard Curve





View Raw Data

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

^ Input

Edition

Conterminous U.S. 2008 (v3.2.x)

Spectral Period

Peak Ground Acceleration

Latitude

Decimal degrees

33.7441

Time Horizon

Return period in years

975 Travel Plaza Perris

Longitude

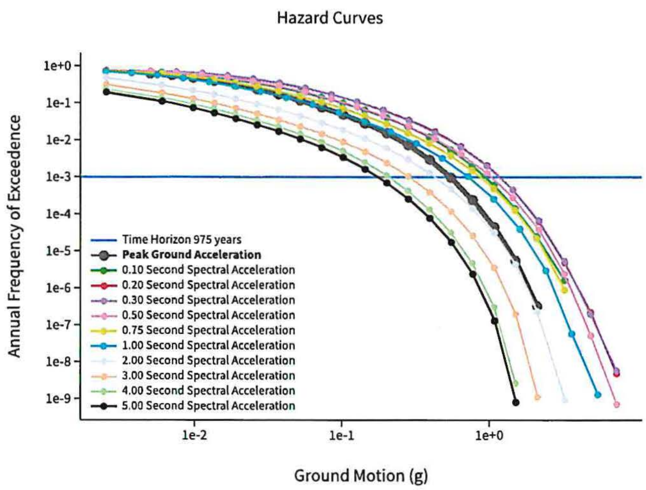
Decimal degrees, negative values for western longitudes

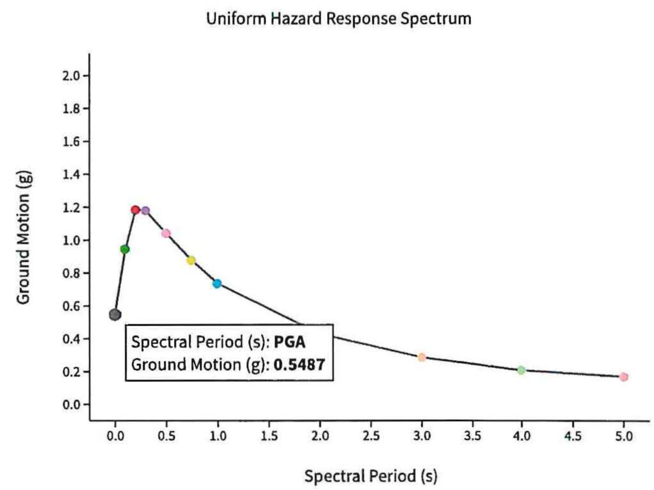
-117.1868

Site Class

259 m/s (Site class D)

Hazard Curve





View Raw Data

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

^ Input

Edition

Conterminous U.S. 2008 (v3.2.x)

Spectral Period

Peak Ground Acceleration

Latitude

Decimal degrees

33.7441

Time Horizon

Return period in years

2475 Travel Plaza Perris

Longitude

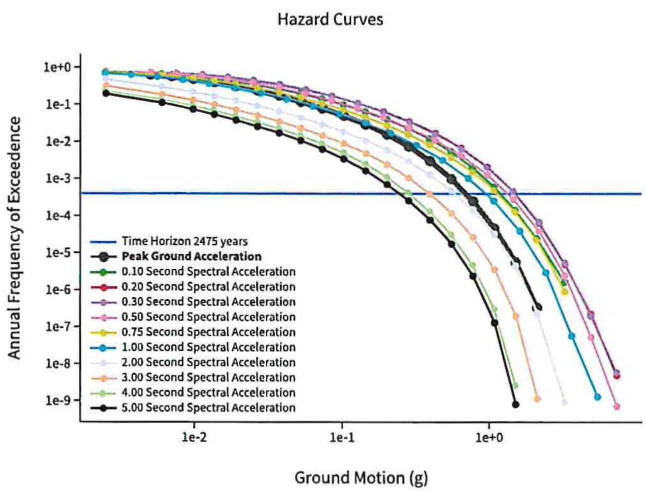
Decimal degrees, negative values for western longitudes

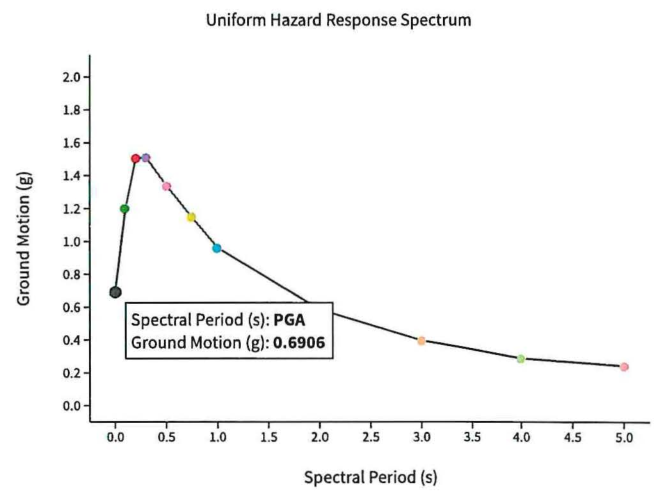
-117.1868

Site Class

259 m/s (Site class D)

^ Hazard Curve



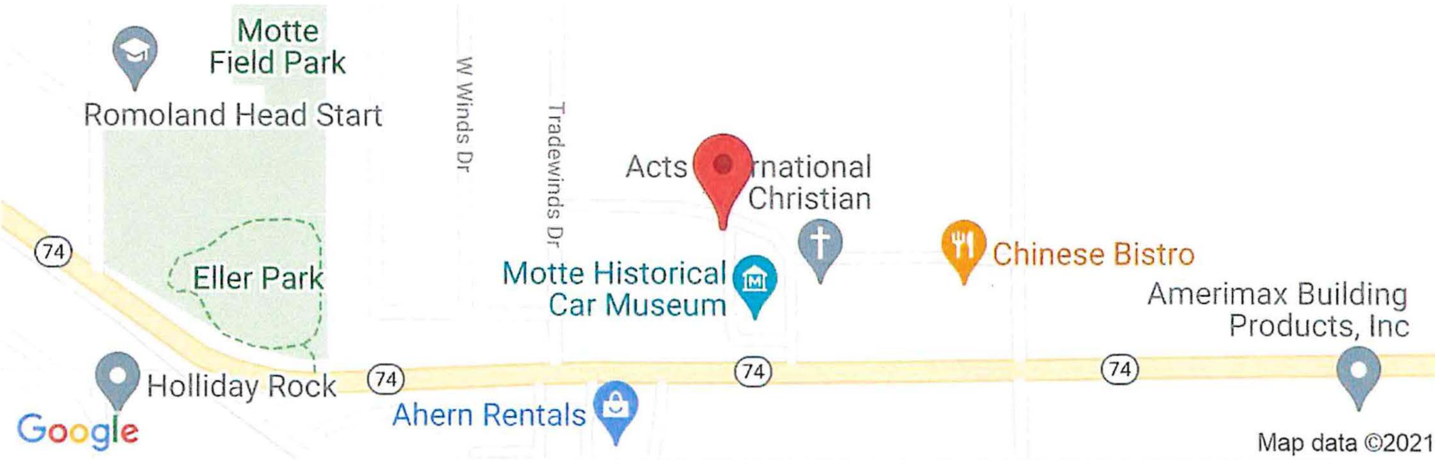


View Raw Data

OSHPD

Travel Plaza Perris

Latitude, Longitude: 33.7441, -117.1658



Date	5/28/2021, 10:30:36 AM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Default (See Section 11.4.3)

Type	Value	Description
S_S	1.428	MCE_R ground motion. (for 0.2 second period)
S_1	0.532	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.714	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.143	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.5	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.6	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.428	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.531	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.532	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.581	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.933	Mapped value of the risk coefficient at short periods
C_{R1}	0.915	Mapped value of the risk coefficient at a period of 1 s

DISCLAIMER

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Appendix C

Recommended Earthwork Specifications

RECOMMENDED EARTHWORK SPECIFICATIONS

1.0 General

1.1 Description

1.1.1 These specifications cover preparation of the subject site to receive fills, the type of soils suitable for use in fills, the compaction standards, and the methods of testing compacted fills.

1.1.2 The Contractor shall furnish all labor, supervision, equipment, operations, and materials to excavate to the required grade, support existing underground facilities, stockpile material, compact fill and backfill, and fine grade. The work of the Contractor shall include all clearing and grubbing, removing existing unsatisfactory material, preparing areas to be filled, spreading and compacting of fill in the areas to be filled and all other work necessary to complete the grading of the filled areas. It shall be the Contractor's responsibility to place, spread, moisten or dry, and compact the fill in strict accordance with these specifications to the lines and grades indicated on project plans or as directed in writing by the Civil Engineer.

1.1.3 Deviations from these specifications will be permitted only upon written authorization from the Owner or his representative.

1.2 Role of the Geotechnical Engineer

1.2.1 Construction - The Owner will employ a Geotechnical Consultant to observe and test this work as it is being performed. The Contractor shall cooperate with the Geotechnical Consultant and allow his unrestricted access to the site as required for the performance of his duties.

The Contractor shall provide a minimum notice of 48 hours to the Geotechnical Engineer before beginning or restarting earthwork operations that will require the presence of the Geotechnical Engineer or his representative on site.

1.2.2 Subsurface Investigations - A geotechnical engineering report for design purposes was prepared by Geotechnical Solutions, Inc., Irvine, California. Any recommendations made in the geotechnical report or subsequent reports are made part of these specifications. These reports are available for review upon request to the Owner.

1.2.3 Observation and Testing - The Geotechnical Engineer's representative shall observe the clearing and grubbing, excavation, filling and compacting operations and shall take density tests in the fill material so that he can state his opinion as to whether or not the fill was constructed in accordance with the specifications. All fill will be tested shortly after its placement to ascertain that the required compaction is achieved. A minimum of one density test will be made on each 500 cubic yards of fill placed, with a minimum of at least one test per every 2 feet of vertical height of fill. If the surface is disturbed, the density tests shall be made in the compacted materials below the disturbed zone. When these tests indicate that the density or water content of any layer of fill or portion thereof does not meet the specified density or water content, the particular layer or portions thereof shall be reworked until the specified density and water content have been obtained.

After the completion of grading, the Geotechnical Engineer will prepare a written opinion of grading. Neither the testing performed by the Geotechnical Consultant nor his opinion as to whether or not the fill was constructed in accordance with these Specifications shall relieve the Contractor of his responsibility to construct the fills in accordance with the Contract Documents.

1.3 Reference Standards

The following ASTM (American Society for Testing and Materials) codes and standards shall be used to the extent indicated by references herein. The most recent revision of the standards shall be used.

D 1556 - "Standard Test Method for Density of Soil in Place by the Sand-Cone Method"

D1557 - "Standard Test Methods for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10-lb (4.54 kg) and 18-inch (457-mm) Drop"

D2216 - "Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures"

D4318 - "Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils"

D4718 - "Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles"

D4829 - "Standard Test Method for Expansion Index of Soils"

D4944 - "Standard Test Method for Field Determination of Water (Moisture) Content of Soil by the Calcium Carbide Gas Pressure Tester Method."

D5195 - "Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)"

D6938 - "Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)"

D7928 - "Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis"

1.4 Degree of Fill Compaction

The degree to which fill is to be compacted is expressed in terms of "relative compaction." Relative compaction is defined as the ratio; expressed in percent, of the in-place dry density of the compacted fill to the reference maximum dry density. The reference maximum dry density shall be obtained following ASTM D1557. Optimum water content shall be obtained in the same test used to obtain the reference maximum dry density. Correction of the maximum dry density and optimum water content for

oversize particles of gravel and cobbles shall be made following ASTM D4718 when, in the opinion of the Geotechnical Engineer, such correction is appropriate. The in-place density shall be obtained following ASTM D1556 (sand cone method) or ASTM D6938 (nuclear method-shallow depth) test method. The in-place water content shall be obtained following ASTM D4944 (calcium carbide gas pressure meter), ASTM D5195 (nuclear method-shallow depth), or ASTM D2216 (oven drying). Correction of the in-place density and water content for oversize particles of gravel and cobbles shall be made following ASTM D4718 when, in the opinion of the Geotechnical Engineer, such correction is appropriate.

If any of the test methods specified in this section are judged by the Geotechnical Engineer to be impractical or unreliable because the material has a coarse particle size distribution, or for other reasons, the Geotechnical Engineer shall establish other procedures to obtain the required soil characteristics.

2.0 Products

2.1 Materials

2.1.1 General - During grading operations, soil types other than those identified in the geotechnical investigation report may be encountered by the Contractor. Consult the Geotechnical Consultant for his evaluation of the suitability of using these soils a fill material prior to placement or disposal.

2.1.2 General Fill - Materials for compacted fill shall consist of material imported from outside the site or excavated from the site that, in the opinion of the Geotechnical Engineer, is suitable for use in constructing engineered fills. The material shall not contain rocks or hard lumps greater than 6 inches in maximum dimension, and at least 70 percent (by weight) of its particles shall pass through a U.S. Standard 3/8 inch sieve. Material greater than 3 inches, but less than 6 inches in maximum dimension, shall be placed by the Contractor so that it is completely surrounded by compacted, finer material;

no nesting of rocks shall be permitted. Do not use any perishable, spongy, hazardous, or other undesirable materials as fill.

2.1.3 Select Fill - Select fill shall meet all criteria for general fill but shall also contain no rocks or hard lumps greater than 3 inches in maximum dimension, and at least 80 percent (by weight) shall pass through a U.S. Standard 3/8-inch sieve. The expansion index of select material shall be less than 50 (i.e., 5.0 percent swell) when tested in accordance with ASTM D4829.

3.0 Execution

3.1 Clearing and Grubbing

Within the project limits, tile Contractor shall demolish structures as specified on the Drawings.

Unless otherwise indicated on the Drawings or by the Owner in writing, the Contractor shall clear and grub all trees, stumps, roots, brush, grass, and other vegetation within construction, fill and stockpile areas to a minimum depth of 3 feet below the existing ground surface or below finished grade, whichever is deeper, unless otherwise recommended by the Geotechnical Engineer's Field Representative.

Remove cleared and grubbed materials from the site and dispose of them legally. No onsite burning or burying of cleared and grubbed materials is permitted. No placement of cleared and grubbed materials in topsoil stockpiles is permitted. No mulching of branches or roots is permitted. Incorporating vegetative matter into stockpiled materials, which are to be used in fill, is not permitted.

Stockpile organic-laden topsoil separate from other fill materials.

Remove any remaining vegetative matter from the deeper excavated soils, which may result from roots deeper than those encountered during clearing and grubbing operations.

All material thereby removed shall be piled at a location away from the immediate work area so as to avoid burying of piled material.

3.2 Compacted Fills

3.2.1 Preparing Areas to be Filled - Brush, grass, and other objectionable materials shall be collected, piled, and disposed of as indicated in Section 3.1 by the Contractor so as to leave the areas that have been cleared with a neat and finished appearance, free from unsightly debris.

Remove all loose soil, uncertified fill, landslide debris, and weathered bedrock to firm material or in-situ bedrock, as approved by the Geotechnical Consultant. The Contractor shall obtain approval from the Geotechnical Engineer or his representative of stripping and site preparation before the compaction of any fill subgrade begins. The surface shall then be scarified to a minimum depth of 6 inches until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment used, and shall be brought to the specified water content and relative compaction. Compact scarified materials to a minimum relative compaction of 90 percent, relative to ASTM D1557, prior to placement of any fill material.

3.2.2 Placing, Spreading, and Compacting, Fill Material - Onsite soil obtained from removals, borrow, or cut areas may be reused as compacted fill provided it is free from deleterious debris and meets the other requirements of the "Materials" portion of this Specification Section.

Use of soil containing deleterious debris from the clearing and grubbing operation or from other sources is not permitted. The fill materials shall be placed by the Contractor in horizontal layers not greater than 8 inches thick, measured before compaction. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to obtain uniformity of material and moisture in each layer. The moisture content of material used for compacted fill should be adjusted to be at or above optimum water content as determined by ASTM D1557. When the water content of the fill material is too high, the

fill materials shall be aerated by the Contractor by blading, mixing, or other satisfactory methods until the water content is as specified.

After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted by the Contractor to a relative compaction of at least 90 percent of the maximum dry density as determined by ASTM D1557 for general fill, and 95 percent of the maximum dry density as determined by ASTM D1557 for select fill, compacted fill pads, and the upper 1 foot of pavement subgrade. Compaction shall be accomplished by: sheepsfoot rollers; vibratory rollers; multiple-wheel, pneumatic-tired rollers; or other types of acceptable compacting equipment. Equipment shall be of such design that it is able to compact the fill to the specified density. Compaction shall be continuous over the entire area, and the equipment shall make sufficient passes to obtain the desired density uniformly. All fill placed on site shall be treated in like manner until finished grades are attained. Jetting, puddling, and hydro consolidation techniques shall not be used, including backfill of utility trenches.

The placement of topsoil is subject to the approval of the Geotechnical Engineer. Topsoil shall not be placed beneath concrete flatwork, beneath or behind retaining walls, or within structural fill. All topsoil material is subject to the same moisture conditioning, placement, and compaction requirements as General Fill. Roots, branches and other organic debris are not permitted within the compacted topsoil layer.

When backfilling around footings and compacting behind retaining walls and flexible retaining structures, the Contractor shall use lightweight compaction equipment such as hand-operated equipment, shoring, or other means to avoid over-stressing structural walls. When using lightweight compaction equipment, the fill materials shall be spread in horizontal layers not greater than 6 inches thick, measured before compaction.

As an alternative, sand-cement slurry may be used to backfill trenches. The slurry shall have minimum cement content of 3 sacks per cubic yard within the zone of influence of foundations and other settlement sensitive structures. A minimum of 2 sacks per cubic

yard of slurry shall be used elsewhere within building limits, and a minimum of one sack per cubic yard of slurry shall be used elsewhere. Slurry shall not be used in those areas where such placement would result in the obstruction of water flow, and is subject to the approval of the Geotechnical Engineer.

3.3 Protection of Work and Adjacent Properties

3.3.1 During Construction - The Contractor shall grade all excavated surfaces to provide good drainage away from construction slopes and prevent ponding of water. He shall control surface water and the transport of silt and sediment to avoid damage to adjoining properties or to finished work on the site. The Contractor shall take remedial measures to prevent erosion of freshly graded areas until such time as permanent drainage and erosion control measures have been installed.

Dispose of all water resulting from dewatering operations legally and in ways that will not cause damage to public or private property, or constitute a nuisance or menace to the public, in accordance with municipal requirements.

The Contractor shall make every effort to minimize the amount of dust raised in excavating, on haul roads and access roads, and all other work areas in the course of construction activities.

Protect benchmarks, monuments, and other reference points against displacement or damage. Repair or replace benchmarks, monuments, and other permanent survey data that become displaced or damaged due to the performance of this work.

3.3.2 After Completion - After earthwork is completed and the, Geotechnical Engineer has finished his observations of the work, no further excavation, filling or backfilling shall be performed except under the observation of the Geotechnical Engineer.

GEOTECHNICAL ADDENDUM REPORT

TRAVEL PLAZA
PERRIS

AT

CORNER OF TRUMBLE ROAD &
ETHANAC ROAD
PERRIS, CALIFORNIA

PREPARED FOR:

BROADBENT, INC.
WEST PACIFIC AVENUE
HENDERSON, NEVADA, 89015

PROJECT NO: G-5908-01

JUNE 11, 2021

PREPARED BY:

GEOTECHNICAL SOLUTIONS, INC.
GEOTECHNICAL & ENVIRONMENTAL
ENGINEERING

June 11, 2021

Project No: G-5908-01

Broadbent, Inc.
8 West Pacific Avenue
Henderson, Nevada, 89015

Attention: Mr. Mark E. Kazelskis, PG, CHG, CEM
Principal Geologist

Via Email: mkazelskis@broadbentinc.com

Re: Geotechnical Engineering Addendum Report
Travel Plaza - Perris
Corner of Trumble Road &
Ethanac Road
Perris, California 92570

Gentlemen:

Submitted herewith is the addendum report to our geotechnical engineering report dated June 11, 2021 conducted by this office for Travel Plaza Perris at the referenced project site.

Recommendations regarding over excavation have been included in this addendum report for the Travel Plaza Perris located just northwest of the intersection of Trumble Road and Ethanac Road, just west of Trumble Road in Perris, San Bernardino County, California as shown on Vicinity Map (Plate A) and Google Map (Plate C).

Site Clearing

Prior to grading, all debris, grass, weeds including construction materials should entirely be removed from the site and disposed of off-site. Existing any undesirable materials should also be removed and hauled off-site. Existing utilities (if Any) should be removed and relocated as required. Any construction debris or ant buried or other contaminated exposed during site clearance should be removed and hauled away from the site. The resulting excavation from any removal should be cleared of loose material then backfilled with compacted soil. Oversized rocks greater than 6 inches should be removed.

Excavation

Excavations into the on-site soils may encounter a variety of challenges for example, very firm and dense to very dense alluvial soils. Some Caving on clean sands may be encountered. The contractor should be made responsible for designing and constructing stable, temporary excavations as required to maintain stability of the excavation sides. All excavations should be sloped or shored in the interest of safety following local and federal regulations including current OSHA excavation and trench safety standards.

Heavy equipments for breaking the very dense alluvial materials may be required for the excavations for shallow foundations, drilled shafts, and utility trenches for the proposed construction. The speed and ease of excavation are dependent on the nature of the deposit, the type of equipment used, and the skill and experience of the equipment operator.

Building Pad Over-excavation (Above Ground Storage Tanks, AST's)

After removal of existing debris, the above ground storage tank areas should be over-excavated at least 3 feet below the lowest grade or 24 inches below the bottom of the footings whichever is greater. Excavation should be extended 3-feet outside building perimeters. Over-excavation may be hard due to the presence of very dense alluviums, therefore heavy equipments may be required. Remove and replace any loose or disturbed soils prior to placing any additional fill materials required to reach the finished subgrade elevations. The over-excavation should be backfilled to the foundation base elevation with the compacted engineering fill in accordance with the recommendations presented in this report.

Compliance

Recommendations for foundations and slabs-on-grade supported on compacted fills or prepared subgrade depend upon compliance with the General Grading and Recommended Earthwork Specifications in Appendix B.

To assess compliance, observation and testing should be performed under the direction of a geotechnical engineer. Please contact us to provide observation and testing services.

Backfill Materials

On-site clean, low-expansive potential soils, or imported materials may be used as fill material for the following:

- Foundation Areas
- Interior Slab Areas
- Pavement Areas
- Backfill

Any earth materials imported or excavated on the property may be utilized in the fill provided that each material has been determined to be suitable by the soil engineer. These materials should be free of roots, tree branches, other organic matter or other deleterious materials. Soils of poor gradation, undesirable expansion potential, or substandard strength characteristics may be designated by the consultant as unsuitable and may require blending with other soils to serve as a satisfactory fill material. Also, rocks of sizes bigger than 3 inches should be discarded for the site material to be used for backfill.

Gradation (as per ASTM C136) should be as follows:

Size	% by Weight
6"	100

4"	85-100
¾"	70-100
No 4 Sieve	50-100
No. 200 Sieve	15 (max)

Any import material should have an expansion Index, EI less than 20. Import material should also meet the following criteria:

Soil Properties	**Values**
Liquid Limit	35 (Max)
Plastic Limit	6 (Max)

Placement and Compaction

Place and compact approved fill material in nearly horizontal layers that when compacted should not exceed 6 inches in thickness.

Use appropriate equipment and procedures that will produce recommended densities and water contents throughout the lift. Moisture condition, blending, and mixing of the fill layer should continue until the fill materials have a uniform moisture content at or above optimum moisture.

Uncompacted fill lifts should not exceed 8 inches.

Materials should be compacted to the following:

On-site or imported soil, reworked and fill:	Minimum % (ASTM D-1557 Laboratory Standard)
Subgrade Below Footings	90
Subgrade Below Slab-on Grade	90
Subgrade Below Pavement	90
Crush Rock Below Slab-on-Grade	95
Aggregate Base below pavement	95

Excavations at Pavement Areas

Subgrade Preparation

After removing the existing deleterious materials, dense to very dense alluvial materials on the pavement areas and hauled offsite, all surficial deposits of loose soil material should be removed and excavate 12 inches below the base and recompacted as recommended. The bottom is further scarified to a depth of at least 6 inches; moisture conditioned as necessary and compacted to 90 percent of the maximum laboratory density as determined by ASTM Test Method D-1557.

Deleterious material, excessively wet or dry pockets, and any other unsuitable materials encountered during excavation or grading should be removed. The compacted fill material should then be brought to the elevation of the proposed subgrade for the pavement. The subgrade should be proof-rolled in order to ensure a uniform, firm and unyielding surface. All grading and fill placement should be observed by the project soils engineer and/or his representative.

Aggregate Base

Compaction and rolling are required for the recommended base section. Minimum relative compaction required will be 95 percent of the laboratory maximum density as determined by ASTM Test Designation D-1557. Aggregate base should be in accordance with 200-2.2 crushed Aggregate base Class II base (minimum R-value=78) and sample should be brought for testing and approval prior to delivery to the site. No crushed miscellaneous base (CMB) should be accepted.

Asphalt Concrete Pavement

Asphalt concrete pavement should be Performance Grade PG 64-10 1/2" maximum aggregate size and should be placed and compacted in two layers. Asphalt concrete shall be compacted to 95 percent of the Hveem Laboratory Standard.

Earthwork Observations:

Relative compaction of all fill materials placed on site should be tested in accordance with ASTM D6938. All new fill shall be brought to near optimum moisture, placed in layers not exceeding six inches in thickness, and compacted to at least 90 percent relative compaction for subgrade and 95 percent relative compaction for aggregate base. No jetting or water tamping of fill soils shall be permitted. All imported soil for engineered fill should be pre-approved by the Geotechnical Engineer and consist of clean, granular, non-expansive soil, free of vegetation and other debris with an Expansion Index of 20 or less.

At all times, the contractor should have a responsible field superintendent on the project in full charge of the work, with authority to make decisions. He should cooperate fully with the Geotechnical Engineer in carrying out the work.

All footing trenches for continuous and spread footings and subgrade for the slab areas should be observed by the project Geotechnical Engineer to verify that over-excavation and re-compaction operations of adequate depth, thickness, and compaction have been performed as specified. All footing excavations should be trimmed neat, level and square. All loose, sloughed or moisture softened soil should be removed and replaced with properly compacted soil.

General Grading

All grading should conform to the guidelines presented in the California Building Code (CBC, 2019), the City of Perris, San Bernardino County, International Conference of Building Officials (ICBO, 2018), and Appendix B in this report, except where specifically superceded in the text of this report. When code references are not equivalent, the more stringent code should be followed. During earthwork construction, all site preparation and the general grading procedures of the contractor should be observed, and the fill selectively tested by a representative (s) of Geotechnical Solutions, Inc. (GSI). If unusual or unexpected conditions are exposed in the field, they should be reviewed by this office and if warranted, modified and /or additional recommendations will be offered. All applicable requirements of local and national construction and general industry safety orders, the Occupational Safety and Health Act and the construction Safety Act should be met.

Closure

The Conclusions and recommendations contained herein are based on the findings and observations made at the test boring locations. It is not unusual to find conditions between and beyond such locations, which differ from the conditions encountered. If conditions are encountered during construction, which appear to differ from those previously disclosed, this office should be notified so as to consider the need for modifications. On-site construction observations and wherever appropriate, tests should be performed during the course of construction by a representative of this office to evaluate compliance with the design concepts, specifications, and recommendations contained herein.

This report has been compiled for the exclusive use of our client, it shall not be transferred to, or used by, other parties, or applied to any project on this site other than described herein without consent and /or thorough review by this office.

The investigation was made in accordance with generally accepted geotechnical engineering principles and procedures and included such field and laboratory tests considered necessary under the circumstances.

In the opinion of the undersigned, the accompanying report has been substantiated by mathematical and other data and presents fairly the design information requested by your organization.

Respectfully Submitted,

Geotechnical Solutions, Inc.

Dharma Shakya, PhD, PE, GE
Principal Geotechnical Engineer

Abraham S. Baha, PE, M. ASCE
Sr. Principal

Distribution: (3+pdf) Addressee

References

Geotechnical Solutions, Inc., 2021, "Geotechnical Evaluation Report for Travel Plaza Perris, Located at the corner of Trumble Road and Ethanac Road, Perris, California", Project Number G-5908-01, dated June 11.

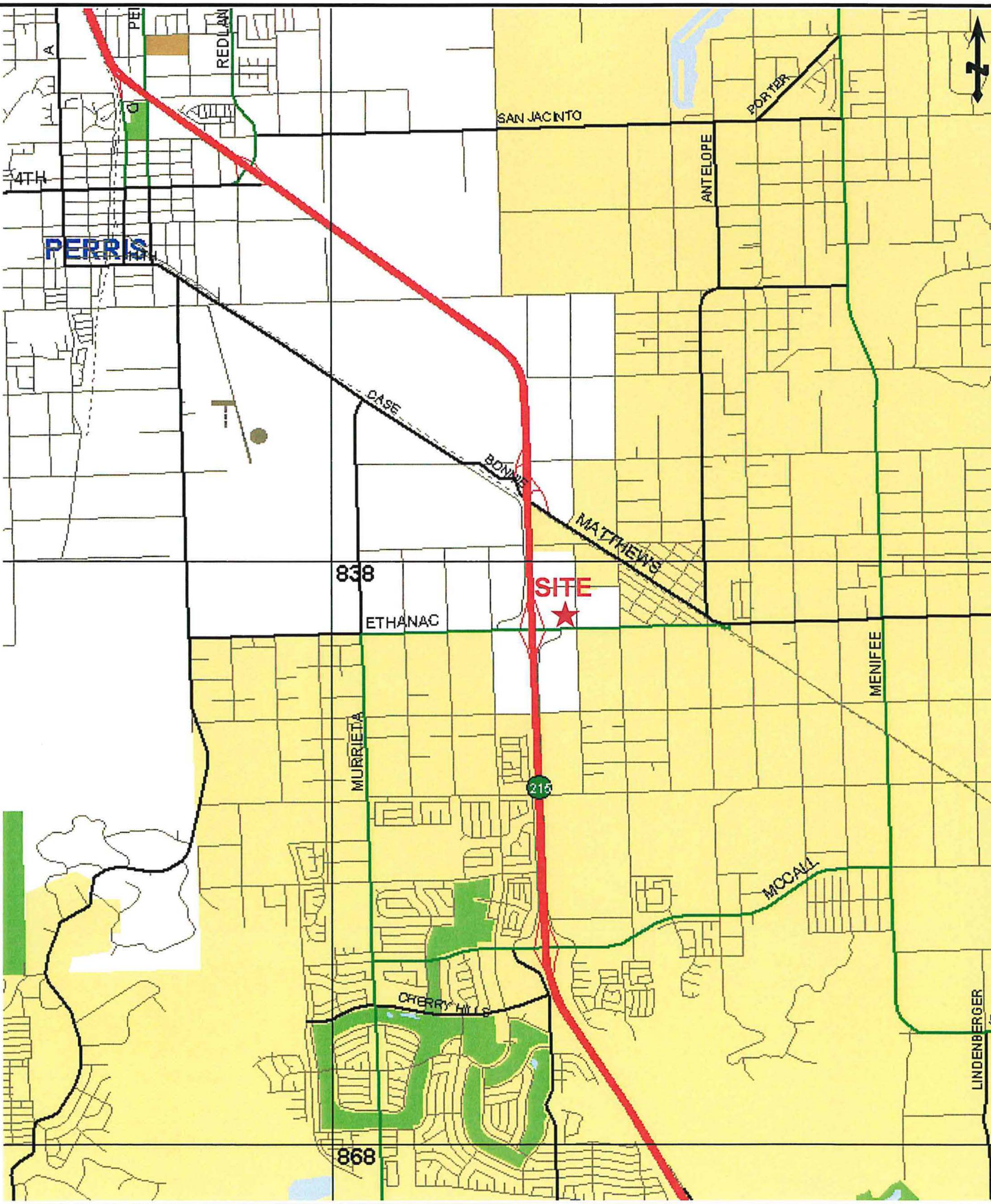
International Conference of Building Officials (ICBO), 2019, California Building Code, California Code of Regulations, Title 24, Part 2, Volume 2.

Appendix A

Plates

- **Vicinity Map**
- **Plot Plan**
- **Google Map**

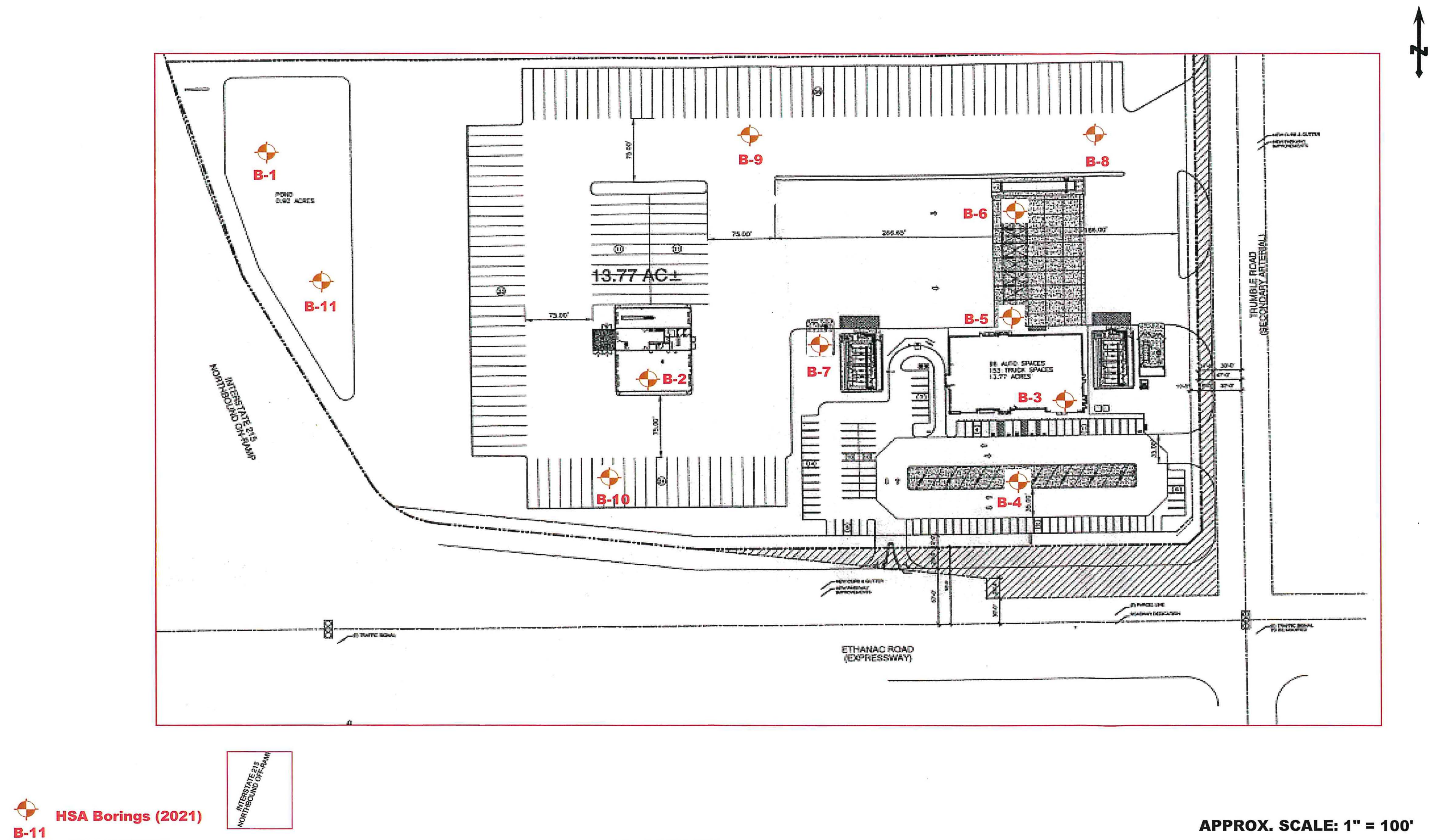
VICINITY MAP



Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	A

Geotechnical Solutions, Inc.

PLOT PLAN & BORING LOCATION MAP



APPROX. SCALE: 1" = 100'

Travel Plaza - Perris		Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California		Plate:	B

Geotechnical Solutions, Inc.

GOOGLE MAP

Travel Plaza - Perris	Project No.	G-5908-01
Corner of Trumble Road and Ethanac, Perris, California	Plate:	C

Geotechnical Solutions, Inc.

Appendix B

Recommended Earthwork Specifications

RECOMMENDED EARTHWORK SPECIFICATIONS

1.0 General

1.1 Description

1.1.1 These specifications cover preparation of the subject site to receive fills, the type of soils suitable for use in fills, the compaction standards, and the methods of testing compacted fills.

1.1.2 The Contractor shall furnish all labor, supervision, equipment, operations, and materials to excavate to the required grade, support existing underground facilities, stockpile material, compact fill and backfill, and fine grade. The work of the Contractor shall include all clearing and grubbing, removing existing unsatisfactory material, preparing areas to be filled, spreading and compacting of fill in the areas to be filled and all other work necessary to complete the grading of the filled areas. It shall be the Contractor's responsibility to place, spread, moisten or dry, and compact the fill in strict accordance with these specifications to the lines and grades indicated on project plans or as directed in writing by the Civil Engineer.

1.1.3 Deviations from these specifications will be permitted only upon written authorization from the Owner or his representative.

1.2 Role of the Geotechnical Engineer

1.2.1 Construction - The Owner will employ a Geotechnical Consultant to observe and test this work as it is being performed. The Contractor shall cooperate with the Geotechnical Consultant and allow his unrestricted access to the site as required for the performance of his duties.

The Contractor shall provide a minimum notice of 48 hours to the Geotechnical Engineer before beginning or restarting earthwork operations that will require the presence of the Geotechnical Engineer or his representative on site.

1.2.2 Subsurface Investigations - A geotechnical engineering report for design purposes was prepared by Geotechnical Solutions, Inc., Irvine, California. Any recommendations made in the geotechnical report or subsequent reports are made part of these specifications. These reports are available for review upon request to the Owner.

1.2.3 Observation and Testing - The Geotechnical Engineer's representative shall observe the clearing and grubbing, excavation, filling and compacting operations and shall take density tests in the fill material so that he can state his opinion as to whether or not the fill was constructed in accordance with the specifications. All fill will be tested shortly after its placement to ascertain that the required compaction is achieved. A minimum of one density test will be made on each 500 cubic yards of fill placed, with a minimum of at least one test per every 2 feet of vertical height of fill. If the surface is disturbed, the density tests shall be made in the compacted materials below the disturbed zone. When these tests indicate that the density or water content of any layer of fill or portion thereof does not meet the specified density or water content, the particular layer or portions thereof shall be reworked until the specified density and water content have been obtained.

After the completion of grading, the Geotechnical Engineer will prepare a written opinion of grading. Neither the testing performed by the Geotechnical Consultant nor his opinion as to whether or not the fill was constructed in accordance with these Specifications shall relieve the Contractor of his responsibility to construct the fills in accordance with the Contract Documents.

1.3 Reference Standards

The following ASTM (American Society for Testing and Materials) codes and standards shall be used to the extent indicated by references herein. The most recent revision of the standards shall be used.

D 1556 - "Standard Test Method for Density of Soil in Place by the Sand-Cone Method"

D1557 - "Standard Test Methods for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10-lb (4.54 kg) and 18-inch (457-mm) Drop"

D2216 - "Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures"

D4318 - "Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils"

D4718 - "Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles"

D4829 - "Standard Test Method for Expansion Index of Soils"

D4944 - "Standard Test Method for Field Determination of Water (Moisture) Content of Soil by the Calcium Carbide Gas Pressure Tester Method."

D5195 - "Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)"

D6938 - "Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)"

D7928 - "Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis"

1.4 Degree of Fill Compaction

The degree to which fill is to be compacted is expressed in terms of "relative compaction." Relative compaction is defined as the ratio; expressed in percent, of the in-place dry density of the compacted fill to the reference maximum dry density. The reference maximum dry density shall be obtained following ASTM D1557. Optimum water content shall be obtained in the same test used to obtain the reference maximum dry density. Correction of the maximum dry density and optimum water content for

oversize particles of gravel and cobbles shall be made following ASTM D4718 when, in the opinion of the Geotechnical Engineer, such correction is appropriate. The in-place density shall be obtained following ASTM D1556 (sand cone method) or ASTM D6938 (nuclear method-shallow depth) test method. The in-place water content shall be obtained following ASTM D4944 (calcium carbide gas pressure meter), ASTM D5195 (nuclear method-shallow depth), or ASTM D2216 (oven drying). Correction of the in-place density and water content for oversize particles of gravel and cobbles shall be made following ASTM D4718 when, in the opinion of the Geotechnical Engineer, such correction is appropriate.

If any of the test methods specified in this section are judged by the Geotechnical Engineer to be impractical or unreliable because the material has a coarse particle size distribution, or for other reasons, the Geotechnical Engineer shall establish other procedures to obtain the required soil characteristics.

2.0 Products

2.1 Materials

2.1.1 General - During grading operations, soil types other than those identified in the geotechnical investigation report may be encountered by the Contractor. Consult the Geotechnical Consultant for his evaluation of the suitability of using these soils a fill material prior to placement or disposal.

2.1.2 General Fill - Materials for compacted fill shall consist of material imported from outside the site or excavated from the site that, in the opinion of the Geotechnical Engineer, is suitable for use in constructing engineered fills. The material shall not contain rocks or hard lumps greater than 6 inches in maximum dimension, and at least 70 percent (by weight) of its particles shall pass through a U.S. Standard 3/8 inch sieve. Material greater than 3 inches, but less than 6 inches in maximum dimension, shall be placed by the Contractor so that it is completely surrounded by compacted, finer material;

no nesting of rocks shall be permitted. Do not use any perishable, spongy, hazardous, or other undesirable materials as fill.

2.1.3 Select Fill - Select fill shall meet all criteria for general fill but shall also contain no rocks or hard lumps greater than 3 inches in maximum dimension, and at least 80 percent (by weight) shall pass through a U.S. Standard 3/8-inch sieve. The expansion index of select material shall be less than 50 (i.e., 5.0 percent swell) when tested in accordance with ASTM D4829.

3.0 Execution

3.1 Clearing and Grubbing

Within the project limits, tile Contractor shall demolish structures as specified on the Drawings.

Unless otherwise indicated on the Drawings or by the Owner in writing, the Contractor shall clear and grub all trees, stumps, roots, brush, grass, and other vegetation within construction, fill and stockpile areas to a minimum depth of 3 feet below the existing ground surface or below finished grade, whichever is deeper, unless otherwise recommended by the Geotechnical Engineer's Field Representative.

Remove cleared and grubbed materials from the site and dispose of them legally. No onsite burning or burying of cleared and grubbed materials is permitted. No placement of cleared and grubbed materials in topsoil stockpiles is permitted. No mulching of branches or roots is permitted. Incorporating vegetative matter into stockpiled materials, which are to be used in fill, is not permitted.

Stockpile organic-laden topsoil separate from other fill materials.

Remove any remaining vegetative matter from the deeper excavated soils, which may result from roots deeper than those encountered during clearing and grubbing operations.

All material thereby removed shall be piled at a location away from the immediate work area so as to avoid burying of piled material.

3.2 Compacted Fills

3.2.1 Preparing Areas to be Filled - Brush, grass, and other objectionable materials shall be collected, piled, and disposed of as indicated in Section 3.1 by the Contractor so as to leave the areas that have been cleared with a neat and finished appearance, free from unsightly debris.

Remove all loose soil, uncertified fill, landslide debris, and weathered bedrock to firm material or in-situ bedrock, as approved by the Geotechnical Consultant. The Contractor shall obtain approval from the Geotechnical Engineer or his representative of stripping and site preparation before the compaction of any fill subgrade begins. The surface shall then be scarified to a minimum depth of 6 inches until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment used, and shall be brought to the specified water content and relative compaction. Compact scarified materials to a minimum relative compaction of 90 percent, relative to ASTM D1557, prior to placement of any fill material.

3.2.2 Placing, Spreading, and Compacting, Fill Material - Onsite soil obtained from removals, borrow, or cut areas may be reused as compacted fill provided it is free from deleterious debris and meets the other requirements of the "Materials" portion of this Specification Section.

Use of soil containing deleterious debris from the clearing and grubbing operation or from other sources is not permitted. The fill materials shall be placed by the Contractor in horizontal layers not greater than 8 inches thick, measured before compaction. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to obtain uniformity of material and moisture in each layer. The moisture content of material used for compacted fill should be adjusted to be at or above optimum water content as determined by ASTM D1557. When the water content of the fill material is too high, the

fill materials shall be aerated by the Contractor by blading, mixing, or other satisfactory methods until the water content is as specified.

After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted by the Contractor to a relative compaction of at least 90 percent of the maximum dry density as determined by ASTM D1557 for general fill, and 95 percent of the maximum dry density as determined by ASTM D1557 for select fill, compacted fill pads, and the upper 1 foot of pavement subgrade. Compaction shall be accomplished by: sheepsfoot rollers; vibratory rollers; multiple-wheel, pneumatic-tired rollers; or other types of acceptable compacting equipment. Equipment shall be of such design that it is able to compact the fill to the specified density. Compaction shall be continuous over the entire area, and the equipment shall make sufficient passes to obtain the desired density uniformly. All fill placed on site shall be treated in like manner until finished grades are attained. Jetting, puddling, and hydro consolidation techniques shall not be used, including backfill of utility trenches.

The placement of topsoil is subject to the approval of the Geotechnical Engineer. Topsoil shall not be placed beneath concrete flatwork, beneath or behind retaining walls, or within structural fill. All topsoil material is subject to the same moisture conditioning, placement, and compaction requirements as General Fill. Roots, branches and other organic debris are not permitted within the compacted topsoil layer.

When backfilling around footings and compacting behind retaining walls and flexible retaining structures, the Contractor shall use lightweight compaction equipment such as hand-operated equipment, shoring, or other means to avoid over-stressing structural walls. When using lightweight compaction equipment, the fill materials shall be spread in horizontal layers not greater than 6 inches thick, measured before compaction.

As an alternative, sand-cement slurry may be used to backfill trenches. The slurry shall have minimum cement content of 3 sacks per cubic yard within the zone of influence of foundations and other settlement sensitive structures. A minimum of 2 sacks per cubic

yard of slurry shall be used elsewhere within building limits, and a minimum of one sack per cubic yard of slurry shall be used elsewhere. Slurry shall not be used in those areas where such placement would result in the obstruction of water flow, and is subject to the approval of the Geotechnical Engineer.

3.3 Protection of Work and Adjacent Properties

3.3.1 During Construction - The Contractor shall grade all excavated surfaces to provide good drainage away from construction slopes and prevent ponding of water. He shall control surface water and the transport of silt and sediment to avoid damage to adjoining properties or to finished work on the site. The Contractor shall take remedial measures to prevent erosion of freshly graded areas until such time as permanent drainage and erosion control measures have been installed.

Dispose of all water resulting from dewatering operations legally and in ways that will not cause damage to public or private property, or constitute a nuisance or menace to the public, in accordance with municipal requirements.

The Contractor shall make every effort to minimize the amount of dust raised in excavating, on haul roads and access roads, and all other work areas in the course of construction activities.

Protect benchmarks, monuments, and other reference points against displacement or damage. Repair or replace benchmarks, monuments, and other permanent survey data that become displaced or damaged due to the performance of this work.

3.3.2 After Completion - After earthwork is completed and the, Geotechnical Engineer has finished his observations of the work, no further excavation, filling or backfilling shall be performed except under the observation of the Geotechnical Engineer.

Appendix 4: Historical Site Conditions

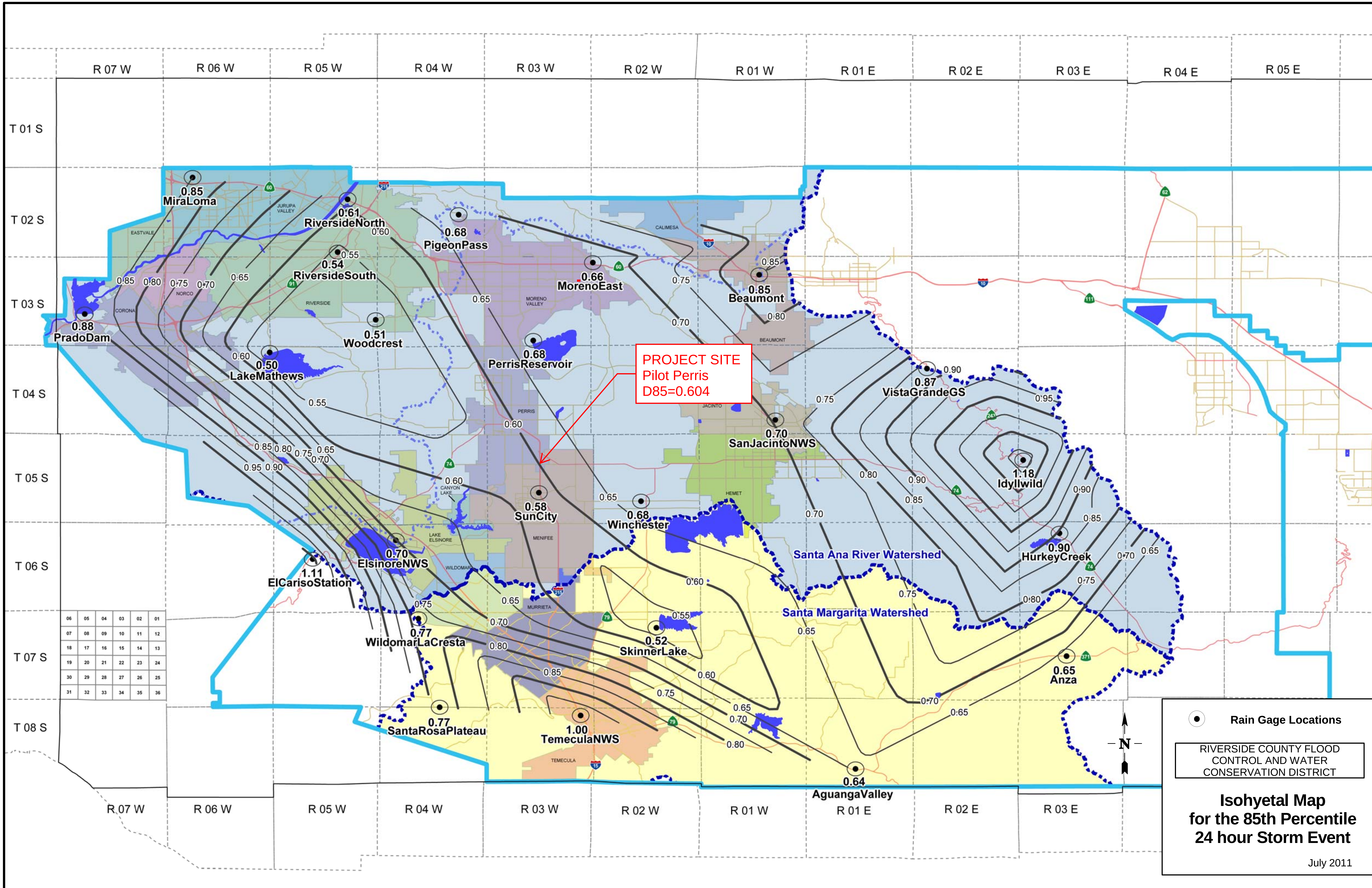
Phase I Environmental Site Assessment or Other Information on Past Site Use

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation


R 07 W
R 06 W
R 05 W
R 04 W
R 03 W
R 02 W
R 01 W
R 01 E
R 02 E
R 03 E
R 04 E
R 05 E
T 01 S
T 02 S
T 03 S
T 04 S
T 05 S
T 06 S
T 07 S
T 08 S
0.85
MiraLoma
0.61
RiversideNorth
0.68
PigeonPass
0.54
RiversideSouth
0.66
MorenoEast
0.85
Beaumont
0.88
PradoDam
0.51
Woodcrest
0.68
PerrisReservoir
0.50
LakeMathews
PROJECT SITE
Pilot Perris
D85=0.604
0.87
VistaGrandeGS
0.70
SanJacintoNWS
1.18
Idyllwild
0.58
SunCity
0.68
Winchester
0.90
HurkeyCreek
0.70
ElsinoreNWS
1.11
ElCarisoStation
Santa Ana River Watershed
Santa Margarita Watershed
0.77
WildomarLaCresta
0.52
SkinnerLake
0.65
Anza
0.77
SantaRosaPlateau
1.00
TemeculaNWS
0.64
AguangaValley
N
Rain Gage Locations
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
Isohyetal Map
for the 85th Percentile
24 hour Storm Event
July 2011

Santa Ana Watershed

V_{BMP} and Q_{BMP} worksheets

These worksheets are to be used to determine the required

Design Capture Volume (V_{BMP})
or the
Design Flow Rate (Q_{BMP})

for BMPs in the Santa Ana Watershed

To verify which watershed your project is located within, visit

www.rcflood.org/npdes

and use the 'Locate my Watershed' tool

If your project is not located in the Santa Ana Watershed,

Do not use these worksheets! Instead visit

www.rcflood.org/npdes/developers.aspx

To access worksheets applicable to your watershed

Use the tabs across the bottom
to access the worksheets for the Santa Ana Watershed

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: Kimley-Horn
Date: 3/9/2022
Designed by: XO
Case No:
Company Project Number/Name: Pilot Perris

BMP Identification

BMP NAME / ID: BMP-1

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.60 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
1A	*395,859*	*Concrete or Asphalt*	*1*	*0.89*	*353106.2*			
1B	*152,078*	*Ornamental Landscaping*	*0.1*	*0.11*	*16798.2*			
	547937	***Total***			**369904.4**	**0.60**	***18618.5***	***48,658***

Notes:

Effective Impervious Fraction

Developed Cover Types	Effective Impervious Fraction
Roofs	1.00
Concrete or Asphalt	1.00
Grouted or Gapless Paving Blocks	1.00
Compacted Soil (e.g. unpaved parking)	0.40
Decomposed Granite	0.40
Permeable Paving Blocks w/ Sand Filled Gap	0.25
Class 2 Base	0.30
Gravel or Class 2 Permeable Base	0.10
Pervious Concrete / Porous Asphalt	0.10
Open and Porous Pavers	0.10
Turf block	0.10
Ornamental Landscaping	0.10
Natural (A Soil)	0.03
Natural (B Soil)	0.15
Natural (C Soil)	0.30
Natural (D Soil)	0.40

Mixed Surface Types

Use this table to determine the effective impervious fraction for the V_{BMP} and Q_{BMP} calculation sheets

Bioretention Facility - Design Procedure	BMP ID	Legend:	Required Entries
	BMP-1		Calculated Cells

Company Name:	Kimley-Horn	Date:	3/9/2022
Designed by:	XO	County/City Case No.:	

Design Volume

Enter the area tributary to this feature A_T= 12.58 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook V_{BMP}= 18,619 ft^3

Type of Bioretention Facility Design

◉ Side slopes required (parallel to parking spaces or adjacent to walkways)

◯ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer d_S = 1.5 ft

Top Width of Bioretention Facility, excluding curb w_T = 100.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ d_E = 1.34 ft

Minimum Surface Area, A_m

$$A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$$

A_M = 13,864 ft^2

Proposed Surface Area A= 36,312 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility z = 4 :1

Diameter of Underdrain 6 inches

Longitudinal Slope of Site (3% maximum) 0 %

6" Check Dam Spacing 0 feet

Describe Vegetation: Other

Notes: Dual purpose Bioretention Basin for stormwater treatment and mitigation.Water quality ponding depth is 6" from basin bottom and basin top is at least 3.5' beyond that. There will be a riser outlet structure with an orifice and a grated top. The basin width varies but 100' was used as an average.

3.5 Bioretention Facility

Type of BMP	LID – Bioretention
Treatment Mechanisms	Infiltration, Evapotranspiration, Evaporation, Biofiltration
Maximum Drainage Area	This BMP is intended to be integrated into a project's landscaped area in a distributed manner. Typically, contributing drainage areas to Bioretention Facilities range from less than 1 acre to a maximum of around 10 acres.
Other Names	Rain Garden, Bioretention Cell, Bioretention Basin, Biofiltration Basin, Landscaped Filter Basin, Porous Landscape Detention

Description

Bioretention Facilities are shallow, vegetated basins underlain by an engineered soil media. Healthy plant and biological activity in the root zone maintain and renew the macro-pore space in the soil and maximize plant uptake of pollutants and runoff. This keeps the Best Management Practice (BMP) from becoming clogged and allows more of the soil column to function as both a sponge (retaining water) and a highly effective and self-maintaining biofilter. In most cases, the bottom of a Bioretention Facility is unlined, which also provides an opportunity for infiltration to the extent the underlying onsite soil can accommodate. When the infiltration rate of the underlying soil is exceeded, fully biotreated flows are discharged via underdrains. Bioretention Facilities therefore will inherently achieve the maximum feasible level of infiltration and evapotranspiration and achieve the minimum feasible (but highly biotreated) discharge to the storm drain system.

Siting Considerations

These facilities work best when they are designed in a relatively level area. Unlike other BMPs, Bioretention Facilities can be used in smaller landscaped spaces on the site, such as:

- ✓ Parking islands
- ✓ Medians
- ✓ Site entrances

Landscaped areas on the site (such as may otherwise be required through minimum landscaping ordinances), can often be designed as Bioretention Facilities. This can be accomplished by:

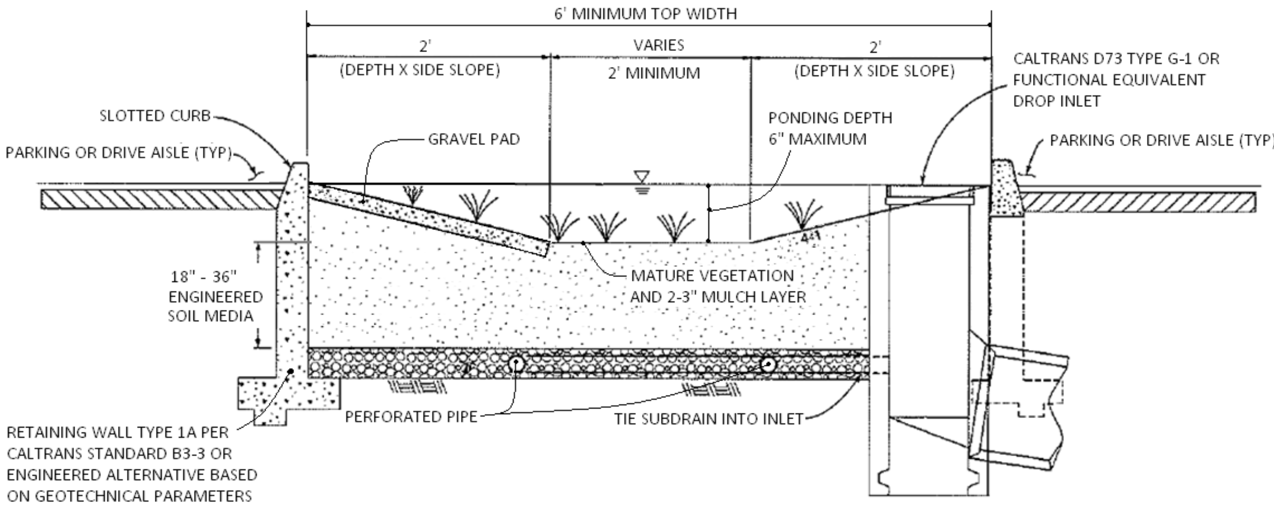
- *Depressing* landscaped areas below adjacent impervious surfaces, rather than elevating those areas
- Grading the site to direct runoff from those impervious surfaces *into* the Bioretention Facility, rather than away from the landscaping
- Sizing and designing the depressed landscaped area as a Bioretention Facility as described in this Fact Sheet

Bioretention Facilities should however not be used downstream of areas where large amounts of sediment can clog the system. Placing a Bioretention Facility at the toe of a steep slope should also be avoided due to the potential for clogging the engineered soil media with erosion from the slope, as well as the potential for damaging the vegetation.

Design and Sizing Criteria

The recommended cross section necessary for a Bioretention Facility includes:

- Vegetated area
- 18' minimum depth of engineered soil media
- 12' minimum gravel layer depth with 6' perforated pipes (added flow control features such as orifice plates may be required to mitigate for HCOC conditions)



While the 18-inch minimum engineered soil media depth can be used in some cases, it is recommended to use 24 inches or a preferred 36 inches to provide an adequate root zone for the chosen plant palate. Such a design also provides for improved removal effectiveness for nutrients. The recommended ponding depth inside of a Bioretention Facility is 6 inches; measured from the flat bottom surface to the top of the water surface as shown in Figure 1.

Because this BMP is filled with an engineered soil media, pore space in the soil and gravel layer is assumed to provide storage volume. However, several considerations must be noted:

- Surcharge storage above the soil surface (6 inches) is important to assure that design flows do not bypass the BMP when runoff exceeds the soil’s absorption rate.
- In cases where the Bioretention Facility contains engineered soil media deeper than 36 inches, the pore space within the engineered soil media can only be counted to the 36-inch depth.
- A maximum of 30 percent pore space can be used for the soil media whereas a maximum of 40 percent pore space can be use for the gravel layer.

Figure 1: Standard Layout for a Bioretention Facility

Engineered Soil Media Requirements

The engineered soil media shall be comprised of 85 percent mineral component and 15 percent organic component, by volume, drum mixed prior to placement. The mineral component shall be a Class A sandy loam topsoil that meets the range specified in Table 1 below. The organic component shall be nitrogen stabilized compost[1], such that nitrogen does not leach from the media.

Table 1: Mineral Component Range Requirements

Percent Range	Component
70-80	Sand
15-20	Silt
5-10	Clay

The trip ticket, or certificate of compliance, shall be made available to the inspector to prove the engineered mix meets this specification.

Vegetation Requirements

Vegetative cover is important to minimize erosion and ensure that treatment occurs in the Bioretention Facility. The area should be designed for at least 70 percent mature coverage throughout the Bioretention Facility. To prevent the BMP from being used as walkways, Bioretention Facilities shall be planted with a combination of small trees, densely planted shrubs, and natural grasses. Grasses shall be native or ornamental; preferably ones that do not need to be mowed. The application of fertilizers and pesticides should be minimal. To maintain oxygen levels for the vegetation and promote biodegradation, it is important that vegetation not be completely submerged for any extended period of time. Therefore, a maximum of 6 inches of ponded water shall be used in the design to ensure that plants within the Bioretention Facility remain healthy.

A 2 to 3-inch layer of standard shredded aged hardwood mulch shall be placed as the top layer inside the Bioretention Facility. The 6-inch ponding depth shown in Figure 1 above shall be measured from the top surface of the 2 to 3-inch mulch layer.

Curb Cuts

To allow water to flow into the Bioretention Facility, 1-foot-wide (minimum) curb cuts should be placed approximately every 10 feet around the perimeter of the Bioretention Facility. Figure 2 shows a curb cut in a Bioretention Facility. <u>Curb cut flow lines must be at or above the V_{BMP} water surface level</u>.

[1] For more information on compost, visit the US Composting Council website at: http://compostingcouncil.org/

Figure 2: Curb Cut located in a Bioretention Facility

To reduce erosion, a gravel pad shall be placed at each inlet point to the Bioretention Facility. The gravel should be 1- to 1.5-inch diameter in size. The gravel should overlap the curb cut opening a minimum of 6 inches. The gravel pad inside the Bioretention Facility should be flush with the finished surface at the curb cut and extend to the bottom of the slope.

In addition, place an apron of stone or concrete, a foot square or larger, inside each inlet to prevent vegetation from growing up and blocking the inlet. See Figure 3.

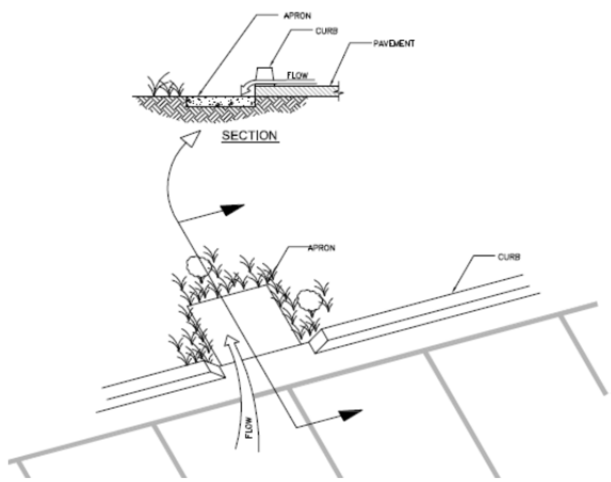


Figure 3: Apron located in a Bioretention Facility

Terracing the Landscaped Filter Basin

It is recommended that Bioretention Facilities be level. In the event the facility site slopes and lacks proper design, water would fill the lowest point of the BMP and then discharge from the basin without being treated. To ensure that the water will be held within the Bioretention Facility on sloped sites, the BMP must be terraced with nonporous check dams to provide the required storage and treatment capacity.

The terraced version of this BMP shall be used on non-flat sites with no more than a 3 percent slope. The surcharge depth cannot exceed 0.5 feet, and side slopes shall not exceed 4:1. Table 2 below shows the spacing of the check dams, and slopes shall be rounded up (i.e., 2.5 percent slope shall use 10' spacing for check dams).

Table 2: Check Dam Spacing

6" Check Dam Spacing	
Slope	**Spacing**
1%	*25'*
2%	*15'*
3%	*10'*

Roof Runoff

Roof downspouts may be directed towards Bioretention Facilities. However, the downspouts must discharge onto a concrete splash block to protect the Bioretention Facility from erosion.

Retaining Walls

It is recommended that Retaining Wall Type 1A, per Caltrans Standard B3-3 or equivalent, be constructed around the entire perimeter of the Bioretention Facility. This practice will protect the sides of the Bioretention Facility from collapsing during construction and maintenance or from high service loads adjacent to the BMP. Where such service loads would not exist adjacent to the BMP, an engineered alternative may be used if signed by a licensed civil engineer.

Side Slope Requirements

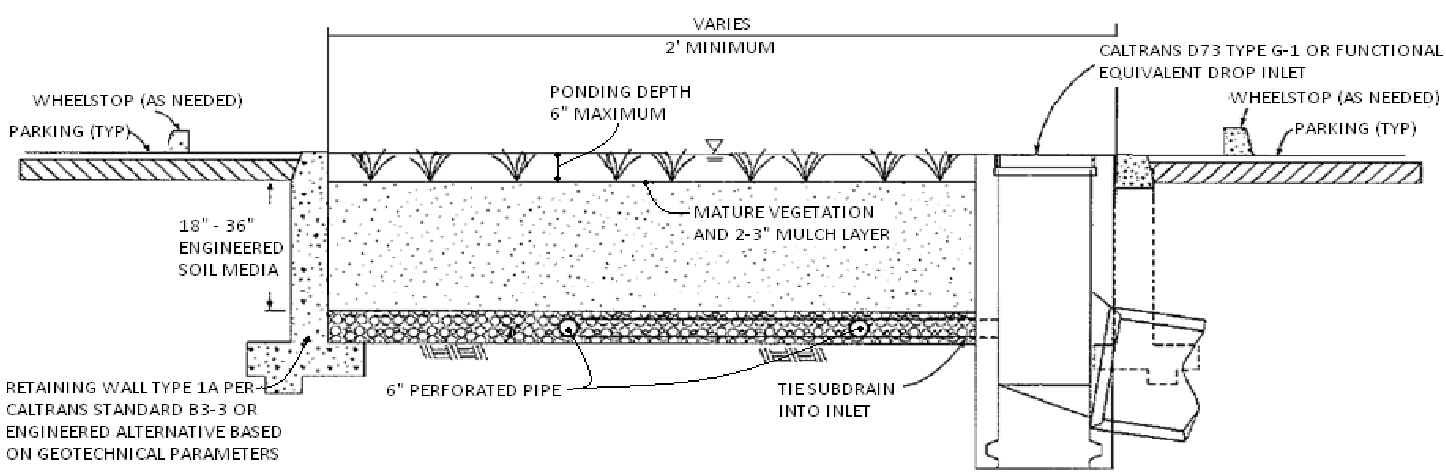
Bioretention Facilities Requiring Side Slopes

The design should assure that the Bioretention Facility does not present a tripping hazard. Bioretention Facilities proposed near pedestrian areas, such as areas parallel to parking spaces or along a walkway, must have a gentle slope to the bottom of the facility. Side slopes inside of a Bioretention Facility shall be 4:1. A typical cross section for the Bioretention Facility is shown in Figure 1.

Bioretention Facilities Not Requiring Side Slopes

Where cars park perpendicular to the Bioretention Facility, side slopes are not required. A 6-inch maximum drop may be used, and the Bioretention Facility must be planted with trees and shrubs to prevent pedestrian access. In this case, a curb is not placed around the Bioretention Facility,

but wheel stops shall be used to prevent vehicles from entering the Bioretention Facility, as shown in Figure 4.



Planter Boxes

Bioretention Facilities can also be placed above ground as planter boxes. Planter boxes must have a minimum width of 2 feet, a maximum surcharge depth of 6 inches, and no side slopes are necessary. Planter boxes must be constructed so as to ensure that the top surface of the engineered soil media will remain level. This option may be constructed of concrete, brick, stone or other stable materials that will not warp or bend. Chemically treated wood or galvanized steel, which has the ability to contaminate stormwater, should not be used. Planter boxes must be lined with an impermeable liner on all sides, including the bottom. Due to the impermeable liner, the inside bottom of the planter box shall be designed and constructed with a cross fall, directing treated flows within the subdrain layer toward the point where subdrain exits the planter box, and subdrains shall be oriented with drain holes oriented down. These provisions will help avoid excessive stagnant water within the gravel underdrain layer. Similar to the in-ground Bioretention Facility versions, this BMP benefits from healthy plants and biological activity in the root zone. Planter boxes should be planted with appropriately selected vegetation.

Figure 5: Planter Box

Source: LA Team Effort

Overflow

An overflow route is needed in the Bioretention Facility design to bypass stored runoff from storm events larger than V_{BMP} or in the event of facility or subdrain clogging. Overflow systems must connect to an acceptable discharge point, such as a downstream conveyance system as shown in Figure 1 and Figure 4. The inlet to the overflow structure shall be elevated inside the Bioretention Facility to be flush with the ponding surface for the design capture volume (V_{BMP}) as shown in Figure 4. This will allow the design capture volume to be fully treated by the Bioretention Facility, and for larger events to safely be conveyed to downstream systems. The overflow inlet shall **not** be located in the entrance of a Bioretention Facility, as shown in Figure 6.

Underdrain Gravel and Pipes
An underdrain gravel layer and pipes shall be provided in accordance with Appendix B – Underdrains.

Figure 6: Incorrect Placement of an Overflow Inlet.

Inspection and Maintenance Schedule

The Bioretention Facility area shall be inspected for erosion, dead vegetation, soggy soils, or standing water. The use of fertilizers and pesticides on the plants inside the Bioretention Facility should be minimized.

Schedule	Activity
Ongoing	• Keep adjacent landscape areas maintained. Remove clippings from landscape maintenance activities. • Remove trash and debris • Replace damaged grass and/or plants • Replace surface mulch layer as needed to maintain a 2-3 inch soil cover.
After storm events	• Inspect areas for ponding
Annually	• Inspect/clean inlets and outlets

Bioretention Facility Design Procedure

1) Enter the area tributary, A_T, to the Bioretention Facility.

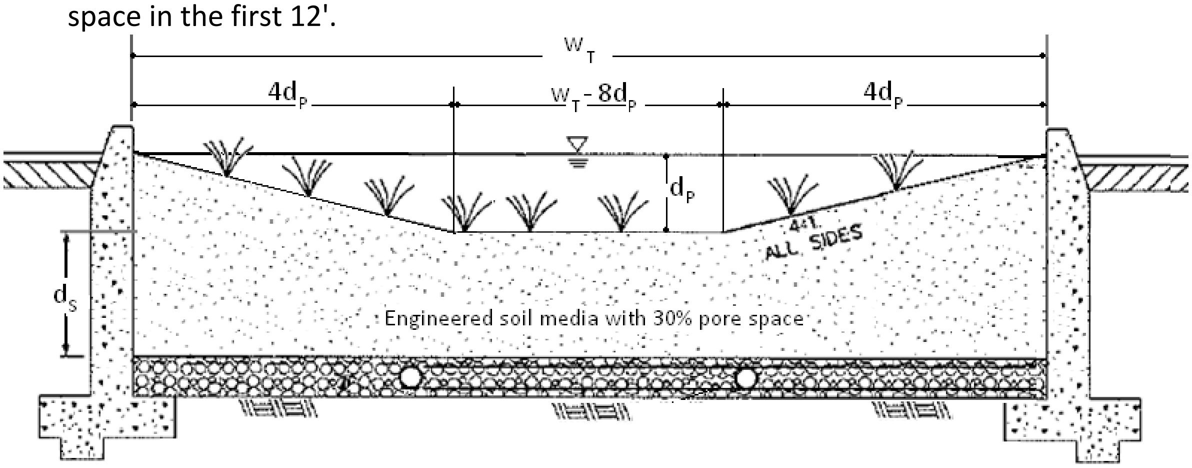
2) Enter the Design Volume, $V_{BMP,}$ determined from Section 2.1 of this Handbook.

3) Select the type of design used. There are two types of Bioretention Facility designs: the standard design used for most project sites that include side slopes, and the modified design used when the BMP is located perpendicular to the parking spaces or with planter boxes that do not use side slopes.

4) Enter the depth of the engineered soil media, d_S. The minimum depth for the engineered soil media can be 18' in limited cases, but it is recommended to use 24' or a preferred 36' to provide an adequate root zone for the chosen plant palette. Engineered soil media deeper than 36' will only get credit for the pore space in the first 36'.

5) Enter the top width of the Bioretention Facility.

6) Calculate the total effective depth, d_E, within the Bioretention Facility. The maximum allowable pore space of the soil media is 30% while the maximum allowable pore space for the gravel layer is 40%. Gravel layer deeper than 12' will only get credit for the pore space in the first 12'.



   a. For the design with side slopes the following equation shall be used to determine the total effective depth. Where, d_P is the depth of ponding within the basin.

$$d_E(\mathrm{ft}) = \frac{0.3 \times \left[\left(w_T(\mathrm{ft}) \times d_S(\mathrm{ft})\right) + 4\left(d_P(\mathrm{ft})\right)^2\right] + 0.4 \times 1(\mathrm{ft}) + d_P(\mathrm{ft})\left[4d_P(\mathrm{ft}) + \left(w_T(\mathrm{ft}) - 8d_P(\mathrm{ft})\right)\right]}{w_T(\mathrm{ft})}$$

   This above equation can be simplified if the maximum ponding depth of 0.5’ is used. The equation below is used on the worksheet to find the minimum area required for the Bioretention Facility:

$$d_E(\mathrm{ft}) = (0.3 \times d_S(\mathrm{ft}) + 0.4 \text{ x } 1(\mathrm{ft})) - \left(\frac{0.7\ (\mathrm{ft}^2)}{w_T(\mathrm{ft})}\right) + 0.5(\mathrm{ft})$$

b. For the design without side slopes the following equation shall be used to determine the total effective depth:

$$d_E(ft) = d_P(ft) + [(0.3) \times d_S(ft) + (0.4) \times 1(ft)]$$

The equation below, using the maximum ponding depth of 0.5', is used on the worksheet to find the minimum area required for the Bioretention Facility:

$$d_E(ft) = 0.5\ (ft) + [(0.3) \times d_S(ft) + (0.4) \times 1(ft)]$$

7) Calculate the minimum surface area, A_M, required for the Bioretention Facility. This does not include the curb surrounding the Bioretention Facility or side slopes.

$$A_M(ft^2) = \frac{V_{BMP}(ft^3)}{d_E\ (ft)}$$

8) Enter the proposed surface area. This area shall not be less than the minimum required surface area.

9) Verify that side slopes are no steeper than 4:1 in the standard design, and are not required in the modified design.

10) Provide the diameter, minimum 6 inches, of the perforated underdrain used in the Bioretention Facility. See Appendix B for specific information regarding perforated pipes.

11) Provide the slope of the site around the Bioretention Facility, if used. The maximum slope is 3 percent for a standard design.

12) Provide the check dam spacing, if the site around the Bioretention Facility is sloped.

13) Describe the vegetation used within the Bioretention Facility.

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Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

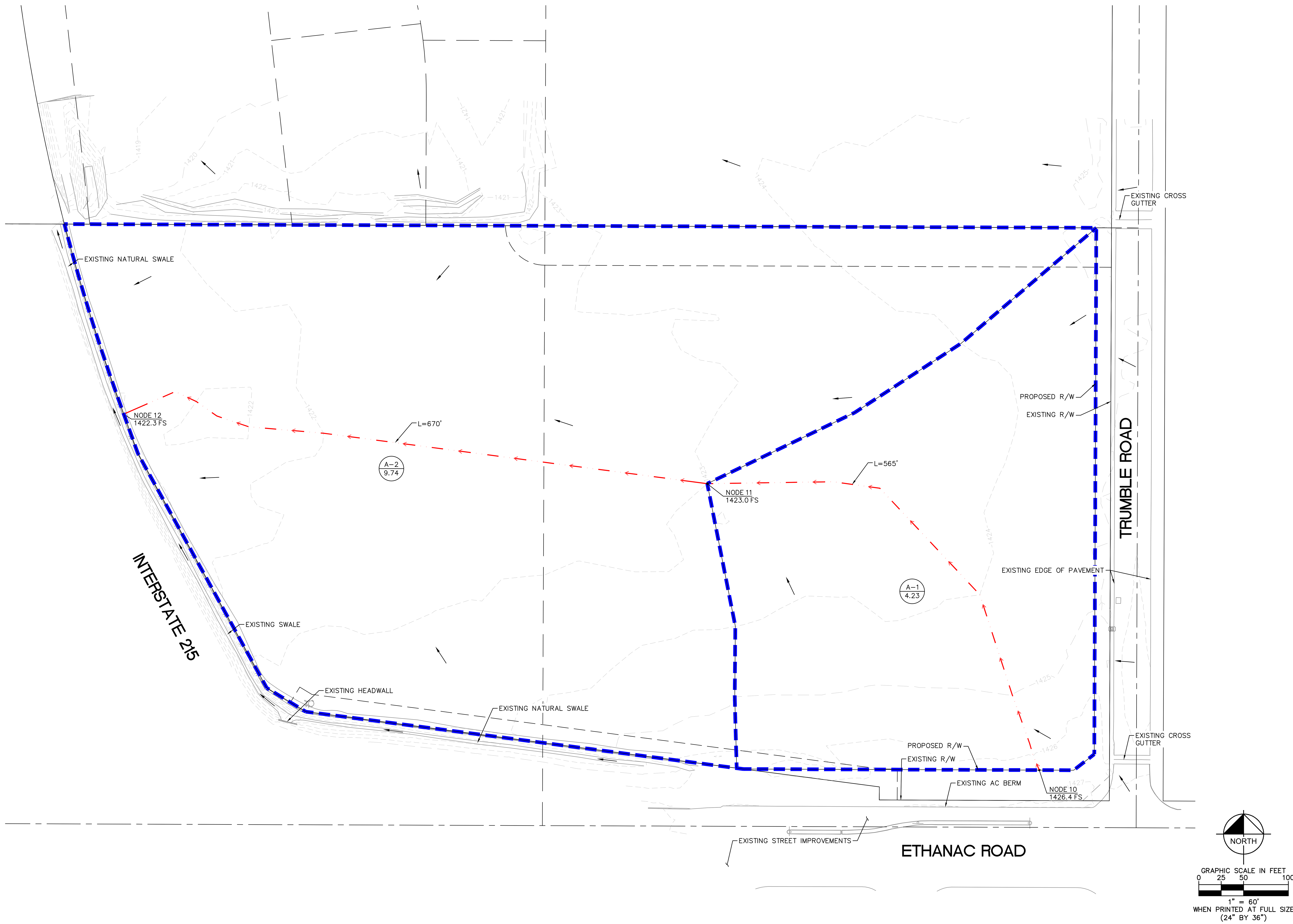
HCOC Applicability Map

Hydromodification Susceptibility Documentation Report and Mapping
Riverside County Flood Control and Water Conservation District

Map 2

LEGEND

(1695)	EXISTING CONTOUR
	PROPERTY LINE
	DMA BOUNDARY
	FLOW PATH
	FLOW ARROW
NODE 10 50.00 FS	NODE ID AND ELEVATION
X XX	DA NAME DA AREA (IN ACRES)
	RIGHT OF WAY

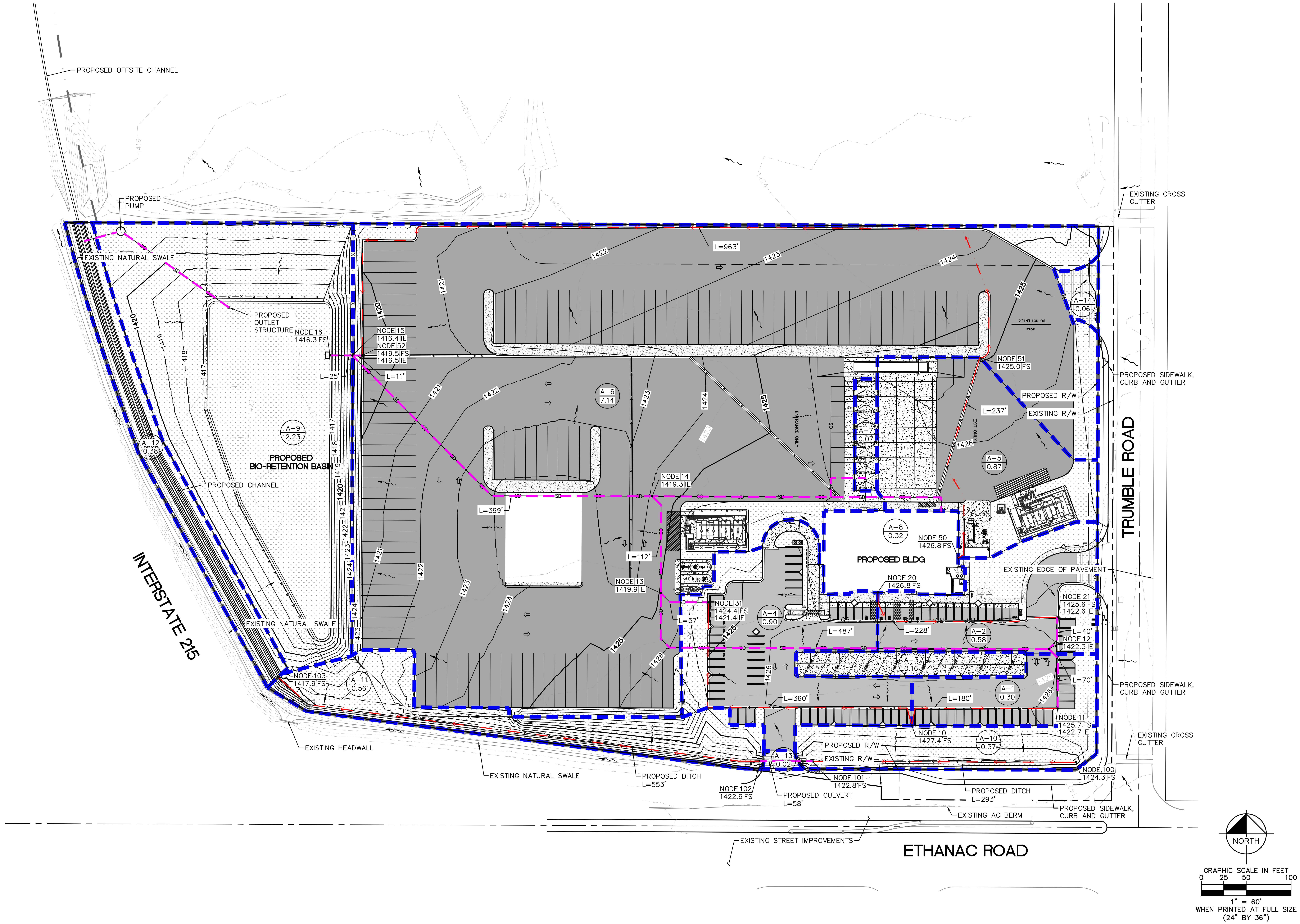


Kimley»Horn

EXISTING DRAINAGE EXHIBIT
PILOT PERRIS
12/7/2021

LEGEND

1695	PROPOSED CONTOUR
(1695)	EXISTING CONTOUR
	PROPERTY LINE
	DMA BOUNDARY
	PROPOSED STORM DRAIN
	FLOW PATH
	FLOW ARROW
NODE 10 50.00 FS	NODE ID AND ELEVATION
X XX	DA NAME DA AREA (IN ACRES)
	RIGHT OF WAY



Kimley»Horn

PROPOSED DRAINAGE EXHIBIT
PILOT PERRIS
3/9/2022

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
        Rational Hydrology Study       Date: 12/07/21  File:PP2E.out
------------------------------------------------------------------------
PILOT PERRIS
EXIST 2-YR
XO 12/7/21

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 6443

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =    2.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)
For the [ Perris Valley ] area used.
10 year storm 10 minute intensity =  1.880(In/Hr)
10 year storm 60 minute intensity =  0.780(In/Hr)
100 year storm 10 minute intensity =  2.690(In/Hr)
100 year storm 60 minute intensity =  1.120(In/Hr)

Storm event year =   2.0
Calculated rainfall intensity data:
1 hour intensity =  0.542(In/Hr)
Slope of intensity duration curve = 0.4900



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       11.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   565.000(Ft.)
Top (of initial area) elevation =    26.400(Ft.)
Bottom (of initial area) elevation =    23.000(Ft.)
Difference in elevation =     3.400(Ft.)
Slope =    0.00602  s(percent)=       0.60
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   18.587 min.
Rainfall intensity =      0.963(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.630
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.568(CFS)
Total initial stream area =        4.230(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       12.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
```

```
________________________________________________________________________
Top of natural channel elevation =     23.000(Ft.)
End of natural channel elevation =     22.300(Ft.)
Length of natural channel  =   670.000(Ft.)
Estimated mean flow rate at midpoint of channel =      5.525(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   0.70(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0010
Corrected/adjusted channel slope =  0.0010
Travel time =   15.99 min.     TC =   34.58  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.570
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.710(In/Hr) for a     2.0 year storm
Subarea runoff =      3.943(CFS) for      9.740(Ac.)
Total runoff =      6.511(CFS)  Total area =      13.970(Ac.)
End of computations, total study area =           13.97 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  89.0
```

```
                  Riverside County Rational Hydrology Program

        CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0
                Rational Hydrology Study       Date: 03/22/22  File:PP2P.out

------------------------------------------------------------------------
        PILOT PERRIS
        PROP 2-YR
        XO 3/22/22



------------------------------------------------------------------------
         *********   Hydrology Study Control Information **********

         English (in-lb) Units used in input data file


------------------------------------------------------------------------


        Program License Serial Number 6443


------------------------------------------------------------------------
        Rational Method Hydrology Program based on
        Riverside County Flood Control & Water Conservation District
        1978 hydrology manual

        Storm event (year) =    2.00 Antecedent Moisture Condition = 1

        Standard intensity-duration curves data (Plate D-4.1)
        For the [ Perris Valley ] area used.
        10 year storm 10 minute intensity =  1.880(In/Hr)
        10 year storm 60 minute intensity =  0.780(In/Hr)
        100 year storm 10 minute intensity =  2.690(In/Hr)
        100 year storm 60 minute intensity =  1.120(In/Hr)

        Storm event year =   2.0
        Calculated rainfall intensity data:
        1 hour intensity =  0.542(In/Hr)
        Slope of intensity duration curve = 0.4900




        ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
        Process from Point/Station      10.000 to Point/Station      11.000
        **** INITIAL AREA EVALUATION ****
```

```
Initial area flow distance =   180.000(Ft.)
Top (of initial area) elevation =    27.400(Ft.)
Bottom (of initial area) elevation =    25.700(Ft.)
Difference in elevation =     1.700(Ft.)
Slope =    0.00944  s(percent)=      0.94
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.551 min.
Rainfall intensity =      1.605(In/Hr) for a     2.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.831
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.200; Impervious fraction =  0.800
Initial subarea runoff =      0.400(CFS)
Total initial stream area =        0.300(Ac.)
Pervious area fraction = 0.200
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station      12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    22.700(Ft.)
Downstream point/station elevation =    22.300(Ft.)
Pipe length  =    70.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     0.400(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.400(CFS)
Normal flow depth in pipe =    4.34(In.)
Flow top width inside pipe =    5.37(In.)
Critical Depth =    3.86(In.)
Pipe flow velocity =      2.64(Ft/s)
Travel time through pipe =    0.44 min.
Time of concentration (TC) =     6.99 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station      12.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.300(Ac.)
Runoff from this stream =      0.400(CFS)
Time of concentration =    6.99 min.
Rainfall intensity =     1.555(In/Hr)
```

```
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station      21.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   228.000(Ft.)
Top (of initial area) elevation =    26.800(Ft.)
Bottom (of initial area) elevation =    25.600(Ft.)
Difference in elevation =     1.200(Ft.)
Slope =    0.00526  s(percent)=      0.53
TC = k(0.336)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.419 min.
Rainfall intensity =      1.420(In/Hr) for a     2.0 year storm
MOBILE HOME PARK subarea type
Runoff Coefficient = 0.807
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.250; Impervious fraction =  0.750
Initial subarea runoff =      0.664(CFS)
Total initial stream area =        0.580(Ac.)
Pervious area fraction = 0.250


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.000 to Point/Station      12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    22.600(Ft.)
Downstream point/station elevation =    22.300(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     0.664(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     0.664(CFS)
Normal flow depth in pipe =    4.11(In.)
Flow top width inside pipe =    8.97(In.)
Critical Depth =    4.44(In.)
Pipe flow velocity =      3.38(Ft/s)
Travel time through pipe =    0.20 min.
Time of concentration (TC) =     8.62 min.


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station      12.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.580(Ac.)
Runoff from this stream =      0.664(CFS)
Time of concentration =    8.62 min.
```

```
Rainfall intensity =     1.404(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        0.400      6.99                 1.555
2        0.664      8.62                 1.404
Largest stream flow has longer time of concentration
Qp =      0.664 + sum of
          Qb         Ia/Ib
           0.400 *    0.903 =      0.361
Qp =      1.025

Total of 2 streams to confluence:
Flow rates before confluence point:
       0.400       0.664
Area of streams before confluence:
        0.300       0.580
Results of confluence:
Total flow rate =      1.025(CFS)
Time of concentration =     8.616 min.
Effective stream area after confluence =      0.880(Ac.)



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    22.300(Ft.)
Downstream point/station elevation =    19.900(Ft.)
Pipe length  =   487.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     1.025(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.025(CFS)
Normal flow depth in pipe =    6.18(In.)
Flow top width inside pipe =    8.35(In.)
Critical Depth =    5.58(In.)
Pipe flow velocity =      3.17(Ft/s)
Travel time through pipe =    2.56 min.
Time of concentration (TC) =    11.17 min.



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       13.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.860
Decimal fraction soil group A = 0.000
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```
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    11.17 min.
Rainfall intensity =      1.236(In/Hr) for a     2.0 year storm
Subarea runoff =      0.170(CFS) for      0.160(Ac.)
Total runoff =      1.195(CFS)  Total area =       1.040(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       13.000
**** CONFLUENCE OF MINOR STREAMS ****
```

```
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.040(Ac.)
Runoff from this stream =      1.195(CFS)
Time of concentration =   11.17 min.
Rainfall intensity =     1.236(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       31.000
**** INITIAL AREA EVALUATION ****
```

```
Initial area flow distance =   360.000(Ft.)
Top (of initial area) elevation =    27.400(Ft.)
Bottom (of initial area) elevation =    24.400(Ft.)
Difference in elevation =     3.000(Ft.)
Slope =    0.00833  s(percent)=       0.83
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.863 min.
Rainfall intensity =      1.384(In/Hr) for a     2.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.824
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.200; Impervious fraction =  0.800
Initial subarea runoff =      1.027(CFS)
Total initial stream area =        0.900(Ac.)
Pervious area fraction = 0.200
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.000 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
```

```
Upstream point/station elevation =    21.400(Ft.)
Downstream point/station elevation =    19.900(Ft.)
Pipe length  =    57.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     1.027(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.027(CFS)
Normal flow depth in pipe =    3.69(In.)
Flow top width inside pipe =    8.85(In.)
Critical Depth =    5.58(In.)
Pipe flow velocity =      6.01(Ft/s)
Travel time through pipe =    0.16 min.
Time of concentration (TC) =     9.02 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       13.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.900(Ac.)
Runoff from this stream =      1.027(CFS)
Time of concentration =    9.02 min.
Rainfall intensity =     1.372(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        1.195     11.17                 1.236
2        1.027      9.02                 1.372
Largest stream flow has longer time of concentration
Qp =      1.195 + sum of
          Qb          Ia/Ib
           1.027 *    0.900 =      0.925
Qp =      2.120

Total of 2 streams to confluence:
Flow rates before confluence point:
       1.195       1.027
Area of streams before confluence:
        1.040       0.900
Results of confluence:
Total flow rate =      2.120(CFS)
Time of concentration =    11.173 min.
Effective stream area after confluence =      1.940(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       14.000
```

```
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =    19.900(Ft.)
Downstream point/station elevation =    19.300(Ft.)
Pipe length  =   112.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     2.120(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.120(CFS)
Normal flow depth in pipe =    7.76(In.)
Flow top width inside pipe =   11.47(In.)
Critical Depth =    7.46(In.)
Pipe flow velocity =      3.95(Ft/s)
Travel time through pipe =    0.47 min.
Time of concentration (TC) =    11.65 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      14.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.859
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    11.65 min.
Rainfall intensity =      1.211(In/Hr) for a     2.0 year storm
Subarea runoff =      0.073(CFS) for      0.070(Ac.)
Total runoff =      2.193(CFS)  Total area =       2.010(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      14.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.859
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    11.65 min.
Rainfall intensity =      1.211(In/Hr) for a     2.0 year storm
Subarea runoff =      0.333(CFS) for      0.320(Ac.)
Total runoff =      2.526(CFS)  Total area =       2.330(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station      15.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =    19.300(Ft.)
Downstream point/station elevation =    16.400(Ft.)
Pipe length  =   399.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     2.526(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.526(CFS)
Normal flow depth in pipe =    7.89(In.)
Flow top width inside pipe =   11.39(In.)
Critical Depth =    8.17(In.)
Pipe flow velocity =     4.62(Ft/s)
Travel time through pipe =    1.44 min.
Time of concentration (TC) =    13.09 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station      15.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.330(Ac.)
Runoff from this stream =      2.526(CFS)
Time of concentration =   13.09 min.
Rainfall intensity =     1.144(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.000 to Point/Station      51.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance =   237.000(Ft.)
Top (of initial area) elevation =    26.800(Ft.)
Bottom (of initial area) elevation =    25.000(Ft.)
Difference in elevation =     1.800(Ft.)
Slope =    0.00759  s(percent)=      0.76
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.094 min.
Rainfall intensity =      1.544(In/Hr) for a     2.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.864
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
```

```
Initial subarea runoff =      1.161(CFS)
Total initial stream area =        0.870(Ac.)
Pervious area fraction = 0.100
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      51.000 to Point/Station      52.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =    25.000(Ft.)
Downstream point elevation =    19.500(Ft.)
Channel length thru subarea  =   963.000(Ft.)
Channel base width      =    0.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank = 100.000
Estimated mean flow rate at midpoint of channel =      4.165(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =      4.165(CFS)
Depth of flow =   0.170(Ft.), Average velocity =   1.446(Ft/s)
Channel flow top width =   33.946(Ft.)
Flow Velocity =    1.45(Ft/s)
Travel time  =   11.10 min.
Time of concentration =   18.20 min.

Sub-Channel No. 1 Critical depth =      0.161(Ft.)
  '     '       '     Critical flow top width =     32.227(Ft.)
  '     '       '     Critical flow velocity=    1.604(Ft/s)
  '     '       '     Critical flow area =      2.596(Sq.Ft)

 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.854
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      0.973(In/Hr) for a     2.0 year storm
Subarea runoff =      5.936(CFS) for      7.140(Ac.)
Total runoff =      7.097(CFS)  Total area =       8.010(Ac.)
Depth of flow =   0.207(Ft.), Average velocity =   1.652(Ft/s)

Sub-Channel No. 1 Critical depth =      0.199(Ft.)
  '     '       '     Critical flow top width =     39.844(Ft.)
  '     '       '     Critical flow velocity=    1.788(Ft/s)
  '     '       '     Critical flow area =      3.969(Sq.Ft)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       52.000 to Point/Station       15.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    16.500(Ft.)
Downstream point/station elevation =    16.400(Ft.)
Pipe length  =    11.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     7.097(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     7.097(CFS)
Normal flow depth in pipe =   10.62(In.)
Flow top width inside pipe =   17.71(In.)
Critical Depth =   12.37(In.)
Pipe flow velocity =      6.55(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    18.22 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       15.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      8.010(Ac.)
Runoff from this stream =      7.097(CFS)
Time of concentration =   18.22 min.
Rainfall intensity =     0.972(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)      (min)                 (In/Hr)


1        2.526     13.09                 1.144
2        7.097     18.22                 0.972
Largest stream flow has longer time of concentration
Qp =      7.097 + sum of
          Qb         Ia/Ib
           2.526 *    0.850 =      2.148
Qp =      9.244

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.526       7.097
Area of streams before confluence:
        2.330       8.010
Results of confluence:
Total flow rate =      9.244(CFS)
Time of concentration =    18.224 min.
Effective stream area after confluence =     10.340(Ac.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      15.000 to Point/Station      16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    16.400(Ft.)
Downstream point/station elevation =    16.300(Ft.)
Pipe length  =    25.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     9.244(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     9.244(CFS)
Normal flow depth in pipe =   14.88(In.)
Flow top width inside pipe =   19.08(In.)
Critical Depth =   13.57(In.)
Pipe flow velocity =      5.07(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    18.31 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      16.000 to Point/Station      16.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.498
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  63.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    18.31 min.
Rainfall intensity =      0.970(In/Hr) for a     2.0 year storm
Subarea runoff =      1.078(CFS) for      2.230(Ac.)
Total runoff =     10.322(CFS)  Total area =      12.570(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      16.000 to Point/Station     103.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     12.570(Ac.)
Runoff from this stream =     10.322(CFS)
Time of concentration =   18.31 min.
Rainfall intensity =     0.970(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     100.000 to Point/Station     101.000
```

```
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   293.000(Ft.)
Top (of initial area) elevation =    24.300(Ft.)
Bottom (of initial area) elevation =    22.800(Ft.)
Difference in elevation =     1.500(Ft.)
Slope =    0.00512  s(percent)=       0.51
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.763 min.
Rainfall intensity =      1.078(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.651
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.260(CFS)
Total initial stream area =        0.370(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    22.800(Ft.)
Downstream point/station elevation =    22.600(Ft.)
Pipe length  =    58.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     0.260(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.260(CFS)
Normal flow depth in pipe =    3.80(In.)
Flow top width inside pipe =    5.78(In.)
Critical Depth =    3.08(In.)
Pipe flow velocity =      1.98(Ft/s)
Travel time through pipe =    0.49 min.
Time of concentration (TC) =    15.25 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =    22.600(Ft.)
Downstream point elevation =    17.900(Ft.)
Channel length thru subarea  =   553.000(Ft.)
Channel base width      =    0.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
```

```
Estimated mean flow rate at midpoint of channel =      0.430(CFS)
Manning's 'N'    = 0.045
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      0.430(CFS)
Depth of flow =   0.453(Ft.), Average velocity =   1.050(Ft/s)
Channel flow top width =    1.811(Ft.)
Flow Velocity =    1.05(Ft/s)
Travel time  =    8.78 min.
Time of concentration =   24.03 min.

Sub-Channel No. 1 Critical depth =      0.311(Ft.)
  '     '       '     Critical flow top width =      1.242(Ft.)
  '     '       '     Critical flow velocity=    2.231(Ft/s)
  '     '       '     Critical flow area =      0.193(Sq.Ft)

 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.606
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  76.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.849(In/Hr) for a     2.0 year storm
Subarea runoff =      0.288(CFS) for      0.560(Ac.)
Total runoff =      0.548(CFS)  Total area =       0.930(Ac.)
Depth of flow =   0.496(Ft.), Average velocity =   1.115(Ft/s)

Sub-Channel No. 1 Critical depth =      0.342(Ft.)
  '     '       '     Critical flow top width =      1.367(Ft.)
  '     '       '     Critical flow velocity=    2.345(Ft/s)
  '     '       '     Critical flow area =      0.234(Sq.Ft)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      16.000 to Point/Station     103.000
**** CONFLUENCE OF MINOR STREAMS ****
```

```
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.930(Ac.)
Runoff from this stream =      0.548(CFS)
Time of concentration =   24.03 min.
Rainfall intensity =     0.849(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)      (min)                  (In/Hr)


1       10.322     18.31                  0.970
```

```
2        0.548     24.03                 0.849
Largest stream flow has longer or shorter time of concentration
Qp =     10.322 + sum of
          Qa            Tb/Ta
           0.548 *    0.762 =      0.417
Qp =     10.740

Total of 2 streams to confluence:
Flow rates before confluence point:
      10.322       0.548
Area of streams before confluence:
       12.570        0.930
Results of confluence:
Total flow rate =      10.740(CFS)
Time of concentration =    18.306 min.
Effective stream area after confluence =     13.500(Ac.)



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      103.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.671
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 1)  =  57.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    18.31 min.
Rainfall intensity =      0.970(In/Hr) for a     2.0 year storm
Subarea runoff =      0.247(CFS) for      0.380(Ac.)
Total runoff =     10.987(CFS)  Total area =      13.880(Ac.)
End of computations, total study area =           13.88 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.331
Area averaged RI index number =  76.7
```

```
       U n i t   H y d r o g r a p h   A n a l y s i s

       Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0
               Study date  12/07/21 File: PP1EUH242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6443

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
PILOT PERRIS
EXIST 2-YR
XO 12/7/21

--------------------------------------------------------------------
Drainage Area =      13.97(Ac.)  =      0.022 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      13.97(Ac.)  =      0.022 Sq. Mi.
USER Entry of lag time in hours
Lag time =    0.461 Hr.
Lag time =    27.66 Min.
25% of lag time =     6.92 Min.
40% of lag time =    11.07 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       13.97            2.05                  28.64

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       13.97            5.33                  74.46

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    2.050(In)
Area Averaged 100-Year Rainfall =    5.330(In)

Point rain (area averaged) =    2.050(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    2.050(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
    13.970          89.00         0.000
 Total Area Entered =     13.97(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
89.0  76.4      0.286     0.000        0.286       1.000      0.286
                                                  Sum (F) =   0.286
Area averaged mean soil loss (F) (In/Hr) =  0.286
Minimum soil loss rate ((In/Hr)) =  0.143
```

(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	18.074	1.584	0.223
2	0.167	36.148	4.339	0.611
3	0.250	54.222	7.448	1.049
4	0.333	72.296	10.625	1.496
5	0.417	90.370	12.568	1.769
6	0.500	108.443	12.628	1.778
7	0.583	126.517	9.581	1.349
8	0.667	144.591	6.576	0.926
9	0.750	162.665	4.850	0.683
10	0.833	180.739	3.515	0.495
11	0.917	198.813	2.773	0.390
12	1.000	216.887	2.454	0.346
13	1.083	234.961	2.115	0.298
14	1.167	253.035	1.841	0.259
15	1.250	271.109	1.666	0.235
16	1.333	289.182	1.501	0.211
17	1.417	307.256	1.291	0.182
18	1.500	325.330	1.123	0.158
19	1.583	343.404	1.084	0.153
20	1.667	361.478	1.026	0.144
21	1.750	379.552	0.815	0.115
22	1.833	397.626	0.795	0.112
23	1.917	415.700	0.713	0.100
24	2.000	433.774	0.580	0.082
25	2.083	451.848	0.578	0.081
26	2.167	469.921	0.557	0.078
27	2.250	487.995	0.542	0.076
28	2.333	506.069	0.534	0.075
29	2.417	524.143	0.430	0.060
30	2.500	542.217	0.398	0.056
31	2.583	560.291	0.386	0.054
32	2.667	578.365	0.332	0.047
33	2.750	596.439	0.325	0.046
34	2.833	614.513	0.302	0.043
35	2.917	632.587	0.254	0.036
36	3.000	650.660	0.253	0.036
37	3.083	668.734	0.214	0.030
38	3.167	686.808	0.181	0.025
39	3.250	704.882	0.181	0.025
40	3.333	722.956	0.181	0.025
41	3.417	741.030	0.181	0.025
42	3.500	759.104	0.181	0.025
43	3.583	777.178	0.181	0.025
44	3.667	795.252	0.181	0.025
45	3.750	813.326	0.138	0.019
			Sum = 100.000	Sum= 14.079

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.08	0.07	0.016	(0.508)	0.015	0.002
2	0.17	0.07	0.016	(0.506)	0.015	0.002
3	0.25	0.07	0.016	(0.504)	0.015	0.002
4	0.33	0.10	0.025	(0.502)	0.022	0.002
5	0.42	0.10	0.025	(0.500)	0.022	0.002
6	0.50	0.10	0.025	(0.498)	0.022	0.002
7	0.58	0.10	0.025	(0.496)	0.022	0.002

8	0.67	0.10	0.025	(0.494)	0.022	0.002
9	0.75	0.10	0.025	(0.492)	0.022	0.002
10	0.83	0.13	0.033	(0.490)	0.030	0.003
11	0.92	0.13	0.033	(0.488)	0.030	0.003
12	1.00	0.13	0.033	(0.486)	0.030	0.003
13	1.08	0.10	0.025	(0.485)	0.022	0.002
14	1.17	0.10	0.025	(0.483)	0.022	0.002
15	1.25	0.10	0.025	(0.481)	0.022	0.002
16	1.33	0.10	0.025	(0.479)	0.022	0.002
17	1.42	0.10	0.025	(0.477)	0.022	0.002
18	1.50	0.10	0.025	(0.475)	0.022	0.002
19	1.58	0.10	0.025	(0.473)	0.022	0.002
20	1.67	0.10	0.025	(0.471)	0.022	0.002
21	1.75	0.10	0.025	(0.469)	0.022	0.002
22	1.83	0.13	0.033	(0.467)	0.030	0.003
23	1.92	0.13	0.033	(0.466)	0.030	0.003
24	2.00	0.13	0.033	(0.464)	0.030	0.003
25	2.08	0.13	0.033	(0.462)	0.030	0.003
26	2.17	0.13	0.033	(0.460)	0.030	0.003
27	2.25	0.13	0.033	(0.458)	0.030	0.003
28	2.33	0.13	0.033	(0.456)	0.030	0.003
29	2.42	0.13	0.033	(0.454)	0.030	0.003
30	2.50	0.13	0.033	(0.452)	0.030	0.003
31	2.58	0.17	0.041	(0.451)	0.037	0.004
32	2.67	0.17	0.041	(0.449)	0.037	0.004
33	2.75	0.17	0.041	(0.447)	0.037	0.004
34	2.83	0.17	0.041	(0.445)	0.037	0.004
35	2.92	0.17	0.041	(0.443)	0.037	0.004
36	3.00	0.17	0.041	(0.441)	0.037	0.004
37	3.08	0.17	0.041	(0.440)	0.037	0.004
38	3.17	0.17	0.041	(0.438)	0.037	0.004
39	3.25	0.17	0.041	(0.436)	0.037	0.004
40	3.33	0.17	0.041	(0.434)	0.037	0.004
41	3.42	0.17	0.041	(0.432)	0.037	0.004
42	3.50	0.17	0.041	(0.430)	0.037	0.004
43	3.58	0.17	0.041	(0.429)	0.037	0.004
44	3.67	0.17	0.041	(0.427)	0.037	0.004
45	3.75	0.17	0.041	(0.425)	0.037	0.004
46	3.83	0.20	0.049	(0.423)	0.044	0.005
47	3.92	0.20	0.049	(0.422)	0.044	0.005
48	4.00	0.20	0.049	(0.420)	0.044	0.005
49	4.08	0.20	0.049	(0.418)	0.044	0.005
50	4.17	0.20	0.049	(0.416)	0.044	0.005
51	4.25	0.20	0.049	(0.414)	0.044	0.005
52	4.33	0.23	0.057	(0.413)	0.052	0.006
53	4.42	0.23	0.057	(0.411)	0.052	0.006
54	4.50	0.23	0.057	(0.409)	0.052	0.006
55	4.58	0.23	0.057	(0.407)	0.052	0.006
56	4.67	0.23	0.057	(0.406)	0.052	0.006
57	4.75	0.23	0.057	(0.404)	0.052	0.006
58	4.83	0.27	0.066	(0.402)	0.059	0.007
59	4.92	0.27	0.066	(0.400)	0.059	0.007
60	5.00	0.27	0.066	(0.399)	0.059	0.007
61	5.08	0.20	0.049	(0.397)	0.044	0.005
62	5.17	0.20	0.049	(0.395)	0.044	0.005
63	5.25	0.20	0.049	(0.393)	0.044	0.005
64	5.33	0.23	0.057	(0.392)	0.052	0.006
65	5.42	0.23	0.057	(0.390)	0.052	0.006
66	5.50	0.23	0.057	(0.388)	0.052	0.006
67	5.58	0.27	0.066	(0.387)	0.059	0.007
68	5.67	0.27	0.066	(0.385)	0.059	0.007
69	5.75	0.27	0.066	(0.383)	0.059	0.007
70	5.83	0.27	0.066	(0.382)	0.059	0.007
71	5.92	0.27	0.066	(0.380)	0.059	0.007
72	6.00	0.27	0.066	(0.378)	0.059	0.007
73	6.08	0.30	0.074	(0.376)	0.066	0.007
74	6.17	0.30	0.074	(0.375)	0.066	0.007
75	6.25	0.30	0.074	(0.373)	0.066	0.007
76	6.33	0.30	0.074	(0.371)	0.066	0.007
77	6.42	0.30	0.074	(0.370)	0.066	0.007
78	6.50	0.30	0.074	(0.368)	0.066	0.007
79	6.58	0.33	0.082	(0.366)	0.074	0.008
80	6.67	0.33	0.082	(0.365)	0.074	0.008

81	6.75	0.33	0.082	(	0.363)	0.074	0.008
82	6.83	0.33	0.082	(	0.362)	0.074	0.008
83	6.92	0.33	0.082	(	0.360)	0.074	0.008
84	7.00	0.33	0.082	(	0.358)	0.074	0.008
85	7.08	0.33	0.082	(	0.357)	0.074	0.008
86	7.17	0.33	0.082	(	0.355)	0.074	0.008
87	7.25	0.33	0.082	(	0.353)	0.074	0.008
88	7.33	0.37	0.090	(	0.352)	0.081	0.009
89	7.42	0.37	0.090	(	0.350)	0.081	0.009
90	7.50	0.37	0.090	(	0.349)	0.081	0.009
91	7.58	0.40	0.098	(	0.347)	0.089	0.010
92	7.67	0.40	0.098	(	0.345)	0.089	0.010
93	7.75	0.40	0.098	(	0.344)	0.089	0.010
94	7.83	0.43	0.107	(	0.342)	0.096	0.011
95	7.92	0.43	0.107	(	0.341)	0.096	0.011
96	8.00	0.43	0.107	(	0.339)	0.096	0.011
97	8.08	0.50	0.123	(	0.337)	0.111	0.012
98	8.17	0.50	0.123	(	0.336)	0.111	0.012
99	8.25	0.50	0.123	(	0.334)	0.111	0.012
100	8.33	0.50	0.123	(	0.333)	0.111	0.012
101	8.42	0.50	0.123	(	0.331)	0.111	0.012
102	8.50	0.50	0.123	(	0.330)	0.111	0.012
103	8.58	0.53	0.131	(	0.328)	0.118	0.013
104	8.67	0.53	0.131	(	0.327)	0.118	0.013
105	8.75	0.53	0.131	(	0.325)	0.118	0.013
106	8.83	0.57	0.139	(	0.323)	0.125	0.014
107	8.92	0.57	0.139	(	0.322)	0.125	0.014
108	9.00	0.57	0.139	(	0.320)	0.125	0.014
109	9.08	0.63	0.156	(	0.319)	0.140	0.016
110	9.17	0.63	0.156	(	0.317)	0.140	0.016
111	9.25	0.63	0.156	(	0.316)	0.140	0.016
112	9.33	0.67	0.164	(	0.314)	0.148	0.016
113	9.42	0.67	0.164	(	0.313)	0.148	0.016
114	9.50	0.67	0.164	(	0.311)	0.148	0.016
115	9.58	0.70	0.172	(	0.310)	0.155	0.017
116	9.67	0.70	0.172	(	0.308)	0.155	0.017
117	9.75	0.70	0.172	(	0.307)	0.155	0.017
118	9.83	0.73	0.180	(	0.305)	0.162	0.018
119	9.92	0.73	0.180	(	0.304)	0.162	0.018
120	10.00	0.73	0.180	(	0.303)	0.162	0.018
121	10.08	0.50	0.123	(	0.301)	0.111	0.012
122	10.17	0.50	0.123	(	0.300)	0.111	0.012
123	10.25	0.50	0.123	(	0.298)	0.111	0.012
124	10.33	0.50	0.123	(	0.297)	0.111	0.012
125	10.42	0.50	0.123	(	0.295)	0.111	0.012
126	10.50	0.50	0.123	(	0.294)	0.111	0.012
127	10.58	0.67	0.164	(	0.292)	0.148	0.016
128	10.67	0.67	0.164	(	0.291)	0.148	0.016
129	10.75	0.67	0.164	(	0.290)	0.148	0.016
130	10.83	0.67	0.164	(	0.288)	0.148	0.016
131	10.92	0.67	0.164	(	0.287)	0.148	0.016
132	11.00	0.67	0.164	(	0.285)	0.148	0.016
133	11.08	0.63	0.156	(	0.284)	0.140	0.016
134	11.17	0.63	0.156	(	0.282)	0.140	0.016
135	11.25	0.63	0.156	(	0.281)	0.140	0.016
136	11.33	0.63	0.156	(	0.280)	0.140	0.016
137	11.42	0.63	0.156	(	0.278)	0.140	0.016
138	11.50	0.63	0.156	(	0.277)	0.140	0.016
139	11.58	0.57	0.139	(	0.276)	0.125	0.014
140	11.67	0.57	0.139	(	0.274)	0.125	0.014
141	11.75	0.57	0.139	(	0.273)	0.125	0.014
142	11.83	0.60	0.148	(	0.271)	0.133	0.015
143	11.92	0.60	0.148	(	0.270)	0.133	0.015
144	12.00	0.60	0.148	(	0.269)	0.133	0.015
145	12.08	0.83	0.205	(	0.267)	0.184	0.020
146	12.17	0.83	0.205	(	0.266)	0.184	0.020
147	12.25	0.83	0.205	(	0.265)	0.184	0.020
148	12.33	0.87	0.213	(	0.263)	0.192	0.021
149	12.42	0.87	0.213	(	0.262)	0.192	0.021
150	12.50	0.87	0.213	(	0.261)	0.192	0.021
151	12.58	0.93	0.230	(	0.259)	0.207	0.023
152	12.67	0.93	0.230	(	0.258)	0.207	0.023
153	12.75	0.93	0.230	(	0.257)	0.207	0.023

154	12.83	0.97	0.238	(0.256)	0.214	0.024
155	12.92	0.97	0.238	(0.254)	0.214	0.024
156	13.00	0.97	0.238	(0.253)	0.214	0.024
157	13.08	1.13	0.279	(0.252)	0.251	0.028
158	13.17	1.13	0.279	0.250	(0.251)	0.028
159	13.25	1.13	0.279	0.249	(0.251)	0.030
160	13.33	1.13	0.279	0.248	(0.251)	0.031
161	13.42	1.13	0.279	0.247	(0.251)	0.032
162	13.50	1.13	0.279	0.245	(0.251)	0.033
163	13.58	0.77	0.189	(0.244)	0.170	0.019
164	13.67	0.77	0.189	(0.243)	0.170	0.019
165	13.75	0.77	0.189	(0.242)	0.170	0.019
166	13.83	0.77	0.189	(0.240)	0.170	0.019
167	13.92	0.77	0.189	(0.239)	0.170	0.019
168	14.00	0.77	0.189	(0.238)	0.170	0.019
169	14.08	0.90	0.221	(0.237)	0.199	0.022
170	14.17	0.90	0.221	(0.236)	0.199	0.022
171	14.25	0.90	0.221	(0.234)	0.199	0.022
172	14.33	0.87	0.213	(0.233)	0.192	0.021
173	14.42	0.87	0.213	(0.232)	0.192	0.021
174	14.50	0.87	0.213	(0.231)	0.192	0.021
175	14.58	0.87	0.213	(0.230)	0.192	0.021
176	14.67	0.87	0.213	(0.228)	0.192	0.021
177	14.75	0.87	0.213	(0.227)	0.192	0.021
178	14.83	0.83	0.205	(0.226)	0.184	0.020
179	14.92	0.83	0.205	(0.225)	0.184	0.020
180	15.00	0.83	0.205	(0.224)	0.184	0.020
181	15.08	0.80	0.197	(0.223)	0.177	0.020
182	15.17	0.80	0.197	(0.221)	0.177	0.020
183	15.25	0.80	0.197	(0.220)	0.177	0.020
184	15.33	0.77	0.189	(0.219)	0.170	0.019
185	15.42	0.77	0.189	(0.218)	0.170	0.019
186	15.50	0.77	0.189	(0.217)	0.170	0.019
187	15.58	0.63	0.156	(0.216)	0.140	0.016
188	15.67	0.63	0.156	(0.215)	0.140	0.016
189	15.75	0.63	0.156	(0.214)	0.140	0.016
190	15.83	0.63	0.156	(0.213)	0.140	0.016
191	15.92	0.63	0.156	(0.211)	0.140	0.016
192	16.00	0.63	0.156	(0.210)	0.140	0.016
193	16.08	0.13	0.033	(0.209)	0.030	0.003
194	16.17	0.13	0.033	(0.208)	0.030	0.003
195	16.25	0.13	0.033	(0.207)	0.030	0.003
196	16.33	0.13	0.033	(0.206)	0.030	0.003
197	16.42	0.13	0.033	(0.205)	0.030	0.003
198	16.50	0.13	0.033	(0.204)	0.030	0.003
199	16.58	0.10	0.025	(0.203)	0.022	0.002
200	16.67	0.10	0.025	(0.202)	0.022	0.002
201	16.75	0.10	0.025	(0.201)	0.022	0.002
202	16.83	0.10	0.025	(0.200)	0.022	0.002
203	16.92	0.10	0.025	(0.199)	0.022	0.002
204	17.00	0.10	0.025	(0.198)	0.022	0.002
205	17.08	0.17	0.041	(0.197)	0.037	0.004
206	17.17	0.17	0.041	(0.196)	0.037	0.004
207	17.25	0.17	0.041	(0.195)	0.037	0.004
208	17.33	0.17	0.041	(0.194)	0.037	0.004
209	17.42	0.17	0.041	(0.193)	0.037	0.004
210	17.50	0.17	0.041	(0.192)	0.037	0.004
211	17.58	0.17	0.041	(0.191)	0.037	0.004
212	17.67	0.17	0.041	(0.190)	0.037	0.004
213	17.75	0.17	0.041	(0.189)	0.037	0.004
214	17.83	0.13	0.033	(0.188)	0.030	0.003
215	17.92	0.13	0.033	(0.187)	0.030	0.003
216	18.00	0.13	0.033	(0.186)	0.030	0.003
217	18.08	0.13	0.033	(0.185)	0.030	0.003
218	18.17	0.13	0.033	(0.185)	0.030	0.003
219	18.25	0.13	0.033	(0.184)	0.030	0.003
220	18.33	0.13	0.033	(0.183)	0.030	0.003
221	18.42	0.13	0.033	(0.182)	0.030	0.003
222	18.50	0.13	0.033	(0.181)	0.030	0.003
223	18.58	0.10	0.025	(0.180)	0.022	0.002
224	18.67	0.10	0.025	(0.179)	0.022	0.002
225	18.75	0.10	0.025	(0.178)	0.022	0.002
226	18.83	0.07	0.016	(0.177)	0.015	0.002

227	18.92	0.07	0.016	(0.177)	0.015	0.002
228	19.00	0.07	0.016	(0.176)	0.015	0.002
229	19.08	0.10	0.025	(0.175)	0.022	0.002
230	19.17	0.10	0.025	(0.174)	0.022	0.002
231	19.25	0.10	0.025	(0.173)	0.022	0.002
232	19.33	0.13	0.033	(0.173)	0.030	0.003
233	19.42	0.13	0.033	(0.172)	0.030	0.003
234	19.50	0.13	0.033	(0.171)	0.030	0.003
235	19.58	0.10	0.025	(0.170)	0.022	0.002
236	19.67	0.10	0.025	(0.169)	0.022	0.002
237	19.75	0.10	0.025	(0.169)	0.022	0.002
238	19.83	0.07	0.016	(0.168)	0.015	0.002
239	19.92	0.07	0.016	(0.167)	0.015	0.002
240	20.00	0.07	0.016	(0.166)	0.015	0.002
241	20.08	0.10	0.025	(0.166)	0.022	0.002
242	20.17	0.10	0.025	(0.165)	0.022	0.002
243	20.25	0.10	0.025	(0.164)	0.022	0.002
244	20.33	0.10	0.025	(0.163)	0.022	0.002
245	20.42	0.10	0.025	(0.163)	0.022	0.002
246	20.50	0.10	0.025	(0.162)	0.022	0.002
247	20.58	0.10	0.025	(0.161)	0.022	0.002
248	20.67	0.10	0.025	(0.161)	0.022	0.002
249	20.75	0.10	0.025	(0.160)	0.022	0.002
250	20.83	0.07	0.016	(0.159)	0.015	0.002
251	20.92	0.07	0.016	(0.159)	0.015	0.002
252	21.00	0.07	0.016	(0.158)	0.015	0.002
253	21.08	0.10	0.025	(0.157)	0.022	0.002
254	21.17	0.10	0.025	(0.157)	0.022	0.002
255	21.25	0.10	0.025	(0.156)	0.022	0.002
256	21.33	0.07	0.016	(0.156)	0.015	0.002
257	21.42	0.07	0.016	(0.155)	0.015	0.002
258	21.50	0.07	0.016	(0.155)	0.015	0.002
259	21.58	0.10	0.025	(0.154)	0.022	0.002
260	21.67	0.10	0.025	(0.153)	0.022	0.002
261	21.75	0.10	0.025	(0.153)	0.022	0.002
262	21.83	0.07	0.016	(0.152)	0.015	0.002
263	21.92	0.07	0.016	(0.152)	0.015	0.002
264	22.00	0.07	0.016	(0.151)	0.015	0.002
265	22.08	0.10	0.025	(0.151)	0.022	0.002
266	22.17	0.10	0.025	(0.150)	0.022	0.002
267	22.25	0.10	0.025	(0.150)	0.022	0.002
268	22.33	0.07	0.016	(0.149)	0.015	0.002
269	22.42	0.07	0.016	(0.149)	0.015	0.002
270	22.50	0.07	0.016	(0.148)	0.015	0.002
271	22.58	0.07	0.016	(0.148)	0.015	0.002
272	22.67	0.07	0.016	(0.148)	0.015	0.002
273	22.75	0.07	0.016	(0.147)	0.015	0.002
274	22.83	0.07	0.016	(0.147)	0.015	0.002
275	22.92	0.07	0.016	(0.146)	0.015	0.002
276	23.00	0.07	0.016	(0.146)	0.015	0.002
277	23.08	0.07	0.016	(0.146)	0.015	0.002
278	23.17	0.07	0.016	(0.145)	0.015	0.002
279	23.25	0.07	0.016	(0.145)	0.015	0.002
280	23.33	0.07	0.016	(0.145)	0.015	0.002
281	23.42	0.07	0.016	(0.145)	0.015	0.002
282	23.50	0.07	0.016	(0.144)	0.015	0.002
283	23.58	0.07	0.016	(0.144)	0.015	0.002
284	23.67	0.07	0.016	(0.144)	0.015	0.002
285	23.75	0.07	0.016	(0.144)	0.015	0.002
286	23.83	0.07	0.016	(0.143)	0.015	0.002
287	23.92	0.07	0.016	(0.143)	0.015	0.002
288	24.00	0.07	0.016	(0.143)	0.015	0.002

(Loss Rate Not Used)

Sum = 100.0 Sum = 2.5

Flood volume = Effective rainfall 0.21(In)

times area 14.0(Ac.)/[(In)/(Ft.)] = 0.2(Ac.Ft)

Total soil loss = 1.84(In)

Total soil loss = 2.146(Ac.Ft)

Total rainfall = 2.05(In)

Flood volume = 10459.3 Cubic Feet

Total soil loss = 93495.7 Cubic Feet

Peak flow rate of this hydrograph = 0.371(CFS)

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          ----------------------------------------------------------------------
          ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                              24 - H O U R    S T O R M
                         R u n o f f     H y d r o g r a p h
          ----------------------------------------------------------------------
                      Hydrograph in   5   Minute intervals ((CFS))

          ----------------------------------------------------------------------
    Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
    ----------------------------------------------------------------------
      0+ 5       0.0000      0.00  Q         |         |         |         |
      0+10       0.0000      0.00  Q         |         |         |         |
      0+15       0.0000      0.00  Q         |         |         |         |
      0+20       0.0001      0.01  Q         |         |         |         |
      0+25       0.0001      0.01  Q         |         |         |         |
      0+30       0.0002      0.01  Q         |         |         |         |
      0+35       0.0003      0.02  Q         |         |         |         |
      0+40       0.0005      0.02  Q         |         |         |         |
      0+45       0.0006      0.02  Q         |         |         |         |
      0+50       0.0008      0.02  Q         |         |         |         |
      0+55       0.0010      0.03  Q         |         |         |         |
      1+ 0       0.0012      0.03  Q         |         |         |         |
      1+ 5       0.0014      0.03  Q         |         |         |         |
      1+10       0.0016      0.03  Q         |         |         |         |
      1+15       0.0018      0.03  Q         |         |         |         |
      1+20       0.0020      0.03  Q         |         |         |         |
      1+25       0.0023      0.03  Q         |         |         |         |
      1+30       0.0025      0.03  Q         |         |         |         |
      1+35       0.0027      0.03  Q         |         |         |         |
      1+40       0.0029      0.03  Q         |         |         |         |
      1+45       0.0032      0.03  Q         |         |         |         |
      1+50       0.0034      0.03  Q         |         |         |         |
      1+55       0.0036      0.03  Q         |         |         |         |
      2+ 0       0.0038      0.03  Q         |         |         |         |
      2+ 5       0.0041      0.04  Q         |         |         |         |
      2+10       0.0043      0.04  Q         |         |         |         |
      2+15       0.0046      0.04  Q         |         |         |         |
      2+20       0.0049      0.04  Q         |         |         |         |
      2+25       0.0052      0.04  Q         |         |         |         |
      2+30       0.0055      0.04  Q         |         |         |         |
      2+35       0.0058      0.04  Q         |         |         |         |
      2+40       0.0061      0.04  QV        |         |         |         |
      2+45       0.0064      0.04  QV        |         |         |         |
      2+50       0.0067      0.05  QV        |         |         |         |
      2+55       0.0070      0.05  QV        |         |         |         |
      3+ 0       0.0074      0.05  QV        |         |         |         |
      3+ 5       0.0077      0.05  QV        |         |         |         |
      3+10       0.0081      0.05  QV        |         |         |         |
      3+15       0.0084      0.05  QV        |         |         |         |
      3+20       0.0088      0.05  QV        |         |         |         |
      3+25       0.0092      0.05  QV        |         |         |         |
      3+30       0.0095      0.05  QV        |         |         |         |
      3+35       0.0099      0.05  QV        |         |         |         |
      3+40       0.0103      0.05  QV        |         |         |         |
      3+45       0.0107      0.06  QV        |         |         |         |
      3+50       0.0111      0.06  QV        |         |         |         |
      3+55       0.0114      0.06  QV        |         |         |         |
      4+ 0       0.0118      0.06  QV        |         |         |         |
      4+ 5       0.0122      0.06  Q V       |         |         |         |
      4+10       0.0127      0.06  Q V       |         |         |         |
      4+15       0.0131      0.06  Q V       |         |         |         |
      4+20       0.0135      0.06  Q V       |         |         |         |
      4+25       0.0140      0.06  Q V       |         |         |         |
      4+30       0.0144      0.07  Q V       |         |         |         |
      4+35       0.0149      0.07  Q V       |         |         |         |
      4+40       0.0154      0.07  Q V       |         |         |         |
      4+45       0.0159      0.07  Q V       |         |         |         |
      4+50       0.0164      0.07  Q V       |         |         |         |
      4+55       0.0169      0.07  Q V       |         |         |         |
      5+ 0       0.0174      0.08  Q V       |         |         |         |
      5+ 5       0.0180      0.08  Q V       |         |         |         |
      5+10       0.0185      0.08  Q  V      |         |         |         |
      5+15       0.0191      0.08  Q  V      |         |         |         |
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 5+20       0.0196      0.08  Q  V      |         |         |         |
 5+25       0.0201      0.08  Q  V      |         |         |         |
 5+30       0.0207      0.08  Q  V      |         |         |         |
 5+35       0.0212      0.08  Q  V      |         |         |         |
 5+40       0.0217      0.08  Q  V      |         |         |         |
 5+45       0.0223      0.08  Q  V      |         |         |         |
 5+50       0.0228      0.08  Q  V      |         |         |         |
 5+55       0.0234      0.08  Q  V      |         |         |         |
 6+ 0       0.0240      0.08  Q  V      |         |         |         |
 6+ 5       0.0246      0.09  Q   V     |         |         |         |
 6+10       0.0252      0.09  Q   V     |         |         |         |
 6+15       0.0258      0.09  Q   V     |         |         |         |
 6+20       0.0264      0.09  Q   V     |         |         |         |
 6+25       0.0270      0.09  Q   V     |         |         |         |
 6+30       0.0277      0.09  Q   V     |         |         |         |
 6+35       0.0284      0.10  Q   V     |         |         |         |
 6+40       0.0290      0.10  Q   V     |         |         |         |
 6+45       0.0297      0.10  Q   V     |         |         |         |
 6+50       0.0304      0.10  Q    V    |         |         |         |
 6+55       0.0311      0.10  Q    V    |         |         |         |
 7+ 0       0.0318      0.11  Q    V    |         |         |         |
 7+ 5       0.0326      0.11  Q    V    |         |         |         |
 7+10       0.0333      0.11  Q    V    |         |         |         |
 7+15       0.0341      0.11  Q    V    |         |         |         |
 7+20       0.0348      0.11  Q    V    |         |         |         |
 7+25       0.0356      0.11  Q    V    |         |         |         |
 7+30       0.0364      0.11  Q     V   |         |         |         |
 7+35       0.0372      0.11  Q     V   |         |         |         |
 7+40       0.0380      0.12  Q     V   |         |         |         |
 7+45       0.0388      0.12  Q     V   |         |         |         |
 7+50       0.0396      0.12  Q     V   |         |         |         |
 7+55       0.0405      0.13  Q     V   |         |         |         |
 8+ 0       0.0414      0.13  Q     V   |         |         |         |
 8+ 5       0.0423      0.13  Q      V  |         |         |         |
 8+10       0.0432      0.14  Q      V  |         |         |         |
 8+15       0.0442      0.14  Q      V  |         |         |         |
 8+20       0.0452      0.14  Q      V  |         |         |         |
 8+25       0.0462      0.15  Q      V  |         |         |         |
 8+30       0.0472      0.15  Q      V  |         |         |         |
 8+35       0.0483      0.16  Q       V |         |         |         |
 8+40       0.0494      0.16  Q       V |         |         |         |
 8+45       0.0505      0.16  Q       V |         |         |         |
 8+50       0.0517      0.16  Q       V |         |         |         |
 8+55       0.0528      0.17  Q       V |         |         |         |
 9+ 0       0.0540      0.17  Q       V |         |         |         |
 9+ 5       0.0552      0.17  Q        V|         |         |         |
 9+10       0.0564      0.18  Q        V|         |         |         |
 9+15       0.0577      0.18  Q        V|         |         |         |
 9+20       0.0590      0.19  Q        V|         |         |         |
 9+25       0.0603      0.19  Q         V         |         |         |
 9+30       0.0617      0.20  Q         V         |         |         |
 9+35       0.0631      0.20  Q         V         |         |         |
 9+40       0.0645      0.21  Q         V         |         |         |
 9+45       0.0659      0.21  Q         V         |         |         |
 9+50       0.0674      0.22  Q         |V        |         |         |
 9+55       0.0689      0.22  Q         |V        |         |         |
10+ 0       0.0705      0.22  Q         |V        |         |         |
10+ 5       0.0721      0.23  Q         | V       |         |         |
10+10       0.0736      0.23  Q         | V       |         |         |
10+15       0.0752      0.22  Q         | V       |         |         |
10+20       0.0767      0.22  Q         | V       |         |         |
10+25       0.0781      0.21  Q         |  V      |         |         |
10+30       0.0795      0.20  Q         |  V      |         |         |
10+35       0.0808      0.20  Q         |  V      |         |         |
10+40       0.0822      0.19  Q         |  V      |         |         |
10+45       0.0835      0.20  Q         |  V      |         |         |
10+50       0.0849      0.20  Q         |   V     |         |         |
10+55       0.0863      0.21  Q         |   V     |         |         |
11+ 0       0.0878      0.21  Q         |   V     |         |         |
11+ 5       0.0892      0.22  Q         |   V     |         |         |
11+10       0.0907      0.22  Q         |    V    |         |         |
11+15       0.0923      0.22  Q         |    V    |         |         |
11+20       0.0938      0.22  Q         |    V    |         |         |
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11+25       0.0953      0.22  Q         |    V    |         |         |
11+30       0.0968      0.22  Q         |     V   |         |         |
11+35       0.0983      0.22  Q         |     V   |         |         |
11+40       0.0998      0.22  Q         |     V   |         |         |
11+45       0.1013      0.22  Q         |     V   |         |         |
11+50       0.1027      0.21  Q         |      V  |         |         |
11+55       0.1042      0.21  Q         |      V  |         |         |
12+ 0       0.1056      0.21  Q         |      V  |         |         |
12+ 5       0.1071      0.21  Q         |      V  |         |         |
12+10       0.1085      0.21  Q         |       V |         |         |
12+15       0.1100      0.22  Q         |       V |         |         |
12+20       0.1116      0.23  Q         |       V |         |         |
12+25       0.1133      0.24  Q         |       V |         |         |
12+30       0.1150      0.25  |Q        |        V|         |         |
12+35       0.1168      0.26  |Q        |        V|         |         |
12+40       0.1186      0.27  |Q        |        V|         |         |
12+45       0.1205      0.27  |Q        |         V         |         |
12+50       0.1224      0.28  |Q        |         V         |         |
12+55       0.1244      0.29  |Q        |         V         |         |
13+ 0       0.1264      0.29  |Q        |         |V        |         |
13+ 5       0.1285      0.30  |Q        |         |V        |         |
13+10       0.1306      0.31  |Q        |         |V        |         |
13+15       0.1328      0.32  |Q        |         | V       |         |
13+20       0.1351      0.33  |Q        |         | V       |         |
13+25       0.1374      0.34  |Q        |         | V       |         |
13+30       0.1398      0.35  |Q        |         |  V      |         |
13+35       0.1424      0.37  |Q        |         |  V      |         |
13+40       0.1449      0.37  |Q        |         |   V     |         |
13+45       0.1475      0.37  |Q        |         |   V     |         |
13+50       0.1499      0.36  |Q        |         |   V     |         |
13+55       0.1523      0.34  |Q        |         |    V    |         |
14+ 0       0.1545      0.32  |Q        |         |    V    |         |
14+ 5       0.1566      0.31  |Q        |         |     V   |         |
14+10       0.1587      0.30  |Q        |         |     V   |         |
14+15       0.1607      0.30  |Q        |         |     V   |         |
14+20       0.1628      0.30  |Q        |         |      V  |         |
14+25       0.1649      0.30  |Q        |         |      V  |         |
14+30       0.1670      0.31  |Q        |         |      V  |         |
14+35       0.1691      0.31  |Q        |         |       V |         |
14+40       0.1712      0.31  |Q        |         |       V |         |
14+45       0.1733      0.31  |Q        |         |       V |         |
14+50       0.1754      0.30  |Q        |         |        V|         |
14+55       0.1775      0.30  |Q        |         |        V|         |
15+ 0       0.1796      0.30  |Q        |         |        V|         |
15+ 5       0.1817      0.30  |Q        |         |         V         |
15+10       0.1837      0.30  |Q        |         |         V         |
15+15       0.1858      0.30  |Q        |         |         V         |
15+20       0.1878      0.29  |Q        |         |         |V        |
15+25       0.1898      0.29  |Q        |         |         |V        |
15+30       0.1918      0.29  |Q        |         |         |V        |
15+35       0.1937      0.28  |Q        |         |         | V       |
15+40       0.1956      0.28  |Q        |         |         | V       |
15+45       0.1975      0.27  |Q        |         |         | V       |
15+50       0.1994      0.27  |Q        |         |         |  V      |
15+55       0.2012      0.26  |Q        |         |         |  V      |
16+ 0       0.2029      0.25  |Q        |         |         |  V      |
16+ 5       0.2046      0.24  Q         |         |         |   V     |
16+10       0.2062      0.23  Q         |         |         |   V     |
16+15       0.2077      0.22  Q         |         |         |   V     |
16+20       0.2090      0.20  Q         |         |         |   V     |
16+25       0.2102      0.17  Q         |         |         |    V    |
16+30       0.2113      0.15  Q         |         |         |    V    |
16+35       0.2122      0.13  Q         |         |         |    V    |
16+40       0.2130      0.12  Q         |         |         |    V    |
16+45       0.2137      0.11  Q         |         |         |    V    |
16+50       0.2144      0.10  Q         |         |         |    V    |
16+55       0.2150      0.09  Q         |         |         |    V    |
17+ 0       0.2156      0.09  Q         |         |         |    V    |
17+ 5       0.2162      0.08  Q         |         |         |     V   |
17+10       0.2167      0.08  Q         |         |         |     V   |
17+15       0.2172      0.07  Q         |         |         |     V   |
17+20       0.2177      0.07  Q         |         |         |     V   |
17+25       0.2182      0.07  Q         |         |         |     V   |
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17+30       0.2187      0.07  Q          |         |         |    V   |
17+35       0.2192      0.07  Q          |         |         |    V   |
17+40       0.2197      0.07  Q          |         |         |    V   |
17+45       0.2202      0.07  Q          |         |         |    V   |
17+50       0.2206      0.07  Q          |         |         |    V   |
17+55       0.2211      0.07  Q          |         |         |    V   |
18+ 0       0.2216      0.07  Q          |         |         |    V   |
18+ 5       0.2220      0.06  Q          |         |         |    V   |
18+10       0.2224      0.06  Q          |         |         |     V  |
18+15       0.2228      0.06  Q          |         |         |     V  |
18+20       0.2232      0.06  Q          |         |         |     V  |
18+25       0.2236      0.06  Q          |         |         |     V  |
18+30       0.2240      0.05  Q          |         |         |     V  |
18+35       0.2244      0.05  Q          |         |         |     V  |
18+40       0.2247      0.05  Q          |         |         |     V  |
18+45       0.2251      0.05  Q          |         |         |     V  |
18+50       0.2254      0.05  Q          |         |         |     V  |
18+55       0.2257      0.05  Q          |         |         |     V  |
19+ 0       0.2260      0.04  Q          |         |         |     V  |
19+ 5       0.2263      0.04  Q          |         |         |     V  |
19+10       0.2265      0.04  Q          |         |         |     V  |
19+15       0.2268      0.04  Q          |         |         |     V  |
19+20       0.2270      0.04  Q          |         |         |     V  |
19+25       0.2273      0.04  Q          |         |         |     V  |
19+30       0.2275      0.04  Q          |         |         |     V  |
19+35       0.2278      0.04  Q          |         |         |     V  |
19+40       0.2281      0.04  Q          |         |         |     V  |
19+45       0.2284      0.04  Q          |         |         |      V |
19+50       0.2286      0.04  Q          |         |         |      V |
19+55       0.2289      0.04  Q          |         |         |      V |
20+ 0       0.2291      0.04  Q          |         |         |      V |
20+ 5       0.2294      0.03  Q          |         |         |      V |
20+10       0.2296      0.03  Q          |         |         |      V |
20+15       0.2298      0.03  Q          |         |         |      V |
20+20       0.2301      0.03  Q          |         |         |      V |
20+25       0.2303      0.03  Q          |         |         |      V |
20+30       0.2305      0.03  Q          |         |         |      V |
20+35       0.2307      0.03  Q          |         |         |      V |
20+40       0.2310      0.03  Q          |         |         |      V |
20+45       0.2312      0.03  Q          |         |         |      V |
20+50       0.2315      0.03  Q          |         |         |      V |
20+55       0.2317      0.03  Q          |         |         |      V |
21+ 0       0.2319      0.03  Q          |         |         |      V |
21+ 5       0.2321      0.03  Q          |         |         |      V |
21+10       0.2323      0.03  Q          |         |         |      V |
21+15       0.2326      0.03  Q          |         |         |      V |
21+20       0.2328      0.03  Q          |         |         |      V |
21+25       0.2330      0.03  Q          |         |         |      V |
21+30       0.2332      0.03  Q          |         |         |      V |
21+35       0.2334      0.03  Q          |         |         |      V |
21+40       0.2336      0.03  Q          |         |         |      V |
21+45       0.2338      0.03  Q          |         |         |      V |
21+50       0.2340      0.03  Q          |         |         |      V |
21+55       0.2342      0.03  Q          |         |         |       V|
22+ 0       0.2344      0.03  Q          |         |         |       V|
22+ 5       0.2346      0.03  Q          |         |         |       V|
22+10       0.2348      0.03  Q          |         |         |       V|
22+15       0.2350      0.03  Q          |         |         |       V|
22+20       0.2352      0.03  Q          |         |         |       V|
22+25       0.2354      0.03  Q          |         |         |       V|
22+30       0.2356      0.03  Q          |         |         |       V|
22+35       0.2358      0.03  Q          |         |         |       V|
22+40       0.2360      0.03  Q          |         |         |       V|
22+45       0.2362      0.03  Q          |         |         |       V|
22+50       0.2364      0.03  Q          |         |         |       V|
22+55       0.2366      0.03  Q          |         |         |       V|
23+ 0       0.2368      0.03  Q          |         |         |       V|
23+ 5       0.2369      0.03  Q          |         |         |       V|
23+10       0.2371      0.02  Q          |         |         |       V|
23+15       0.2373      0.02  Q          |         |         |       V|
23+20       0.2374      0.02  Q          |         |         |       V|
23+25       0.2376      0.02  Q          |         |         |       V|
23+30       0.2378      0.02  Q          |         |         |       V|
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   23+35       0.2379      0.02  Q         |         |         |        V|
   23+40       0.2381      0.02  Q         |         |         |        V|
   23+45       0.2383      0.02  Q         |         |         |        V|
   23+50       0.2384      0.02  Q         |         |         |        V|
   23+55       0.2386      0.02  Q         |         |         |        V|
   24+ 0       0.2388      0.02  Q         |         |         |        V|
   24+ 5       0.2389      0.02  Q         |         |         |        V|
   24+10       0.2391      0.02  Q         |         |         |        V|
   24+15       0.2392      0.02  Q         |         |         |        V|
   24+20       0.2393      0.02  Q         |         |         |        V|
   24+25       0.2394      0.02  Q         |         |         |        V|
   24+30       0.2395      0.01  Q         |         |         |        V|
   24+35       0.2396      0.01  Q         |         |         |        V|
   24+40       0.2396      0.01  Q         |         |         |        V|
   24+45       0.2397      0.01  Q         |         |         |        V|
   24+50       0.2397      0.01  Q         |         |         |        V|
   24+55       0.2398      0.01  Q         |         |         |        V|
   25+ 0       0.2398      0.01  Q         |         |         |        V|
   25+ 5       0.2398      0.00  Q         |         |         |        V|
   25+10       0.2399      0.00  Q         |         |         |        V|
   25+15       0.2399      0.00  Q         |         |         |        V|
   25+20       0.2399      0.00  Q         |         |         |        V|
   25+25       0.2399      0.00  Q         |         |         |        V|
   25+30       0.2400      0.00  Q         |         |         |        V|
   25+35       0.2400      0.00  Q         |         |         |        V|
   25+40       0.2400      0.00  Q         |         |         |        V|
   25+45       0.2400      0.00  Q         |         |         |        V|
   25+50       0.2400      0.00  Q         |         |         |        V|
   25+55       0.2400      0.00  Q         |         |         |        V|
   26+ 0       0.2400      0.00  Q         |         |         |        V|
   26+ 5       0.2400      0.00  Q         |         |         |        V|
   26+10       0.2401      0.00  Q         |         |         |        V|
   26+15       0.2401      0.00  Q         |         |         |        V|
   26+20       0.2401      0.00  Q         |         |         |        V|
   26+25       0.2401      0.00  Q         |         |         |        V|
   26+30       0.2401      0.00  Q         |         |         |        V|
   26+35       0.2401      0.00  Q         |         |         |        V|
   26+40       0.2401      0.00  Q         |         |         |        V|
   26+45       0.2401      0.00  Q         |         |         |        V|
   26+50       0.2401      0.00  Q         |         |         |        V|
   26+55       0.2401      0.00  Q         |         |         |        V|
   27+ 0       0.2401      0.00  Q         |         |         |        V|
   27+ 5       0.2401      0.00  Q         |         |         |        V|
   27+10       0.2401      0.00  Q         |         |         |        V|
   27+15       0.2401      0.00  Q         |         |         |        V|
   27+20       0.2401      0.00  Q         |         |         |        V|
   27+25       0.2401      0.00  Q         |         |         |        V|
   27+30       0.2401      0.00  Q         |         |         |        V|
   27+35       0.2401      0.00  Q         |         |         |        V|
   27+40       0.2401      0.00  Q         |         |         |         V
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                U n i t   H y d r o g r a p h   A n a l y s i s

                Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0
                        Study date  03/22/22 File: PP1PUH242.out


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------------------------------------------------------------------------

        Riverside County Synthetic Unit Hydrology Method
        RCFC & WCD Manual date - April 1978


        Program License Serial Number 6443

        ---------------------------------------------------------------------
         English (in-lb) Input Units Used
         English Rainfall Data (Inches) Input Values Used

         English Units used in output format



        ---------------------------------------------------------------------
        PILOT PERRIS
        PROP 2-YR
        XO 3/22/22

        --------------------------------------------------------------------
        Drainage Area =      13.97(Ac.)  =      0.022 Sq. Mi.
        Drainage Area for Depth-Area Areal Adjustment =      13.97(Ac.)  =
 0.022 Sq. Mi.
        USER Entry of lag time in hours
        Lag time =    0.244 Hr.
        Lag time =    14.64 Min.
        25% of lag time =     3.66 Min.
        40% of lag time =     5.86 Min.
        Unit time =     5.00 Min.
        Duration of storm = 24 Hour(s)
        User Entered Base Flow =     0.00(CFS)

        2 YEAR Area rainfall data:


        Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
               13.97            2.05                     28.64

        100 YEAR Area rainfall data:
```

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
13.97	5.33	74.46

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.050(In)
Area Averaged 100-Year Rainfall = 5.330(In)

Point rain (area averaged) = 2.050(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.050(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
10.190	75.00	0.900
3.780	87.00	0.000

Total Area Entered = 13.97(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
75.0	57.0	0.501	0.900	0.095	0.729	0.069
87.0	73.2	0.324	0.000	0.324	0.271	0.088
					Sum (F) =	0.157

Area averaged mean soil loss (F) (In/Hr) = 0.157
Minimum soil loss rate ((In/Hr)) = 0.079
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.364

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	34.153	3.465	0.488
2	0.167	68.306	13.463	1.895
3	0.250	102.459	22.544	3.174
4	0.333	136.612	19.842	2.794
5	0.417	170.765	10.757	1.514
6	0.500	204.918	6.115	0.861
7	0.583	239.071	4.397	0.619
8	0.667	273.224	3.439	0.484
9	0.750	307.377	2.771	0.390
10	0.833	341.530	2.176	0.306
11	0.917	375.683	1.895	0.267
12	1.000	409.836	1.503	0.212
13	1.083	443.989	1.197	0.168
14	1.167	478.142	1.070	0.151
15	1.250	512.295	1.008	0.142
16	1.333	546.448	0.807	0.114

17	1.417	580.601	0.697	0.098
18	1.500	614.754	0.603	0.085
19	1.583	648.907	0.500	0.070
20	1.667	683.060	0.414	0.058
21	1.750	717.213	0.342	0.048
22	1.833	751.366	0.342	0.048
23	1.917	785.519	0.342	0.048
24	2.000	819.672	0.316	0.044
			Sum = 100.000	Sum= 14.079

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.08	0.07	0.016	(0.279)	0.006	0.010
2	0.17	0.07	0.016	(0.277)	0.006	0.010
3	0.25	0.07	0.016	(0.276)	0.006	0.010
4	0.33	0.10	0.025	(0.275)	0.009	0.016
5	0.42	0.10	0.025	(0.274)	0.009	0.016
6	0.50	0.10	0.025	(0.273)	0.009	0.016
7	0.58	0.10	0.025	(0.272)	0.009	0.016
8	0.67	0.10	0.025	(0.271)	0.009	0.016
9	0.75	0.10	0.025	(0.270)	0.009	0.016
10	0.83	0.13	0.033	(0.269)	0.012	0.021
11	0.92	0.13	0.033	(0.268)	0.012	0.021
12	1.00	0.13	0.033	(0.267)	0.012	0.021
13	1.08	0.10	0.025	(0.266)	0.009	0.016
14	1.17	0.10	0.025	(0.265)	0.009	0.016
15	1.25	0.10	0.025	(0.264)	0.009	0.016
16	1.33	0.10	0.025	(0.263)	0.009	0.016
17	1.42	0.10	0.025	(0.262)	0.009	0.016
18	1.50	0.10	0.025	(0.260)	0.009	0.016
19	1.58	0.10	0.025	(0.259)	0.009	0.016
20	1.67	0.10	0.025	(0.258)	0.009	0.016
21	1.75	0.10	0.025	(0.257)	0.009	0.016
22	1.83	0.13	0.033	(0.256)	0.012	0.021
23	1.92	0.13	0.033	(0.255)	0.012	0.021
24	2.00	0.13	0.033	(0.254)	0.012	0.021
25	2.08	0.13	0.033	(0.253)	0.012	0.021
26	2.17	0.13	0.033	(0.252)	0.012	0.021
27	2.25	0.13	0.033	(0.251)	0.012	0.021
28	2.33	0.13	0.033	(0.250)	0.012	0.021
29	2.42	0.13	0.033	(0.249)	0.012	0.021
30	2.50	0.13	0.033	(0.248)	0.012	0.021
31	2.58	0.17	0.041	(0.247)	0.015	0.026
32	2.67	0.17	0.041	(0.246)	0.015	0.026
33	2.75	0.17	0.041	(0.245)	0.015	0.026
34	2.83	0.17	0.041	(0.244)	0.015	0.026

35	2.92	0.17	0.041	(0.243)	0.015	0.026
36	3.00	0.17	0.041	(0.242)	0.015	0.026
37	3.08	0.17	0.041	(0.241)	0.015	0.026
38	3.17	0.17	0.041	(0.240)	0.015	0.026
39	3.25	0.17	0.041	(0.239)	0.015	0.026
40	3.33	0.17	0.041	(0.238)	0.015	0.026
41	3.42	0.17	0.041	(0.237)	0.015	0.026
42	3.50	0.17	0.041	(0.236)	0.015	0.026
43	3.58	0.17	0.041	(0.235)	0.015	0.026
44	3.67	0.17	0.041	(0.234)	0.015	0.026
45	3.75	0.17	0.041	(0.233)	0.015	0.026
46	3.83	0.20	0.049	(0.232)	0.018	0.031
47	3.92	0.20	0.049	(0.231)	0.018	0.031
48	4.00	0.20	0.049	(0.230)	0.018	0.031
49	4.08	0.20	0.049	(0.229)	0.018	0.031
50	4.17	0.20	0.049	(0.228)	0.018	0.031
51	4.25	0.20	0.049	(0.227)	0.018	0.031
52	4.33	0.23	0.057	(0.226)	0.021	0.037
53	4.42	0.23	0.057	(0.225)	0.021	0.037
54	4.50	0.23	0.057	(0.224)	0.021	0.037
55	4.58	0.23	0.057	(0.223)	0.021	0.037
56	4.67	0.23	0.057	(0.222)	0.021	0.037
57	4.75	0.23	0.057	(0.221)	0.021	0.037
58	4.83	0.27	0.066	(0.221)	0.024	0.042
59	4.92	0.27	0.066	(0.220)	0.024	0.042
60	5.00	0.27	0.066	(0.219)	0.024	0.042
61	5.08	0.20	0.049	(0.218)	0.018	0.031
62	5.17	0.20	0.049	(0.217)	0.018	0.031
63	5.25	0.20	0.049	(0.216)	0.018	0.031
64	5.33	0.23	0.057	(0.215)	0.021	0.037
65	5.42	0.23	0.057	(0.214)	0.021	0.037
66	5.50	0.23	0.057	(0.213)	0.021	0.037
67	5.58	0.27	0.066	(0.212)	0.024	0.042
68	5.67	0.27	0.066	(0.211)	0.024	0.042
69	5.75	0.27	0.066	(0.210)	0.024	0.042
70	5.83	0.27	0.066	(0.209)	0.024	0.042
71	5.92	0.27	0.066	(0.208)	0.024	0.042
72	6.00	0.27	0.066	(0.207)	0.024	0.042
73	6.08	0.30	0.074	(0.206)	0.027	0.047
74	6.17	0.30	0.074	(0.206)	0.027	0.047
75	6.25	0.30	0.074	(0.205)	0.027	0.047
76	6.33	0.30	0.074	(0.204)	0.027	0.047
77	6.42	0.30	0.074	(0.203)	0.027	0.047
78	6.50	0.30	0.074	(0.202)	0.027	0.047
79	6.58	0.33	0.082	(0.201)	0.030	0.052
80	6.67	0.33	0.082	(0.200)	0.030	0.052
81	6.75	0.33	0.082	(0.199)	0.030	0.052
82	6.83	0.33	0.082	(0.198)	0.030	0.052
83	6.92	0.33	0.082	(0.197)	0.030	0.052
84	7.00	0.33	0.082	(0.196)	0.030	0.052
85	7.08	0.33	0.082	(0.196)	0.030	0.052
86	7.17	0.33	0.082	(0.195)	0.030	0.052
87	7.25	0.33	0.082	(0.194)	0.030	0.052

88	7.33	0.37	0.090	(0.193)	0.033	0.057
89	7.42	0.37	0.090	(0.192)	0.033	0.057
90	7.50	0.37	0.090	(0.191)	0.033	0.057
91	7.58	0.40	0.098	(0.190)	0.036	0.063
92	7.67	0.40	0.098	(0.189)	0.036	0.063
93	7.75	0.40	0.098	(0.189)	0.036	0.063
94	7.83	0.43	0.107	(0.188)	0.039	0.068
95	7.92	0.43	0.107	(0.187)	0.039	0.068
96	8.00	0.43	0.107	(0.186)	0.039	0.068
97	8.08	0.50	0.123	(0.185)	0.045	0.078
98	8.17	0.50	0.123	(0.184)	0.045	0.078
99	8.25	0.50	0.123	(0.183)	0.045	0.078
100	8.33	0.50	0.123	(0.182)	0.045	0.078
101	8.42	0.50	0.123	(0.182)	0.045	0.078
102	8.50	0.50	0.123	(0.181)	0.045	0.078
103	8.58	0.53	0.131	(0.180)	0.048	0.083
104	8.67	0.53	0.131	(0.179)	0.048	0.083
105	8.75	0.53	0.131	(0.178)	0.048	0.083
106	8.83	0.57	0.139	(0.177)	0.051	0.089
107	8.92	0.57	0.139	(0.177)	0.051	0.089
108	9.00	0.57	0.139	(0.176)	0.051	0.089
109	9.08	0.63	0.156	(0.175)	0.057	0.099
110	9.17	0.63	0.156	(0.174)	0.057	0.099
111	9.25	0.63	0.156	(0.173)	0.057	0.099
112	9.33	0.67	0.164	(0.172)	0.060	0.104
113	9.42	0.67	0.164	(0.172)	0.060	0.104
114	9.50	0.67	0.164	(0.171)	0.060	0.104
115	9.58	0.70	0.172	(0.170)	0.063	0.110
116	9.67	0.70	0.172	(0.169)	0.063	0.110
117	9.75	0.70	0.172	(0.168)	0.063	0.110
118	9.83	0.73	0.180	(0.168)	0.066	0.115
119	9.92	0.73	0.180	(0.167)	0.066	0.115
120	10.00	0.73	0.180	(0.166)	0.066	0.115
121	10.08	0.50	0.123	(0.165)	0.045	0.078
122	10.17	0.50	0.123	(0.164)	0.045	0.078
123	10.25	0.50	0.123	(0.164)	0.045	0.078
124	10.33	0.50	0.123	(0.163)	0.045	0.078
125	10.42	0.50	0.123	(0.162)	0.045	0.078
126	10.50	0.50	0.123	(0.161)	0.045	0.078
127	10.58	0.67	0.164	(0.160)	0.060	0.104
128	10.67	0.67	0.164	(0.160)	0.060	0.104
129	10.75	0.67	0.164	(0.159)	0.060	0.104
130	10.83	0.67	0.164	(0.158)	0.060	0.104
131	10.92	0.67	0.164	(0.157)	0.060	0.104
132	11.00	0.67	0.164	(0.156)	0.060	0.104
133	11.08	0.63	0.156	(0.156)	0.057	0.099
134	11.17	0.63	0.156	(0.155)	0.057	0.099
135	11.25	0.63	0.156	(0.154)	0.057	0.099
136	11.33	0.63	0.156	(0.153)	0.057	0.099
137	11.42	0.63	0.156	(0.153)	0.057	0.099
138	11.50	0.63	0.156	(0.152)	0.057	0.099
139	11.58	0.57	0.139	(0.151)	0.051	0.089
140	11.67	0.57	0.139	(0.150)	0.051	0.089

141	11.75	0.57	0.139	(0.150)	0.051	0.089
142	11.83	0.60	0.148	(0.149)	0.054	0.094
143	11.92	0.60	0.148	(0.148)	0.054	0.094
144	12.00	0.60	0.148	(0.147)	0.054	0.094
145	12.08	0.83	0.205	(0.147)	0.075	0.130
146	12.17	0.83	0.205	(0.146)	0.075	0.130
147	12.25	0.83	0.205	(0.145)	0.075	0.130
148	12.33	0.87	0.213	(0.144)	0.078	0.136
149	12.42	0.87	0.213	(0.144)	0.078	0.136
150	12.50	0.87	0.213	(0.143)	0.078	0.136
151	12.58	0.93	0.230	(0.142)	0.084	0.146
152	12.67	0.93	0.230	(0.142)	0.084	0.146
153	12.75	0.93	0.230	(0.141)	0.084	0.146
154	12.83	0.97	0.238	(0.140)	0.087	0.151
155	12.92	0.97	0.238	(0.139)	0.087	0.151
156	13.00	0.97	0.238	(0.139)	0.087	0.151
157	13.08	1.13	0.279	(0.138)	0.101	0.177
158	13.17	1.13	0.279	(0.137)	0.101	0.177
159	13.25	1.13	0.279	(0.137)	0.101	0.177
160	13.33	1.13	0.279	(0.136)	0.101	0.177
161	13.42	1.13	0.279	(0.135)	0.101	0.177
162	13.50	1.13	0.279	(0.135)	0.101	0.177
163	13.58	0.77	0.189	(0.134)	0.069	0.120
164	13.67	0.77	0.189	(0.133)	0.069	0.120
165	13.75	0.77	0.189	(0.133)	0.069	0.120
166	13.83	0.77	0.189	(0.132)	0.069	0.120
167	13.92	0.77	0.189	(0.131)	0.069	0.120
168	14.00	0.77	0.189	(0.131)	0.069	0.120
169	14.08	0.90	0.221	(0.130)	0.081	0.141
170	14.17	0.90	0.221	(0.129)	0.081	0.141
171	14.25	0.90	0.221	(0.129)	0.081	0.141
172	14.33	0.87	0.213	(0.128)	0.078	0.136
173	14.42	0.87	0.213	(0.127)	0.078	0.136
174	14.50	0.87	0.213	(0.127)	0.078	0.136
175	14.58	0.87	0.213	(0.126)	0.078	0.136
176	14.67	0.87	0.213	(0.125)	0.078	0.136
177	14.75	0.87	0.213	(0.125)	0.078	0.136
178	14.83	0.83	0.205	(0.124)	0.075	0.130
179	14.92	0.83	0.205	(0.123)	0.075	0.130
180	15.00	0.83	0.205	(0.123)	0.075	0.130
181	15.08	0.80	0.197	(0.122)	0.072	0.125
182	15.17	0.80	0.197	(0.121)	0.072	0.125
183	15.25	0.80	0.197	(0.121)	0.072	0.125
184	15.33	0.77	0.189	(0.120)	0.069	0.120
185	15.42	0.77	0.189	(0.120)	0.069	0.120
186	15.50	0.77	0.189	(0.119)	0.069	0.120
187	15.58	0.63	0.156	(0.118)	0.057	0.099
188	15.67	0.63	0.156	(0.118)	0.057	0.099
189	15.75	0.63	0.156	(0.117)	0.057	0.099
190	15.83	0.63	0.156	(0.117)	0.057	0.099
191	15.92	0.63	0.156	(0.116)	0.057	0.099
192	16.00	0.63	0.156	(0.115)	0.057	0.099
193	16.08	0.13	0.033	(0.115)	0.012	0.021

194	16.17	0.13	0.033	(	0.114)	0.012	0.021
195	16.25	0.13	0.033	(	0.114)	0.012	0.021
196	16.33	0.13	0.033	(	0.113)	0.012	0.021
197	16.42	0.13	0.033	(	0.112)	0.012	0.021
198	16.50	0.13	0.033	(	0.112)	0.012	0.021
199	16.58	0.10	0.025	(	0.111)	0.009	0.016
200	16.67	0.10	0.025	(	0.111)	0.009	0.016
201	16.75	0.10	0.025	(	0.110)	0.009	0.016
202	16.83	0.10	0.025	(	0.110)	0.009	0.016
203	16.92	0.10	0.025	(	0.109)	0.009	0.016
204	17.00	0.10	0.025	(	0.109)	0.009	0.016
205	17.08	0.17	0.041	(	0.108)	0.015	0.026
206	17.17	0.17	0.041	(	0.107)	0.015	0.026
207	17.25	0.17	0.041	(	0.107)	0.015	0.026
208	17.33	0.17	0.041	(	0.106)	0.015	0.026
209	17.42	0.17	0.041	(	0.106)	0.015	0.026
210	17.50	0.17	0.041	(	0.105)	0.015	0.026
211	17.58	0.17	0.041	(	0.105)	0.015	0.026
212	17.67	0.17	0.041	(	0.104)	0.015	0.026
213	17.75	0.17	0.041	(	0.104)	0.015	0.026
214	17.83	0.13	0.033	(	0.103)	0.012	0.021
215	17.92	0.13	0.033	(	0.103)	0.012	0.021
216	18.00	0.13	0.033	(	0.102)	0.012	0.021
217	18.08	0.13	0.033	(	0.102)	0.012	0.021
218	18.17	0.13	0.033	(	0.101)	0.012	0.021
219	18.25	0.13	0.033	(	0.101)	0.012	0.021
220	18.33	0.13	0.033	(	0.100)	0.012	0.021
221	18.42	0.13	0.033	(	0.100)	0.012	0.021
222	18.50	0.13	0.033	(	0.099)	0.012	0.021
223	18.58	0.10	0.025	(	0.099)	0.009	0.016
224	18.67	0.10	0.025	(	0.098)	0.009	0.016
225	18.75	0.10	0.025	(	0.098)	0.009	0.016
226	18.83	0.07	0.016	(	0.097)	0.006	0.010
227	18.92	0.07	0.016	(	0.097)	0.006	0.010
228	19.00	0.07	0.016	(	0.096)	0.006	0.010
229	19.08	0.10	0.025	(	0.096)	0.009	0.016
230	19.17	0.10	0.025	(	0.096)	0.009	0.016
231	19.25	0.10	0.025	(	0.095)	0.009	0.016
232	19.33	0.13	0.033	(	0.095)	0.012	0.021
233	19.42	0.13	0.033	(	0.094)	0.012	0.021
234	19.50	0.13	0.033	(	0.094)	0.012	0.021
235	19.58	0.10	0.025	(	0.093)	0.009	0.016
236	19.67	0.10	0.025	(	0.093)	0.009	0.016
237	19.75	0.10	0.025	(	0.092)	0.009	0.016
238	19.83	0.07	0.016	(	0.092)	0.006	0.010
239	19.92	0.07	0.016	(	0.092)	0.006	0.010
240	20.00	0.07	0.016	(	0.091)	0.006	0.010
241	20.08	0.10	0.025	(	0.091)	0.009	0.016
242	20.17	0.10	0.025	(	0.090)	0.009	0.016
243	20.25	0.10	0.025	(	0.090)	0.009	0.016
244	20.33	0.10	0.025	(	0.090)	0.009	0.016
245	20.42	0.10	0.025	(	0.089)	0.009	0.016
246	20.50	0.10	0.025	(	0.089)	0.009	0.016

247	20.58	0.10	0.025	(0.089)	0.009	0.016
248	20.67	0.10	0.025	(0.088)	0.009	0.016
249	20.75	0.10	0.025	(0.088)	0.009	0.016
250	20.83	0.07	0.016	(0.087)	0.006	0.010
251	20.92	0.07	0.016	(0.087)	0.006	0.010
252	21.00	0.07	0.016	(0.087)	0.006	0.010
253	21.08	0.10	0.025	(0.086)	0.009	0.016
254	21.17	0.10	0.025	(0.086)	0.009	0.016
255	21.25	0.10	0.025	(0.086)	0.009	0.016
256	21.33	0.07	0.016	(0.085)	0.006	0.010
257	21.42	0.07	0.016	(0.085)	0.006	0.010
258	21.50	0.07	0.016	(0.085)	0.006	0.010
259	21.58	0.10	0.025	(0.084)	0.009	0.016
260	21.67	0.10	0.025	(0.084)	0.009	0.016
261	21.75	0.10	0.025	(0.084)	0.009	0.016
262	21.83	0.07	0.016	(0.084)	0.006	0.010
263	21.92	0.07	0.016	(0.083)	0.006	0.010
264	22.00	0.07	0.016	(0.083)	0.006	0.010
265	22.08	0.10	0.025	(0.083)	0.009	0.016
266	22.17	0.10	0.025	(0.082)	0.009	0.016
267	22.25	0.10	0.025	(0.082)	0.009	0.016
268	22.33	0.07	0.016	(0.082)	0.006	0.010
269	22.42	0.07	0.016	(0.082)	0.006	0.010
270	22.50	0.07	0.016	(0.081)	0.006	0.010
271	22.58	0.07	0.016	(0.081)	0.006	0.010
272	22.67	0.07	0.016	(0.081)	0.006	0.010
273	22.75	0.07	0.016	(0.081)	0.006	0.010
274	22.83	0.07	0.016	(0.081)	0.006	0.010
275	22.92	0.07	0.016	(0.080)	0.006	0.010
276	23.00	0.07	0.016	(0.080)	0.006	0.010
277	23.08	0.07	0.016	(0.080)	0.006	0.010
278	23.17	0.07	0.016	(0.080)	0.006	0.010
279	23.25	0.07	0.016	(0.080)	0.006	0.010
280	23.33	0.07	0.016	(0.079)	0.006	0.010
281	23.42	0.07	0.016	(0.079)	0.006	0.010
282	23.50	0.07	0.016	(0.079)	0.006	0.010
283	23.58	0.07	0.016	(0.079)	0.006	0.010
284	23.67	0.07	0.016	(0.079)	0.006	0.010
285	23.75	0.07	0.016	(0.079)	0.006	0.010
286	23.83	0.07	0.016	(0.079)	0.006	0.010
287	23.92	0.07	0.016	(0.079)	0.006	0.010
288	24.00	0.07	0.016	(0.079)	0.006	0.010

(Loss Rate Not Used)

Sum = 100.0 Sum = 15.6

Flood volume = Effective rainfall 1.30(In)
times area 14.0(Ac.)/[(In)/(Ft.)] = 1.5(Ac.Ft)
Total soil loss = 0.75(In)
Total soil loss = 0.869(Ac.Ft)
Total rainfall = 2.05(In)
Flood volume = 66115.3 Cubic Feet
Total soil loss = 37839.6 Cubic Feet

Peak flow rate of this hydrograph = 2.374(CFS)

```
            ---------------------------------------------------------------------
            +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                                24 - H O U R     S T O R M
                           R u n o f f      H y d r o g r a p h
            ---------------------------------------------------------------------
                        Hydrograph in   5   Minute intervals ((CFS))

            ---------------------------------------------------------------------
      Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
      -----------------------------------------------------------------------
        0+ 5        0.0000      0.01  Q         |         |         |         |
        0+10        0.0002      0.02  Q         |         |         |         |
        0+15        0.0006      0.06  Q         |         |         |         |
        0+20        0.0012      0.09  Q         |         |         |         |
        0+25        0.0020      0.12  Q         |         |         |         |
        0+30        0.0030      0.14  Q         |         |         |         |
        0+35        0.0041      0.16  Q         |         |         |         |
        0+40        0.0053      0.17  Q         |         |         |         |
        0+45        0.0066      0.18  Q         |         |         |         |
        0+50        0.0079      0.19  Q         |         |         |         |
        0+55        0.0093      0.21  Q         |         |         |         |
        1+ 0        0.0109      0.23  Q         |         |         |         |
        1+ 5        0.0126      0.24  Q         |         |         |         |
        1+10        0.0143      0.24  Q         |         |         |         |
        1+15        0.0159      0.24  Q         |         |         |         |
        1+20        0.0174      0.23  Q         |         |         |         |
        1+25        0.0190      0.22  Q         |         |         |         |
        1+30        0.0205      0.22  Q         |         |         |         |
        1+35        0.0220      0.22  Q         |         |         |         |
        1+40        0.0236      0.22  Q         |         |         |         |
        1+45        0.0251      0.22  Q         |         |         |         |
        1+50        0.0266      0.22  Q         |         |         |         |
        1+55        0.0282      0.23  Q         |         |         |         |
        2+ 0        0.0300      0.25  VQ        |         |         |         |
        2+ 5        0.0318      0.27  VQ        |         |         |         |
        2+10        0.0337      0.27  VQ        |         |         |         |
        2+15        0.0356      0.28  VQ        |         |         |         |
        2+20        0.0375      0.28  VQ        |         |         |         |
        2+25        0.0395      0.28   |Q       |         |         |         |
        2+30        0.0414      0.29   |Q       |         |         |         |
        2+35        0.0434      0.29   |Q       |         |         |         |
        2+40        0.0455      0.30   |Q       |         |         |         |
        2+45        0.0477      0.32   |Q       |         |         |         |
        2+50        0.0500      0.33   |Q       |         |         |         |
        2+55        0.0523      0.34   |Q       |         |         |         |
        3+ 0        0.0547      0.35   |Q       |         |         |         |
        3+ 5        0.0571      0.35   |Q       |         |         |         |
        3+10        0.0596      0.35   |Q       |         |         |         |
        3+15        0.0620      0.36   |Q       |         |         |         |
        3+20        0.0645      0.36   |Q       |         |         |         |
        3+25        0.0670      0.36   |Q       |         |         |         |
        3+30        0.0694      0.36   |Q       |         |         |         |
        3+35        0.0719      0.36   |Q       |         |         |         |
```

3+40	0.0744	0.36	Q				
3+45	0.0769	0.36	QV				
3+50	0.0795	0.37	QV				
3+55	0.0821	0.38	QV				
4+ 0	0.0848	0.39	QV				
4+ 5	0.0876	0.41	QV				
4+10	0.0905	0.42	QV				
4+15	0.0934	0.42	QV				
4+20	0.0964	0.43	QV				
4+25	0.0994	0.44	QV				
4+30	0.1026	0.46	QV				
4+35	0.1058	0.48	QV				
4+40	0.1092	0.49	QV				
4+45	0.1126	0.49	QV				
4+50	0.1160	0.50	Q V				
4+55	0.1195	0.51	QV				
5+ 0	0.1232	0.53	QV				
5+ 5	0.1269	0.54	QV				
5+10	0.1306	0.53	QV				
5+15	0.1340	0.50	QV				
5+20	0.1374	0.48	Q V				
5+25	0.1407	0.48	Q V				
5+30	0.1441	0.49	Q V				
5+35	0.1475	0.50	QV				
5+40	0.1511	0.52	QV				
5+45	0.1548	0.54	Q V				
5+50	0.1586	0.55	Q V				
5+55	0.1625	0.56	Q V				
6+ 0	0.1664	0.57	Q V				
6+ 5	0.1704	0.57	Q V				
6+10	0.1744	0.59	Q V				
6+15	0.1786	0.61	Q V				
6+20	0.1829	0.62	Q V				
6+25	0.1872	0.63	Q V				
6+30	0.1916	0.64	Q V				
6+35	0.1960	0.64	Q V				
6+40	0.2006	0.66	Q V				
6+45	0.2052	0.68	Q V				
6+50	0.2100	0.69	Q V				
6+55	0.2149	0.70	Q V				
7+ 0	0.2197	0.71	Q V				
7+ 5	0.2247	0.71	Q V				
7+10	0.2296	0.72	Q V				
7+15	0.2346	0.72	Q V				
7+20	0.2396	0.73	Q V				
7+25	0.2447	0.74	Q V				
7+30	0.2499	0.76	Q V				
7+35	0.2552	0.77	Q V				
7+40	0.2607	0.79	Q V				
7+45	0.2663	0.82	Q V				
7+50	0.2720	0.84	Q V				
7+55	0.2780	0.86	Q V				
8+ 0	0.2840	0.88	Q V				

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 8+ 5       0.2903       0.91  |  Q   V  |         |         |         |
 8+10       0.2967       0.94  |  Q   V  |         |         |         |
 8+15       0.3035       0.98  |  Q   V  |         |         |         |
 8+20       0.3105       1.01  |   Q   V |         |         |         |
 8+25       0.3176       1.04  |   Q   V |         |         |         |
 8+30       0.3248       1.05  |   Q   V |         |         |         |
 8+35       0.3321       1.06  |   Q   V |         |         |         |
 8+40       0.3395       1.08  |   Q   V |         |         |         |
 8+45       0.3471       1.10  |   Q    V|         |         |         |
 8+50       0.3549       1.12  |   Q    V|         |         |         |
 8+55       0.3627       1.15  |   Q    V|         |         |         |
 9+ 0       0.3708       1.17  |   Q    V|         |         |         |
 9+ 5       0.3790       1.20  |   Q    V|         |         |         |
 9+10       0.3875       1.23  |   Q     V         |         |         |
 9+15       0.3963       1.27  |    Q    V         |         |         |
 9+20       0.4053       1.31  |    Q    V         |         |         |
 9+25       0.4145       1.34  |    Q    V         |         |         |
 9+30       0.4239       1.37  |    Q    |V        |         |         |
 9+35       0.4336       1.40  |    Q    |V        |         |         |
 9+40       0.4434       1.42  |    Q    |V        |         |         |
 9+45       0.4534       1.45  |    Q    |V        |         |         |
 9+50       0.4635       1.48  |    Q    | V       |         |         |
 9+55       0.4739       1.50  |     Q   | V       |         |         |
10+ 0       0.4844       1.53  |     Q   | V       |         |         |
10+ 5       0.4950       1.53  |     Q   |  V      |         |         |
10+10       0.5051       1.48  |    Q    |  V      |         |         |
10+15       0.5146       1.37  |    Q    |  V      |         |         |
10+20       0.5234       1.28  |    Q    |  V      |         |         |
10+25       0.5318       1.23  |   Q     |   V     |         |         |
10+30       0.5401       1.20  |   Q     |   V     |         |         |
10+35       0.5483       1.20  |   Q     |   V     |         |         |
10+40       0.5568       1.23  |   Q     |   V     |         |         |
10+45       0.5658       1.30  |    Q    |   V     |         |         |
10+50       0.5752       1.37  |    Q    |    V    |         |         |
10+55       0.5848       1.40  |    Q    |    V    |         |         |
11+ 0       0.5946       1.42  |    Q    |    V    |         |         |
11+ 5       0.6044       1.42  |    Q    |    V    |         |         |
11+10       0.6142       1.42  |    Q    |     V   |         |         |
11+15       0.6239       1.41  |    Q    |     V   |         |         |
11+20       0.6336       1.40  |    Q    |     V   |         |         |
11+25       0.6432       1.40  |    Q    |     V   |         |         |
11+30       0.6528       1.40  |    Q    |      V  |         |         |
11+35       0.6624       1.39  |    Q    |      V  |         |         |
11+40       0.6718       1.37  |    Q    |      V  |         |         |
11+45       0.6810       1.34  |    Q    |      V  |         |         |
11+50       0.6900       1.31  |    Q    |       V |         |         |
11+55       0.6990       1.30  |    Q    |       V |         |         |
12+ 0       0.7080       1.31  |    Q    |       V |         |         |
12+ 5       0.7172       1.34  |    Q    |       V |         |         |
12+10       0.7270       1.41  |    Q    |        V|         |         |
12+15       0.7375       1.53  |     Q   |        V|         |         |
12+20       0.7487       1.63  |     Q   |        V|         |         |
12+25       0.7604       1.70  |     Q   |         V         |         |
```

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12+30       0.7724      1.75  |     Q   |         V         |         |
12+35       0.7847      1.79  |      Q  |         V         |         |
12+40       0.7974      1.83  |      Q  |         |V        |         |
12+45       0.8103      1.88  |      Q  |         |V        |         |
12+50       0.8236      1.93  |      Q  |         |V        |         |
12+55       0.8372      1.97  |      Q  |         | V       |         |
13+ 0       0.8510      2.00  |       Q |         | V       |         |
13+ 5       0.8650      2.04  |       Q |         | V       |         |
13+10       0.8796      2.11  |       Q |         |  V      |         |
13+15       0.8948      2.21  |       Q |         |  V      |         |
13+20       0.9106      2.29  |        Q|         |  V      |         |
13+25       0.9268      2.34  |        Q|         |   V     |         |
13+30       0.9431      2.37  |        Q|         |   V     |         |
13+35       0.9594      2.37  |        Q|         |    V    |         |
13+40       0.9751      2.28  |        Q|         |    V    |         |
13+45       0.9897      2.11  |       Q |         |     V   |         |
13+50       1.0032      1.96  |      Q  |         |     V   |         |
13+55       1.0162      1.89  |      Q  |         |     V   |         |
14+ 0       1.0289      1.85  |      Q  |         |      V  |         |
14+ 5       1.0415      1.83  |      Q  |         |      V  |         |
14+10       1.0542      1.84  |      Q  |         |      V  |         |
14+15       1.0672      1.89  |      Q  |         |       V |         |
14+20       1.0805      1.94  |      Q  |         |       V |         |
14+25       1.0939      1.94  |      Q  |         |       V |         |
14+30       1.1073      1.94  |      Q  |         |        V|         |
14+35       1.1206      1.93  |      Q  |         |        V|         |
14+40       1.1338      1.92  |      Q  |         |        V|         |
14+45       1.1470      1.92  |      Q  |         |         V         |
14+50       1.1602      1.92  |      Q  |         |         V         |
14+55       1.1733      1.90  |      Q  |         |         V         |
15+ 0       1.1863      1.89  |      Q  |         |         |V        |
15+ 5       1.1992      1.87  |      Q  |         |         |V        |
15+10       1.2119      1.85  |      Q  |         |         |V        |
15+15       1.2245      1.83  |      Q  |         |         | V       |
15+20       1.2369      1.80  |      Q  |         |         | V       |
15+25       1.2492      1.78  |      Q  |         |         | V       |
15+30       1.2613      1.76  |      Q  |         |         |  V      |
15+35       1.2732      1.73  |     Q   |         |         |  V      |
15+40       1.2848      1.68  |     Q   |         |         |  V      |
15+45       1.2958      1.61  |     Q   |         |         |   V     |
15+50       1.3064      1.54  |     Q   |         |         |   V     |
15+55       1.3168      1.51  |     Q   |         |         |   V     |
16+ 0       1.3270      1.48  |    Q    |         |         |   V     |
16+ 5       1.3369      1.43  |    Q    |         |         |    V    |
16+10       1.3456      1.27  |    Q    |         |         |    V    |
16+15       1.3526      1.01  |   Q     |         |         |    V    |
16+20       1.3580      0.78  |  Q      |         |         |    V    |
16+25       1.3625      0.66  | Q       |         |         |    V    |
16+30       1.3665      0.58  | Q       |         |         |     V   |
16+35       1.3702      0.53  | Q       |         |         |     V   |
16+40       1.3735      0.48  |Q        |         |         |     V   |
16+45       1.3764      0.43  |Q        |         |         |     V   |
16+50       1.3790      0.38  |Q        |         |         |     V   |
```

```
16+55       1.3815      0.35  |Q       |         |         |     V   |
17+ 0       1.3837      0.33  |Q       |         |         |     V   |
17+ 5       1.3859      0.32  |Q       |         |         |     V   |
17+10       1.3881      0.32  |Q       |         |         |     V   |
17+15       1.3905      0.34  |Q       |         |         |     V   |
17+20       1.3929      0.36  |Q       |         |         |     V   |
17+25       1.3954      0.36  |Q       |         |         |     V   |
17+30       1.3979      0.36  |Q       |         |         |     V   |
17+35       1.4004      0.36  |Q       |         |         |     V   |
17+40       1.4029      0.36  |Q       |         |         |     V   |
17+45       1.4054      0.36  |Q       |         |         |      V  |
17+50       1.4079      0.36  |Q       |         |         |      V  |
17+55       1.4103      0.35  |Q       |         |         |      V  |
18+ 0       1.4125      0.33  |Q       |         |         |      V  |
18+ 5       1.4147      0.32  |Q       |         |         |      V  |
18+10       1.4168      0.31  |Q       |         |         |      V  |
18+15       1.4189      0.31  |Q       |         |         |      V  |
18+20       1.4210      0.30  |Q       |         |         |      V  |
18+25       1.4231      0.30  |Q       |         |         |      V  |
18+30       1.4252      0.30  |Q       |         |         |      V  |
18+35       1.4272      0.30  |Q       |         |         |      V  |
18+40       1.4292      0.29  |Q       |         |         |      V  |
18+45       1.4310      0.27  |Q       |         |         |      V  |
18+50       1.4328      0.25  |Q       |         |         |      V  |
18+55       1.4344      0.23  Q         |         |         |      V  |
19+ 0       1.4358      0.21  Q         |         |         |      V  |
19+ 5       1.4372      0.20  Q         |         |         |      V  |
19+10       1.4385      0.20  Q         |         |         |      V  |
19+15       1.4399      0.20  Q         |         |         |      V  |
19+20       1.4414      0.22  Q         |         |         |      V  |
19+25       1.4430      0.23  Q         |         |         |       V |
19+30       1.4447      0.25  Q         |         |         |       V |
19+35       1.4465      0.26  |Q       |         |         |       V |
19+40       1.4483      0.26  |Q       |         |         |       V |
19+45       1.4500      0.25  Q         |         |         |       V |
19+50       1.4516      0.23  Q         |         |         |       V |
19+55       1.4531      0.22  Q         |         |         |       V |
20+ 0       1.4545      0.20  Q         |         |         |       V |
20+ 5       1.4557      0.18  Q         |         |         |       V |
20+10       1.4570      0.19  Q         |         |         |       V |
20+15       1.4584      0.20  Q         |         |         |       V |
20+20       1.4598      0.21  Q         |         |         |       V |
20+25       1.4612      0.21  Q         |         |         |       V |
20+30       1.4627      0.21  Q         |         |         |       V |
20+35       1.4642      0.22  Q         |         |         |       V |
20+40       1.4657      0.22  Q         |         |         |       V |
20+45       1.4672      0.22  Q         |         |         |       V |
20+50       1.4687      0.22  Q         |         |         |       V |
20+55       1.4701      0.21  Q         |         |         |       V |
21+ 0       1.4714      0.19  Q         |         |         |       V |
21+ 5       1.4726      0.18  Q         |         |         |       V |
21+10       1.4739      0.18  Q         |         |         |       V |
21+15       1.4752      0.19  Q         |         |         |       V |
```

21+20	1.4766	0.20	Q				V
21+25	1.4779	0.20	Q				V
21+30	1.4792	0.18	Q				V
21+35	1.4804	0.17	Q				V
21+40	1.4816	0.18	Q				V
21+45	1.4829	0.19	Q				V
21+50	1.4843	0.20	Q				V
21+55	1.4856	0.19	Q				V
22+ 0	1.4868	0.18	Q				V
22+ 5	1.4880	0.17	Q				V
22+10	1.4892	0.17	Q				V
22+15	1.4905	0.19	Q				V
22+20	1.4919	0.20	Q				V
22+25	1.4932	0.19	Q				V
22+30	1.4945	0.18	Q				V
22+35	1.4956	0.17	Q				V
22+40	1.4967	0.16	Q				V
22+45	1.4978	0.16	Q				V
22+50	1.4989	0.16	Q				V
22+55	1.5000	0.15	Q				V
23+ 0	1.5010	0.15	Q				V
23+ 5	1.5021	0.15	Q				V
23+10	1.5031	0.15	Q				V
23+15	1.5041	0.15	Q				V
23+20	1.5052	0.15	Q				V
23+25	1.5062	0.15	Q				V
23+30	1.5072	0.15	Q				V
23+35	1.5082	0.15	Q				V
23+40	1.5093	0.15	Q				V
23+45	1.5103	0.15	Q				V
23+50	1.5113	0.15	Q				V
23+55	1.5123	0.15	Q				V
24+ 0	1.5133	0.15	Q				V
24+ 5	1.5143	0.14	Q				V
24+10	1.5152	0.12	Q				V
24+15	1.5158	0.09	Q				V
24+20	1.5162	0.06	Q				V
24+25	1.5165	0.04	Q				V
24+30	1.5167	0.03	Q				V
24+35	1.5169	0.03	Q				V
24+40	1.5171	0.02	Q				V
24+45	1.5172	0.02	Q				V
24+50	1.5173	0.02	Q				V
24+55	1.5174	0.01	Q				V
25+ 0	1.5175	0.01	Q				V
25+ 5	1.5176	0.01	Q				V
25+10	1.5176	0.01	Q				V
25+15	1.5177	0.01	Q				V
25+20	1.5177	0.01	Q				V
25+25	1.5177	0.00	Q				V
25+30	1.5177	0.00	Q				V
25+35	1.5178	0.00	Q				V
25+40	1.5178	0.00	Q				V

```
   25+45       1.5178      0.00  Q         |         |         |       V|
   25+50       1.5178      0.00  Q         |         |         |       V|
   25+55       1.5178      0.00  Q         |         |         |        V
-----------------------------------------------------------------------
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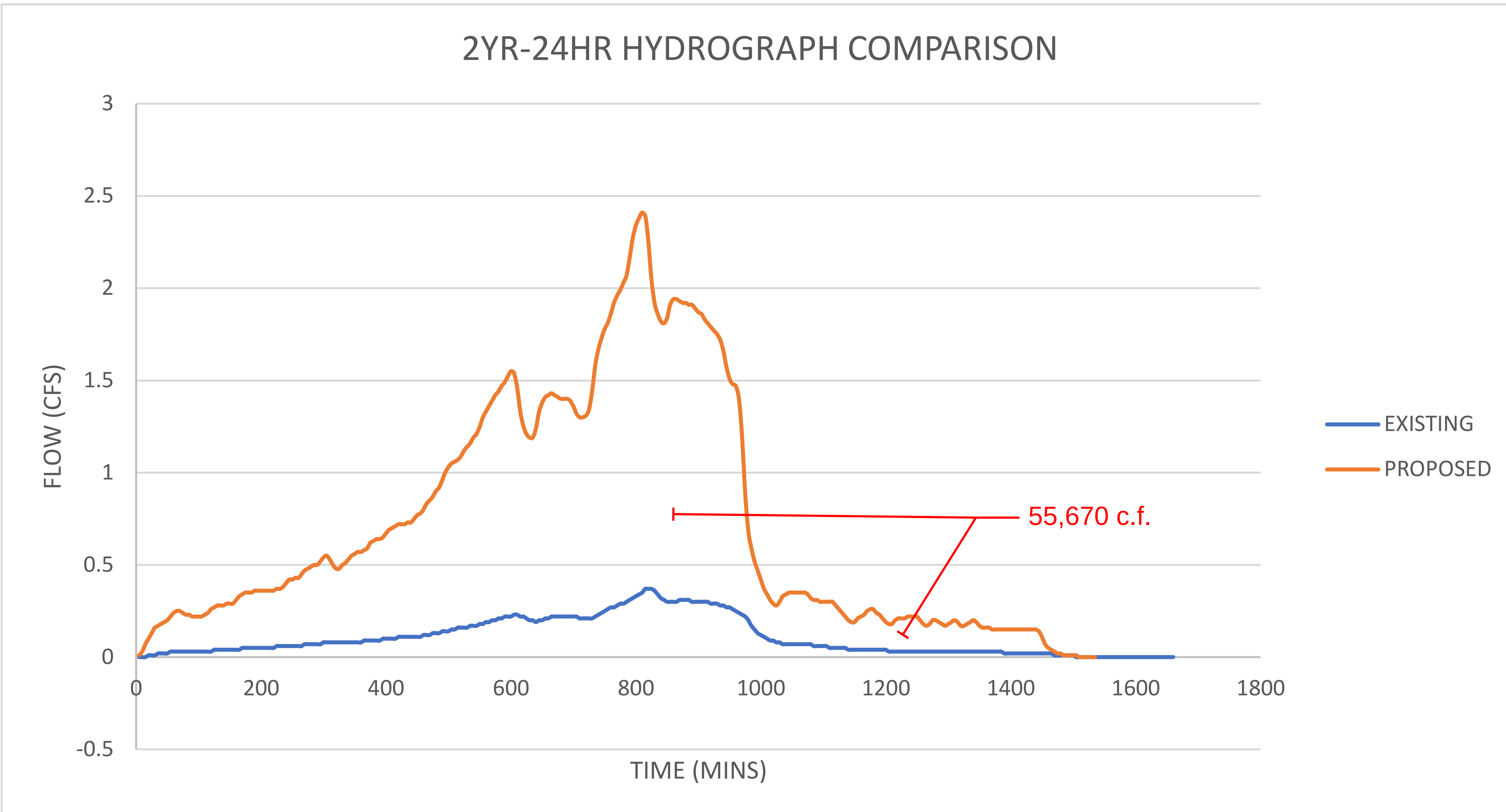
2YR-24HR HYDROGRAPH COMPARISON
FLOW (CFS)
3
2.5
2
1.5
1
0.5
0
-0.5
0
200
400
600
800
1000
1200
1400
1600
1800
TIME (MINS)
EXISTING
PROPOSED
55,670 c.f.

Prelim Basin Volume
Project: Pilot Perris
Basin Description: BMP-1

Contour Elevation	Contour Area (sq. ft)	Depth (ft)	Incremental Volume Avg. End (cu. ft)	Cumulative Volume Avg. End (cu. ft)	Incremental Volume Conic (cu. ft)	Cumulative Volume Conic (cu. ft)
1,416.300	36,306.67	N/A	N/A	0.00	N/A	0.00
1,416.500	37,040.35	0.200	7334.70	7334.70	7334.58	7334.58
1,417.000	40,050.26	0.500	19272.65	26607.35	19267.75	26602.33
1,417.500	44,986.52	0.500	21259.19	47866.55	21247.24	47849.58
1,418.000	50,208.87	0.500	23798.85	71665.39	23786.90	71636.48
1,418.500	55,728.50	0.500	26484.34	98149.73	26472.35	98108.83
1,419.000	61,542.39	0.500	29317.72	127467.45	29305.70	127414.53
1,419.500	67,647.94	0.500	32297.58	159765.04	32285.55	159700.08
1,420.000	74,043.99	0.500	35422.98	195188.02	35410.95	195111.03
1,420.400	79,369.27	0.400	30682.65	225870.67	30676.49	225787.52

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

How to use this worksheet (also see instructions in Section G of the WQMP Template):

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your WQMP Exhibit.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in your WQMP. Use the format shown in Table G.1on page 23 of this WQMP Template. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
✓ A. **On-site storm drain inlets**	✓ **Locations of inlets.**	✓ **Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.**	✓ **Maintain and periodically repaint or replace inlet markings.** ✓ **Provide stormwater pollution prevention information to new site owners, lessees, or operators.** ✓ **See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** ✓ **Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."**
✓ B. **Interior floor drains and elevator shaft sump pumps**		✓ **State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.**	✓ **Inspect and maintain drains to prevent blockages and overflow.**
✗ C. **Interior parking garages**		✗ **State that parking garage floor drains will be plumbed to the sanitary sewer.**	✗ **Inspect and maintain drains to prevent blockages and overflow.**

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☑ D1. **Need for future indoor & structural pest control**		☑ **Note building design features that discourage entry of pests.**	☑ **Provide Integrated Pest Management information to owners, lessees, and operators.**
☑ D2. **Landscape/ Outdoor Pesticide Use**	☒ **Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained.** ☑ **Show self-retaining landscape areas, if any.** ☑ **Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)**	**State that final landscape plans will accomplish all of the following.** ☒ **Preserve existing native trees, shrubs, and ground cover to the maximum extent possible.** ☑ **Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution.** ☑ **Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions.** ☑ **Consider using pest-resistant plants, especially adjacent to hardscape.** ☑ **To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.**	☑ **Maintain landscaping using minimum or no pesticides.** ☑ **See applicable operational BMPs in "What you should know for…..Landscape and Gardening"** at http://rcflood.org/stormwater/**Error! Hyperlink reference not valid.** ☑ **Provide IPM information to new owners, lessees and operators.**

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☒ E. **Pools, spas, ponds, decorative fountains, and other water features.**	☒ **Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet. (Exception: Public pools must be plumbed according to County Department of Environmental Health Guidelines.)**	**If the Co-Permittee requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.**	☒ **See applicable operational BMPs in** "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at http://rcflood.org/stormwater/
☑ F. **Food service**	☑ **For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment.** ☑ **On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.**	☑ **Describe the location and features of the designated cleaning area.** ☑ **Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.**	☑ **See the brochure, "**The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries" at http://rcflood.org/stormwater/ **Provide this brochure to new site owners, lessees, and operators.**
☑ G. **Refuse areas**	☑ **Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas.** ☑ **If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area.** ☑ **Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.**	☑ **State how site refuse will be handled and provide supporting detail to what is shown on plans.** ☑ **State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.**	☑ **State how the following will be implemented:** **Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at** www.cabmphandbooks.com

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☒ H. **Industrial processes.**	☒ **Show process area.**	☒ **If industrial processes are to be located on site, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."**	☒ **See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** See the brochure "Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities" at http://rcflood.org/stormwater/

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
I. **Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)**	**Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area.** **Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults.** **Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.**	**Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains.** **Where appropriate, reference documentation of compliance with the requirements of Hazardous Materials Programs for:** ▪ **Hazardous Waste Generation** ▪ **Hazardous Materials Release Response and Inventory** ▪ **California Accidental Release (CalARP)** ▪ **Aboveground Storage Tank** ▪ **Uniform Fire Code Article 80 Section 103(b) & (c) 1991** ▪ **Underground Storage Tank** www.cchealth.org/groups/hazmat/	**See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at** www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
J. **Vehicle and Equipment Cleaning**	**Show on drawings as appropriate:** **(1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses.** **(2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use).** **(3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer.** **(4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.**	**If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.**	**Describe operational measures to implement the following (if applicable):** **Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system.** Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/ ❑**Car dealerships and similar may rinse cars with water only.**

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☒ K. **Vehicle/Equipment Repair and Maintenance**	☒ **Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater.** ☒ **Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas.** ☒ **Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.**	☒ **State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area.** ☒ **State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.** ☒ **State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.**	**In the Stormwater Control Plan, note that all of the following restrictions apply to use the site:** ☒ **No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains.** ☒ **No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately.** ☒ **No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.** Refer to "Automotive Maintenance & Car Care Best Management Practices for Auto Body Shops, Auto Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations". Brochure can be found at http://rcflood.org/stormwater/ Refer to Outdoor Cleaning Activities and Professional Mobile Service Providers for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☑ L. **Fuel Dispensing Areas**	☑ **Fueling areas[6] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable.** ☑ **Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area[1].] The canopy [or cover] shall not drain onto the fueling area.**		☑ **The property owner shall dry sweep the fueling area routinely.** ☑ **See the Fact Sheet SD-30 , "Fueling Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

[6] **The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
M. **Loading Docks**	**Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer.** **Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation.** **Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.**		**Move loaded and unloaded items indoors as soon as possible.** **See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
N. **Fire Sprinkler Test Water**		**Provide a means to drain fire sprinkler test water to the sanitary sewer.**	**See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**
O. **Miscellaneous Drain or Wash Water or Other Sources** **Boiler drain lines** **Condensate drain lines** **Rooftop equipment** **Drainage sumps** **Roofing, gutters, and trim.** **Other sources**		**Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system.** **Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system.** **Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment.** **Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water.** **Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.** **Include controls for other sources as specified by local reviewer.**	

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☑ P. **Plazas, sidewalks, and parking lots.**			☑ **Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.**

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

TO BE PROVIDED IN FINAL

Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

TO BE PROVIDED IN FINAL