DRAFT ENVIRONMENTAL IMPACT REPORT

469 Stevenson Street Project

PLANNING DEPARTMENT
CASE NO. **2017-014833ENV**
STATE CLEARINGHOUSE NO. **2019100093**

Draft EIR	Draft EIR Publication Date:	**March 11, 2020**
	Draft EIR Public Hearing Date:	**April 16, 2020**
	Draft EIR Public Comment Period:	**March 12, 2020 – April 27, 2020**

Written comments should be sent to:
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TO: Distribution List for the 469 Stevenson Street Draft EIR

FROM: Lisa Gibson, Environmental Review Officer

SUBJECT: Environmental Impact Report for the 469 Stevenson Street Project (Planning Department File No. 2017-014833ENV)

This is the draft environmental impact report (EIR) for the 469 Stevenson Street Project. A public hearing will be held on the adequacy and accuracy of this document. After the public hearing, the San Francisco Planning Department will prepare and publish a document titled "Responses to Comments," which will contain a summary of all relevant comments on this draft EIR and our responses to those comments. It may also specify changes to this draft EIR. Those who testify at the hearing on the draft EIR and provide their contact information will automatically receive a copy of the Responses to Comments document, along with notice of the date reserved for a hearing on the certification of the final EIR at the San Francisco Planning Commission; others may receive a copy of the Responses to Comments and certification hearing notice by request or by visiting the planning department.

This draft EIR together with the Responses to Comments document will be considered by the San Francisco Planning Commission in an advertised public meeting and will be certified as a final EIR if deemed adequate. Therefore, if you receive a copy of the Responses to Comments document in addition to this copy of the draft EIR, you will technically have a copy of the final EIR.

Thank you for your interest in this project.

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Acronyms and Abbreviations

μg/m^3	micrograms per cubic meter
ABAG	Association of Bay Area Governments
ADA	Americans with Disabilities Act
ADRP	archeological data recovery plan
air basin	San Francisco Bay Area Air Basin
air board	California Ambient Air Resources Board
air district	Bay Area Air Quality Management District
APEZ	Air Pollution Exposure Zone
AQI	Air Quality Index
ARPP	archeological resource preservation plan
ATP	archeological testing plan
BART	Bay Area Rapid Transit
Bgs	below ground surface
BTUs	British thermal units
building department	San Francisco Department of Building Inspection
C-3-G	Downtown-General
CAAQS	California Ambient Air Quality Standards
CalEEMod®	California Emissions Estimator Model
CalEPA	California Environmental Protection Agency
CEQA	California Environmental Quality Act
City	City and County of San Francisco
CO	carbon monoxide
dB(A)	A-weighted decibel
DPM	diesel particulate matter
EIR	environmental impact report
EMFAC	Emission Factor
ERO	Environmental Review Officer
FARR	Final Archeological Resources Report
FAR	floor area ratio
gpd	gallons per day
GHG	greenhouse gas
gsf	ground square feet
Guidelines	Transportation Impact Analysis Guidelines for Environmental Review
hp	horsepower
HVAC	heating, ventilation, and air conditioning
kBTU	1,000 British Thermal Units
kWh	kilowatt-hours
LEED	Leadership in Energy and Environmental Design
Maher Ordinance	San Francisco Health Code article 22A
MERV-13	Minimum Efficiency Reporting Value 13
MLD	Most Likely Descendant
MMRP	mitigation monitoring and reporting program
mph	miles per hour
MTBE	methyl tertiary-butyl ether

MTC	Metropolitan Transportation Commission
Muni	Municipal Railway
NAAQS	National Ambient Air Quality Standards
ng/m^3	nanograms per cubic meter
NO_2	nitrogen dioxide
NOP	Notice of Preparation
NO_X	oxides of nitrogen
NWIC	Northwest Information Center
OEHHA	California Office of Environmental Health Hazard Assessment
PDA	Priority Development Area
PG&E	Pacific Gas and Electric Company
planning code	San Francisco Planning Code
planning commission	San Francisco Planning Commission
planning department	San Francisco Planning Department
$PM_{2.5}$	particulate matter 2.5 microns in diameter or less
PM_{10}	particulate matter 10 microns in diameter or less
ppb	part per billion
ppm	part per million
proposed project	469 Stevenson Street Project
QACL	Department Qualified Archaeological Consultants List
ROG	reactive organic gases
sfh	square foot-hours
SFPUC	San Francisco Public Utilities Commission
SO_2	sulfur dioxide
SoMa	South of Market
TAAS	Theoretical Annual Available Sunlight
TACs	toxic air contaminants
TAZ	traffic analysis zones
TCR	tribal cultural resource
TDM	transportation demand management
TDR	transferable development rights
TNCs	Transportation Network Companies
UN	United Nations
U.S. EPA	United States Environmental Protection Agency
VDECS	Verified Diesel Emissions Control Strategy
VMT	vehicle-miles-traveled
VOCs	volatile organic compounds

SUMMARY

S.1 INTRODUCTION

This chapter provides an overview of the topics and issues addressed in the draft environmental impact report (EIR) prepared for the 469 Stevenson Street Project (proposed project). Following the synopsis of the proposed project, a summary table presents the environmental impacts of the proposed project identified in the EIR by topic and the mitigation measures identified to reduce or lessen significant impacts. Significant impacts identified in the initial study prepared for the proposed project are listed in a separate summary table, along with the mitigation measures that would reduce them to less-than-significant levels. Following these summary tables is a description of the alternatives to the proposed project that are addressed in this EIR and tables that compare the characteristics and environmental impacts of those alternatives with those of the proposed project as well as other project alternatives. The chapter concludes with a summary of environmental issues to be resolved and areas of known controversy.

The San Francisco Planning Department (planning department) is the lead agency responsible for preparing this EIR in compliance with the California Environmental Quality Act (CEQA). This is a focused EIR. It discloses the impacts of the proposed project on air quality, wind, and shadow to the public and decision-makers. All other potential environmental impacts of the proposed project, as analyzed under CEQA, are adequately addressed in the initial study for this project (Appendix A).

S.2 PROJECT SYNOPSIS

The project site is a through lot located at 469 Stevenson Street in the South of Market (SoMa) neighborhood of San Francisco. The project site is approximately 28,790 square feet (0.66-acre) and currently developed as a public surface parking lot with 176 parking spaces.

The project sponsor, BUILD, is proposing to demolish the existing surface parking lot and construct a new 27-story mixed-use residential building that is approximately 274 feet tall (with an additional 10 feet for rooftop mechanical equipment). The proposed project would total approximately 535,000[1] gross square feet (gsf) and include 495 dwelling units, approximately 4,000 square feet of commercial retail use on the ground floor, and approximately 25,000 square feet of private and common open space. The proposed 495 dwelling units consisting of approximately 192 studios, 33 junior one-bedroom units, 116 one-bedroom units, 96 two-bedroom units, 50 three-bedroom units, and 8 five-bedroom units would be available to rent. The proposed project would use the Individually Requested State Density Bonus Program[2] and provide affordable housing units onsite.

The proposed project would provide three below grade parking levels with 178 parking spaces, 200 class 1[3] bicycle spaces, and two service delivery loading spaces. Additionally, one on-site loading space

[1] All numbers are rounded to the nearest thousand or hundred thousand.

[2] City of San Francisco Planning Department, Individually Requested State Density Bonus Program, Informational and Supplemental Application Packet. http://forms.sfplanning.org/IndividuallyRequestedState_SupplementalApplication.pdf. Accessed September 18, 2019.

[3] Class 1 bicycle parking space(s) are spaces in secure, weather-protected facilities intended for use as long-term, overnight, and work-day bicycle storage by dwelling unit residents, non-residential occupants, and employees.

would be located on the street level. Twenty-seven class 2[4] bicycle parking spaces would be placed along the sidewalk on Jessie Street.

The proposed project would excavate 55,850 cubic yards of soil at the project site. The proposed project is anticipated to be constructed on a mat foundation and no pile driving or piers are proposed or required. Project construction would span approximately 36 months.

S.3 SUMMARY OF IMPACTS AND MITIGATION MEASURES

The planning department published a Notice of Preparation (NOP) of an EIR and initial study on October 2, 2019, announcing its intent to prepare and distribute a focused EIR (the NOP and initial study are presented in Appendix A of this EIR). The initial study found that the proposed project would have potentially significant impacts in the areas of air quality, wind, and shadow. It also found that the proposed project's impacts on other environmental topics (land use and planning, population and housing, cultural resources, tribal cultural resources, transportation and circulation, odors, greenhouse gas emissions, recreation, utilities and services systems, public services, biological resources, geology and soils, hydrology and water quality, hazards and hazardous materials, mineral resources, energy resources, agriculture and forestry resources, and wildfire) would either be less than significant or less than significant with mitigation or that the proposed project would have no impact. Thus, the topics analyzed in this EIR are air quality, wind, and shadow. All impacts of the proposed project and associated mitigation measures identified in this EIR are summarized in Table S-1. These impacts are listed in the same order as they appear in the text of Chapter 4, Environmental Setting and Impacts, of this EIR.

Since publication of the NOP and initial study, the project sponsor has made changes to the project description. These changes are described in Chapter 2, Project Description, and have been incorporated into the analysis of the proposed project's impacts in Chapter 4, Environmental Setting and Impacts, herein, to evaluate potential impacts to air quality, wind, and shadow. Chapter 4 also includes an analysis of the physical environmental impacts of the revised project description for those topics that were evaluated in the initial study. That analysis finds that the changes made to the project description would not result in any new or substantially more severe significant environmental impacts or necessitate implementation of additional or considerably different mitigation measures than those identified in the initial study. The effects of the revised project description would be substantially the same as those reported in the initial study. All mitigation measures identified in the initial study and summarized in Table S-2 would still be required for the revised project that is presented and evaluated in this EIR.

For the topics evaluated in the EIR, the levels of significance of impacts before and after implementation of applicable mitigation measures are identified as follows:

- **No Impact.** No adverse changes (or impacts) to the environment are expected.
- **Less than Significant.** An impact that would not involve an adverse physical change to the environment, would not exceed the defined significance criteria, or would be eliminated or

[4] Class 2 bicycle parking space(s) are bicycle racks located in a publicly-accessible, highly visible location intended for transient or short-term use by visitors, guests, and patrons to the building or use.

reduced to a less-than-significant level through compliance with existing local, state, and federal laws and regulations.

- **Less than Significant with Mitigation.** An impact that would be reduced to a less-than-significant level through implementation of the identified mitigation measure.
- **Significant and Unavoidable with Mitigation.** An adverse physical environmental impact that would exceed the defined significance criteria but could be reduced through compliance with existing local, state, and federal laws and regulations and/or implementation of feasible mitigation measures. The impact cannot be reduced to a less-than-significant level.
- **Significant and Unavoidable.** An adverse physical environmental impact that exceeds the defined significance criteria and cannot be eliminated or reduced to a less-than-significant level through compliance with existing local, state, and federal laws and regulations. There are no feasible mitigation measures to reduce the impact.

S.3.1 Summary Tables

Table S-1 summarizes all environmental impacts and mitigation measures identified in the EIR for the proposed project. For a complete description of potential impacts and recommended mitigation measures, please refer to the topical sections in Chapter 4 of the EIR. Table S-2 summarizes the significant environmental impacts of the proposed project and mitigation measures for the topics evaluated in the initial study. Both tables are arranged in four columns: 1) impacts, 2) level of significance before mitigation (if applicable), 3) mitigation measures (if applicable), and 4) level of significance after mitigation (if applicable).

Table S-1: Summary of Impacts of the Proposed Project Identified in the EIR

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Air Quality			
Impact AQ-1: During construction, the proposed project would not result in a cumulatively considerable net increase in non-attainment criteria air pollutants.	LTS	None required.	NA
Impact AQ-2: At project buildout, operation of the proposed project would not result in a cumulatively considerable net increase in non-attainment criteria air pollutants.	LTS	None required.	NA
Impact AQ-3: Construction and operation of the proposed project would generate toxic air contaminants, including DPM, at levels that would expose sensitive receptors to substantial pollutant concentrations.	S	***M-AQ-3a: Off-road Construction Equipment Emissions Minimization*** A. *Engine Requirements.* 1. All off-road equipment greater than 25 horsepower (hp) and operating for more than 20 total hours over the entire duration of construction activities shall have engines that meet or exceed U.S. Environmental Protection Agency (U.S. EPA) Tier 4 Interim or Tier 4 Final off-road emission standards. 2. Where access to alternative sources of power are available, portable diesel engines shall be prohibited. 3. Diesel engines, whether for off-road or on-road equipment, shall not be left idling for more than two minutes, at any location, except as provided in exceptions to the applicable state regulations regarding idling for off-road and on-road equipment (e.g., traffic conditions, safe operating conditions). The project sponsor shall post legible and visible signs in English, Spanish, and Chinese, in designated queuing areas and at the construction site to remind operators of the two-minute idling limit. 4. The project sponsor shall instruct construction workers and equipment operators on the maintenance and tuning of construction equipment and require that such workers and operators properly maintain and tune equipment in accordance with manufacturer specifications.	LTS

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		B. *Waivers.* 1. The Planning Department's Environmental Review Officer or designee (ERO) may waive the alternative source of power requirement of Subsection (A)(2) if an alternative source of power is limited or infeasible at the project site. If the ERO grants the waiver, the project sponsor must submit documentation that the equipment used for onsite power generation meets the requirements of Subsection (A)(1). 2. The ERO may waive the equipment requirements of Subsection (A)(1) if: a particular piece of Tier 4 compliant off-road equipment is technically not feasible; the equipment would not produce desired emissions reduction due to expected operating modes; installation of the equipment would create a safety hazard or impaired visibility for the operator; or, there is a compelling emergency need to use off-road equipment that is not Tier 4 compliant. If the ERO grants the waiver, the project sponsor must use the next cleanest piece of off-road equipment, according to Table AQ-1 below. Additionally, the project sponsor must demonstrate that use of the alternative equipment would not result in a cancer risk from project construction and operation that exceeds 7 per one million exposed and annual average $PM_{2.5}$ concentrations that exceed 0.2 $\mu g/m^3$. **Table AQ-1– Off-Road Equipment Compliance Step-down Schedule** **Compliance Alternative** / **Engine Emission Standard** / **Verified Diesel Emissions Control Strategy (VDECS)** 1 / Tier 2 / ARB Level 3 VDECS 2 / Tier 2 / ARB Level 2 VDECS 3 / Tier 2 / ARB Level 1 VDECS How to use the table: If the ERO determines that the equipment requirements cannot be met, then the project sponsor would need to meet Compliance Alternative 1. If the ERO determines that the project sponsor cannot supply off-road equipment meeting Compliance Alternative 1, then the project sponsor must meet Compliance Alternative 2. If the ERO determines that the project sponsor cannot supply off-road equipment meeting Compliance Alternative 2, then the project sponsor must meet Compliance Alternative 3.	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		C. *Construction Emissions Minimization Plan.* Before starting on-site construction activities, the project sponsor shall submit a Construction Emissions Minimization Plan (Plan) to the ERO for review and approval. The Plan shall state, in reasonable detail, how the project sponsor will meet the requirements of Section A. 1. The Plan shall include estimates of the construction timeline by phase, with a description of each piece of off-road equipment required for every construction phase. The description may include, but is not limited to: equipment type, equipment manufacturer, equipment identification number, engine model year, engine certification (Tier rating), horsepower, engine serial number, and expected fuel use and hours of operation. For VDECS installed, the description may include: technology type, serial number, make, model, manufacturer, air board verification number level, and installation date and hour meter reading on installation date. 2. The project sponsor shall ensure that all applicable requirements of the Plan have been incorporated into the contract specifications. The Plan shall include a certification statement that the project sponsor agrees to comply fully with the Plan. 3. The project sponsor shall make the Plan available to the public for review on-site during working hours. The project sponsor shall post at the construction site a legible and visible sign summarizing the Plan. The sign shall also state that the public may ask to inspect the Plan for the project at any time during working hours and shall explain how to request to inspect the Plan. The project sponsor shall post at least one copy of the sign in a visible location on each side of the construction site facing a public right-of-way. D. *Monitoring.* After start of construction activities, the project sponsor shall submit quarterly reports to the ERO documenting compliance with the Plan. After completion of construction activities and prior to receiving a final certificate of occupancy, the project sponsor shall submit to the ERO a final report summarizing construction activities, including the start and end dates and duration of each construction phase, and the specific information required in the Plan.	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		Mitigation Measure M-AQ-3b: Diesel Backup Generator Specifications. The project sponsor shall ensure that the proposed diesel backup generator meets or exceeds California Air Resources Board Tier 4 off-road emission standards. Additionally, once operational, the diesel backup generator shall be maintained in good working order for the life of the equipment and any future replacement of the diesel backup generator shall be required to be consistent with these emissions specifications. The operator of the facility at which the generator is located shall maintain records of the testing schedule for the diesel backup generator for the life of that diesel backup generator and to provide this information for review to the planning department within three months of requesting such information.	
Impact AQ-4: The proposed project would not conflict with implementation of the 2017 Bay Area Clean Air Plan.	LTS	None required.	NA
Impact C-AQ-1: The proposed project during construction and operations, in combination with reasonably foreseeable projects, would result in significant health risk impacts to sensitive receptors.	S	***Mitigation Measures M-AQ-3a and M-AQ-3b***	LTS
Wind			
Impact WD-1: The proposed project would not create wind hazards in publicly accessible areas of substantial pedestrian use.	LTS	None required.	NA
Impact C-WD-1: The proposed project in combination with reasonably foreseeable projects, would not create wind hazards in publicly accessible areas of substantial pedestrian use.	LTS	None required.	NA

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Shadow			
Impact SD-1: The proposed project could create new shadow that could substantially and adversely affect the use and enjoyment of publicly accessible open spaces.	SU	No feasible mitigation.	SU
Impact C-SD-1: The proposed project, in combination with reasonably foreseeable projects, could create new shadow that could substantially and adversely affect the use and enjoyment of publicly accessible open spaces.	SU	No feasible mitigation.	SU

Notes:
NI No impact
LTS Less than significant or negligible impact; no mitigation required
S Significant
SU Significant and unavoidable adverse impact, no feasible mitigation
SUM Significant and unavoidable adverse impact, after mitigation
NA Not applicable

Table S-2: Summary of Significant Impacts of the Proposed Project Identified in the Initial Study (EIR Appendix A)

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Cultural Resources			
Impact CR-3: The proposed project could result in a substantial adverse change in the significance of an archeological resource.	S	***Mitigation Measure M-CR-3: Archeological Testing*** Based on a reasonable presumption that archeological resources may be present within the project site, the following measures shall be undertaken to avoid any potentially significant adverse effect from the proposed project on buried or submerged historical resources and on human remains and associated or unassociated funerary objects. The project sponsor shall retain the services of an archaeological consultant from the rotational Department Qualified Archaeological Consultants List (QACL) maintained by the planning department archaeologist. After the first project approval action or as directed by the Environmental Review Officer (ERO), the project sponsor shall contact the department archeologist to obtain the names and contact information for the next three archeological consultants on the QACL. The archeological consultant shall undertake an archeological testing program as specified herein. In addition, the consultant shall be available to conduct an archeological monitoring and/or data recovery program if required pursuant to this measure. The archeological consultant's work shall be conducted in accordance with this measure at the direction of the ERO. All plans and reports prepared by the consultant as specified herein shall be submitted first and directly to the ERO for review and comment and shall be considered draft reports subject to revision until final approval by the ERO. Archeological monitoring and/or data recovery programs required by this measure could suspend construction of the project for up to a maximum of four weeks. At the direction of the ERO, the suspension of construction can be extended beyond four weeks only if such a suspension is the only feasible means to reduce to a less than significant level potential effects on a significant archeological resource as defined in CEQA Guidelines section. 15064.5 (a) and (c). *Consultation with Descendant Communities*: On discovery of an archeological site[1] with descendant Native Americans, the Overseas Chinese, or other potentially interested descendant group an appropriate representative[2] of the descendant group and the ERO shall be contacted. The representative of the descendant group shall be given the opportunity to monitor archeological field investigations of the site and to offer recommendations to the ERO regarding appropriate archeological treatment of the site, of recovered data from the site, and, if applicable, any interpretative treatment of the associated archeological site. A copy of the Final Archaeological Resources Report shall be provided to the representative of the descendant group.	LTS

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		Archeological Testing Program. The archeological consultant shall prepare and submit to the ERO for review and approval an *archeological testing plan* (ATP). The *archeological testing program* shall be conducted in accordance with the approved ATP. The ATP shall identify the property types of the expected archeological resource(s) that potentially could be adversely affected by the proposed project, the testing method to be used, and the locations recommended for testing. The purpose of the *archeological testing program* will be to determine to the extent possible the presence or absence of archeological resources and to identify and to evaluate whether any archeological resource encountered on the site constitutes a historical resource under CEQA. At the completion of the *archeological testing program*, the archeological consultant shall submit a written report of the findings to the ERO. If based on the *archeological testing program* the archeological consultant finds that significant archeological resources may be present, the ERO in consultation with the archeological consultant shall determine if additional measures are warranted. Additional measures that may be undertaken include additional *archeological testing*, *archeological monitoring*, and/or *an archeological data recovery program*. No archeological data recovery shall be undertaken without the prior approval of the ERO or the planning department archeologist. If the ERO determines that a significant archeological resource is present and that the resource could be adversely affected by the proposed project, at the discretion of the project sponsor either: A. The proposed project shall be re-designed so as to avoid any adverse effect on the significant archeological resource; or B. A data recovery program shall be implemented, unless the ERO determines that the archeological resource is of greater interpretive than research significance and that interpretive use of the resource is feasible. *Archeological Monitoring Program*. If the ERO in consultation with the archeological consultant determines that an archeological monitoring program shall be implemented, the archeological monitoring program shall minimally include the following provisions: • The archeological consultant, project sponsor, and ERO shall meet and consult on the scope of the AMP reasonably prior to any project-related soils disturbing activities commencing. The ERO in consultation with the archeological consultant shall determine what project activities shall be archeologically monitored. The project shall not require pile driving. In most cases, any soils- disturbing activities, such as demolition, foundation removal, excavation, grading, utilities installation, foundation work, site	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		remediation, etc., shall require *archeological monitoring* because of the risk these activities pose to potential archaeological resources and to their depositional context; • The archeological consultant shall undertake a worker training program for soil-disturbing workers that will include an overview of expected resource(s), how to identify the evidence of the expected resource(s), and the appropriate protocol in the event of apparent discovery of an archeological resource; • The archeological monitor(s) shall be present on the project site according to a schedule agreed upon by the archeological consultant and the ERO until the ERO has, in consultation with the project archeological consultant, determined that project construction activities could have no effect on significant archeological deposits; • The archeological monitor shall record and be authorized to collect soil samples and artifactual/ecofactual material as warranted for analysis; • If an intact archeological deposit is encountered, all soils-disturbing activities in the vicinity of the deposit shall cease. The project shall not require pile driving. The archeological monitor shall be empowered to temporarily redirect demolition/excavation installation/construction activities and equipment until the deposit is evaluated. The archeological consultant shall immediately notify the ERO of the encountered archeological deposit. The archeological consultant shall make a reasonable effort to assess the identity, integrity, and significance of the encountered archeological deposit, and present the findings of this assessment to the ERO. Whether or not significant archeological resources are encountered, the archeological consultant shall submit a written report of the findings of the monitoring program to the ERO. *Archeological Data Recovery Program*. The *archeological data recovery program* shall be conducted in accordance with an *archeological data recovery plan* (ADRP). The archeological consultant, project sponsor, and ERO shall meet and consult on the scope of the ADRP prior to preparation of a draft ADRP. The archeological consultant shall submit a draft ADRP to the ERO. The ADRP shall identify how the proposed *data recovery program* will preserve the significant information the archeological resource is expected to contain. That is, the ADRP will identify what scientific/historical research questions are applicable to the expected resource, what *data classes* the resource is	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		expected to possess, and how the expected *data classes* would address the applicable research questions. Data recovery, in general, should be limited to the portions of the historical property that could be adversely affected by the proposed project. Destructive data recovery methods shall not be applied to portions of the archeological resources if nondestructive methods are practical. The scope of the ADRP shall include the following elements: • *Field Methods and Procedures*. Descriptions of proposed field strategies, procedures, and operations. • *Cataloguing and Laboratory Analysis*. Description of selected cataloguing system and artifact analysis procedures. • *Discard and Deaccession Policy*. Description of and rationale for field and post-field discard and deaccession policies. • *Interpretive Program*. Consideration of an onsite/offsite public interpretive program during the course of the *archeological data recovery program*. • *Security Measures*. Recommended security measures to protect the archeological resource from vandalism, looting, and non-intentionally damaging activities. • *Final Report*. Description of proposed report format and distribution of results. • *Curation*. Description of the procedures and recommendations for the curation of any recovered data having potential research value, identification of appropriate curation facilities, and a summary of the accession policies of the curation facilities. *Human Remains, Associated or Unassociated Funerary Objects*. The treatment of human remains and of associated or unassociated funerary objects discovered during any soils disturbing activity shall comply with applicable State and federal laws. This shall include immediate notification of the ERO and the Medical Examiner of the City and County of San Francisco and, in the event of the Medical Examiner's determination that the human remains are Native American remains, notification of the California State Native American Heritage Commission, who shall appoint a Most Likely Descendant (MLD). The MLD will complete his or her inspection of the remains and make recommendations or preferences for treatment within 48 hours of being granted access to the site (Public Resources Code section 5097.98). The ERO also shall be notified immediately upon the discovery of human remains (Public Resources Code section 5097.98). The ERO also shall be notified immediately upon the discovery of human remains.	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		The project sponsor and ERO shall make all reasonable efforts to develop a Burial Agreement ("Agreement") with the MLD, as expeditiously as possible, for the treatment and disposition, with appropriate dignity, of human remains and associated or unassociated funerary objects (as detailed in CEQA Guidelines section 15064.5(d)). The Agreement shall take into consideration the appropriate excavation, removal, recordation, scientific analysis, custodianship, curation, and final disposition of the human remains and associated or unassociated funerary objects. If the MLD agrees to scientific analyses of the remains and/or associated or unassociated funerary objects, the archaeological consultant shall retain possession of the remains and associated or unassociated funerary objects until completion of any such analyses, after which the remains and associated or unassociated funerary objects shall be reinterred or curated as specified in the Agreement. Nothing in existing State regulations or in this mitigation measure compels the project sponsor and the ERO to accept treatment recommendations of an MLD. However, if the ERO, project sponsor and MLD are unable to reach an Agreement on scientific treatment of the remains and associated or unassociated funerary objects, the ERO, with cooperation of the project sponsor, shall ensure that the remains and/or mortuary materials are stored securely and respectfully until they can be reinterred on the property, with appropriate dignity, in a location not subject to further or future subsurface disturbance. Treatment of historic-period human remains and of associated or unassociated funerary objects discovered during any soil-disturbing activity, additionally, shall follow protocols laid out in the project's archaeological treatment documents, and in any related agreement established between the project sponsor, Medical Examiner and the ERO. *Final Archeological Resources Report*. The archeological consultant shall submit a Draft Final Archeological Resources Report (FARR) to the ERO that evaluates the historical significance of any discovered archeological resource and describes the archeological and historical research methods employed in the archeological testing/monitoring/data recovery program(s) undertaken. The Draft FARR shall include a curation and deaccession plan for all recovered cultural materials. The Draft FARR shall also include an Interpretation Plan for public interpretation of all significant archeological features. Copies of the Draft FARR shall be sent to the ERO for review and approval. Once approved by the ERO, the consultant shall also prepare a public distribution version of the FARR. Copies of the FARR shall be distributed as follows: California Archaeological Site Survey Northwest Information Center (NWIC) shall receive one (1)	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		copy and the ERO shall receive a copy of the transmittal of the FARR to the NWIC. The environmental planning division of the planning department shall receive one bound and one unlocked, searchable PDF copy on CD of the FARR along with copies of any formal site recordation forms (CA DPR 523 series) and/or documentation for nomination to the National Register of Historic Places/California Register of Historical Resources. In instances of public interest in or the high interpretive value of the resource, the ERO may require a different or additional final report content, format, and distribution than that presented above.	
Impact CR-4: The project could disturb human remains, including those interred outside of formal cemeteries.	S	***Mitigation Measure M-CR-3***	LTS
Impact C-CR-1: The proposed project, in combination with reasonably foreseeable projects in the vicinity, could result in a cumulatively considerable contribution to a significant cumulative impact related to cultural resources.	S	***Mitigation Measure M-CR-3***	LTS
Tribal Cultural Resources			
Impact TCR-1: Project-related activities could cause a substantial adverse change in the significance of a tribal cultural resource, as defined in Public Resources Code section 21074.	S	***Mitigation Measure M-TCR-1: Tribal Cultural Resources Interpretive Program*** During ground-disturbing activities that encounter archeological resources, if the ERO determines that a significant archeological resource is present, and if in consultation with the affiliated Native American tribal representatives, the ERO determines that the resource constitutes a tribal cultural resource (TCR) and that the resource could be adversely affected by the proposed project, the proposed project shall be redesigned so as to avoid any adverse effect on the significant tribal cultural resource, if feasible. If the ERO determines that preservation-in-place of the TCR is both feasible and effective, then the archeological consultant shall prepare an archeological resource preservation plan (ARPP). Implementation of the approved ARPP by the archeological consultant shall be required when feasible. If the ERO, in consultation with the affiliated Native American tribal representatives and the project sponsor, determines that preservation-in-place of the tribal cultural resources is not a sufficient or feasible option, the project sponsor shall implement an interpretive program of the TCR in consultation with affiliated tribal representatives. An interpretive plan produced in consultation with the ERO and affiliated tribal representatives, at a minimum, and approved by the ERO, would be required to guide the interpretive program. The plan shall identify, as appropriate, proposed locations	LTS

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		for installations or displays, the proposed content and materials of those displays or installation, the producers or artists of the displays or installation, and a long-term maintenance program. The interpretive program may include artist installations, preferably by local Native American artists, oral histories with local Native Americans, artifacts displays and interpretation, and educational panels or other informational displays.	
Impact C-TCR-1: The proposed project, in combination with reasonably foreseeable future projects, could result in a cumulatively considerable contribution to a cumulative tribal cultural resources impact.	S	***Mitigation Measure M-TCR-1***	LTS
Noise			
Impact NO-1: Construction of the proposed project would result in a temporary or periodic increase in ambient noise levels.	S	***Mitigation Measure M-NO-1: Construction Noise*** The project sponsor shall develop site-specific noise attenuation measures under the supervision of a qualified acoustical consultant. At the end of the design phase of this project and prior to commencing construction, the project sponsor shall submit a noise attenuation plan to the San Francisco Planning Department and Department of Building Inspection to ensure maximum feasible noise attenuation will be achieved. The noise attenuation plan shall reduce construction noise to the degree feasible with a goal of reducing construction noise levels at adjacent noise sensitive receptors (e.g., residential, hotel, hospital, convalescent home, school, and church uses) so that noise levels do not exceed 90 A-weighted decibels (dB(A)) and 10 dBA above ambient daytime noise levels. The project sponsor shall include noise attenuation measures in specifications provided to the general contractor and any sub-contractors. Noise attenuation measures shall, at minimum, include the following: • Require the general contractor to ensure that equipment and trucks used for project construction utilize the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures and acoustically attenuating shields or shrouds), wherever feasible. • Require the general contractor to perform all work in a manner that minimizes noise to the extent feasible; use equipment with effective mufflers; undertake the noisiest activities during times of least disturbance to surrounding residents and occupants.	LTS

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		• Require the general contractor to use impact tools (e.g., jack hammers, pavement breakers, and rock drills) that are hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. Where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used, along with external noise jackets on the tools, which could reduce noise levels by as much as 10 dB(A). • Require the general contractor to erect temporary plywood noise barriers (at least 0.5-inch-thick) around stationary noise sources and/or the construction site, particularly where a noise source or the site adjoins noise-sensitive uses. The barriers shall be high enough to block the line of sight from the dominant construction noise source to the closest noise-sensitive receptors. Depending on factors such as barrier height, barrier extent, and distance between the barrier and the noise-producing equipment or activity, such barriers may reduce construction noise by 3–15 dB(A) at the locations of nearby noise-sensitive receptors. • Require the general contractor to use noise control blankets on a building structure as the building is erected to reduce noise emission from the site. • Require the general contractor to line or cover hoppers, storage bins, and chutes with sound-deadening material (e.g., apply wood or rubber liners to metal bin impact surfaces). • Unless safety provisions require otherwise, require the general contractor to adjust audible backup alarms downward in sound level while still maintaining an adequate signal-to-noise ratio for alarm effectiveness. Consider signal persons, strobe lights, or alternative safety equipment and/or processes as allowed to reduce reliance on high-amplitude sonic alarms/beeps. • Require the general contractor to place stationary noise sources, such as generators and air compressors, on the power station side of the project site, as far away from nearby noise-sensitive receptors as possible. To further reduce noise, the contractor shall locate stationary equipment in pit areas or excavated areas, if feasible. • Require the general contractor to place non-noise-producing mobile equipment, such as trailers, in the direct sound pathways between suspected major noise-producing sources and noise-sensitive receptors.	

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		• Under the supervision of a qualified acoustical consultant, the project sponsor shall monitor the effectiveness of noise attenuation measures by taking noise measurements as needed. • Prior to the issuance of a building permit, along with the submission of construction documents, the project sponsor shall submit to the planning department and San Francisco Department of Building Inspection (building department) a list of measures that shall be implemented and that shall respond to and track complaints pertaining to construction noise. These measures shall include: 1. post signs onsite pertaining to permitted construction days and hours. 2. a procedure and phone numbers for notifying the building department and the San Francisco Police Department (during regular construction hours and off-hours). This telephone number shall be maintained until the proposed project is ready for occupancy. 3. a sign posted onsite describing noise complaint procedures and a complaint hotline number that shall be answered at all times during construction. 4. designation of an onsite construction complaint and enforcement manager for the project who shall document, investigate, evaluate, and attempt to resolve all project-related noise complaints. 5. notification of neighboring residents and non-residential building managers within 300 feet of the project construction area at least 30 days in advance of extreme noise generating activities (defined as activities generating anticipated noise levels of 90 dB(A) or greater) about the estimated duration of the activity.	
Impact NO-2: The proposed project would generate noise levels in excess of standards established in the local general plan or noise ordinance and could result in a substantial permanent increase in ambient noise levels in the project vicinity.[3]	S	***Mitigation Measure M-NO-2: HVAC and Mechanical Equipment Exterior Noise*** A minimum of 20.5 dB(A) noise reduction is required from the rooftop equipment to achieve the requirements of the San Francisco Police Code. The project sponsor shall implement the following mitigation measure to reduce noise levels from the source equipment and achieve compliance with the police code: • Enclose as much of the proposed project's rooftop equipment as possible within a mechanical room with small louvered openings to the exterior. The mechanical room and louvered openings can be treated with acoustic absorption and sound attenuators to reduce noise at the property planes. • If the equipment remains open to the roof, select rooftop equipment with a maximum sound pressure level of 54.4 dB(A) at 50 feet from the equipment.	LTS

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
		• Attach sound attenuators to the outside air and exhaust air openings/fans of the rooftop equipment to minimize environmental noise. During the design phase, once the project sponsor has selected the specific HVAC and mechanical equipment for the proposed project, a qualified acoustical consultant shall conduct a property plane noise analysis. The property plane analysis report shall evaluate whether the proposed HVAC and mechanical equipment complies with the noise limits in the San Francisco Police Code. The report shall be submitted to the San Francisco Planning Department for review and approval prior to issuance of a building permit or building permit addendum that would permit the HVAC and mechanical equipment.	
Impact C-NO-1: Construction of the proposed project, in combination with reasonably foreseeable projects, would result in a significant cumulative impact related to noise and the project's contribution would be cumulatively considerable.	S	***Mitigation Measure M-NO-1***	LTS

Notes:
NI No impact
LTS Less than significant or negligible impact; no mitigation required
S Significant
SU Significant and unavoidable adverse impact, no feasible mitigation
SUM Significant and unavoidable adverse impact, after mitigation

[1]The term "archeological site" is intended here to minimally include any archeological deposit, feature, burial, or evidence of burial.
[2]An "appropriate representative" of the descendant group is defined here to mean, in the case of Native Americans, any individual listed in the current Native American Contact List for the City and County of San Francisco maintained by the California Native American Heritage Commission and in the case of the Overseas Chinese, the Chinese Historical Society of America. An appropriate representative of other descendant groups should be determined in consultation with the Department archeologist.
[3] In the initial study, this impact statement is incorrectly labeled as Impact NO-2 when it should have been labeled Impact NO-3. However, to avoid confusion and maintain consistency with the initial study's labeling of impact statements, this impact statement will continue to be labeled as Impact NO-2 in this EIR.

S.4 SUMMARY OF ALTERNATIVES

In addition to the proposed project, this draft EIR analyzes the environmental impacts of three alternatives that were determined to represent a reasonable range of alternatives to the proposed project, as follows:

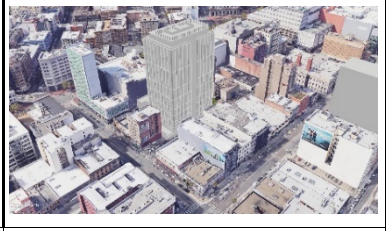
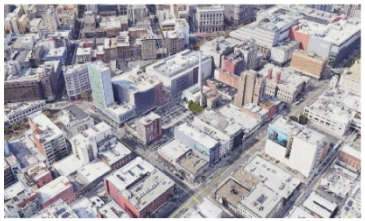
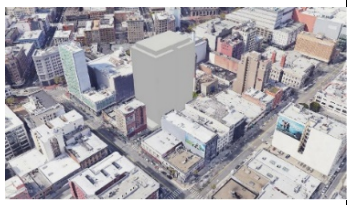
- **Alternative A: No Project Alternative.** The No Project Alternative is based on what would reasonably be expected to occur on the project site if the proposed project is not approved, in accordance with CEQA Guidelines section 15126.6(e). The No Project Alternative assumes that physical conditions on the project site would remain the same.
- **Alternative B: Reduced Density Alternative.** The purpose of the Reduced Density Alternative is to consider a project that would lessen the significant and unavoidable shadow impact on Mint Plaza that would occur from construction of the proposed project. The Reduced Density Alternative would redevelop the project site with a new mixed-use residential project, similar to the proposed project, but would construct a shorter and less dense building than under the proposed project and would include fewer basement levels.
- **Alternative C: No Residential Parking, Tower Only.** The purpose of the No Residential Parking, Tower Only Alternative is to propose a project that would lessen the significant air quality, noise, archeological and tribal cultural resources impacts of the proposed project associated with the grading and excavation needed to build the three below-grade levels for parking and loading spaces. This alternative would redevelop the project site with a new mixed-use residential project, similar to the proposed project, but would include only one basement level (as opposed to the three basement levels included in the proposed project). This alternative would result in a taller building, but with 28 fewer units than under the proposed project by slightly changing the design to eliminate the podium height massing along the four corners and relocate that square footage to the top of the building creating a streamlined single tower.

Pursuant to CEQA Guidelines Section 15126.6(e)(2), if the no project alternative is the environmentally superior alternative, then an EIR is required to identify another environmentally superior alternative from among the alternatives evaluated. The proposed project would result in significant impacts in the areas of cultural resources, tribal cultural resources, noise, and air quality which would be mitigated to a less-than-significant level with implementation of the identified mitigation measures. Additionally, the proposed project would result in a significant and unavoidable project-level shadow impact and a significant and unavoidable cumulative shadow impact.

The Reduced Density Alternative is identified as the environmentally superior alternative. The Reduced Density Alternative would require implementation of the same mitigation measures as the proposed project to reduce impacts related to cultural resources, tribal cultural resources, noise, and air quality. However, the potential for impacts would be similar to or reduced compared with those of the proposed project because of the reduced amount of excavation and earth movement, shorter construction duration, and fewer residential units constructed. The Reduced Density Alternative would be 114 feet shorter than the proposed project and would not cast net new shadow on UN Plaza and would cast less net new shadow on Mint Plaza. The Reduced Density Alternative would not result in a significant and unavoidable project-level or cumulative shadow impact. The Reduced Density Alternative could also feasibly attain most of the project sponsor objectives.

Table S-3 presents a summary of the characteristics of the proposed project, the No Project Alternative, the Reduced Density Alternative, and the No Residential Parking, Tower Only Alternative. Table S-4, presents the potential significant environmental impacts of the proposed project as compared to the project alternatives.

Table S-3: Characteristics of the Proposed Project and Project Alternatives

Project Component	Proposed Project	Alternative A: No Project Alternative	Alternative B: Reduced Density Alternative	Alternative C: No Residential Parking, Tower Only Alternative
				
Building Heights	274 feet (with an additional 10 feet for rooftop mechanical equipment)	--	160 feet (with an additional 10 feet for rooftop mechanical equipment)	284 feet (with an additional 10 feet for rooftop mechanical equipment)
No. of Stories	27 stories 3 below grade levels	--	17 stories 2 below grade level	28 stories 1 below grade level
Total No. Units	495	--	346	467
Studio	192	--	42	0
Junior one-bedroom	33	--	0	0
1 Bedroom	116	--	204	349
2 Bedroom	96	--	64	60
3 Bedroom	50	--	36	58
5 Bedroom	8	--	0	0
Square Footage by Use	475,000 sf residential; 4,000 sf commercial retail	28,790 sf surface parking lot	259,110 sf residential; 6,357 sf commercial retail	343,813 sf residential; 3,651 sf of commercial retail
Total gross square feet (gsf)	535,000 gsf	28,790 gsf	338,629 gsf	479,957 gsf
Open Space	11,000 sf common residential open space; 14,000 sf private residential open space:	--	16,423 sf common residential open space; 252 sf private residential open space	16,756 sf common residential open space; 5,937 sf of private residential open space

Project Component	Proposed Project	Alternative A: No Project Alternative	Alternative B: Reduced Density Alternative	Alternative C: No Residential Parking, Tower Only Alternative
On-Site Vehicular Parking & Loading	1 off-street loading and 2 service vehicle parking; 178 residential vehicular parking spaces; 3 car-share spaces 56,000 sf	176 public vehicular parking spaces; 28,790 sf	2 off-street loading and 2 service vehicle parking; 150 residential vehicular parking spaces; 2 car-share spaces; 57,000 sf	1 off-street loading and 2 service vehicle parking; 2 accessible parking; No car-share parking
Bicycle Parking	200 class 1 27 class 2	None	192 class 1 23 class 2	193 class 1 25 class 2
Entitlements	Conditional Use Authorization; Individually Requested State Density Bonus	None	Conditional Use Authorization	Conditional Use Authorization; Individually Requested State Density Bonus
Excavation Depth	55 feet below grade; 55,850 cubic yards	None	35 feet; 37,600 cubic yards	10 feet; 10,740 cubic yards

Notes:
All numbers rounded to the nearest thousand or hundred thousand.
Common residential open space = solariums, podium terraces/balconies, common areas.

Table S-4: Comparison of Significant Impacts of the Proposed Project to Impacts of the Alternatives

Impact Statement	Proposed Project	Alternative A: No Project Alternative	Alternative B: Reduced Density Alternative	Alternative C: No Residential Parking, Tower Only Alternative
Cultural Resources				
Impact CR-3: The proposed project could result in a substantial adverse change in the significance of an archeological resource.	LSM	NI	LSM =/<	LSM =/<
Impact CR-4: The project could disturb human remains, including those interred outside of formal cemeteries.	LSM	NI	LSM =/<	LSM =/<
Impact C-CR-1: The proposed project, in combination with reasonably foreseeable projects in the vicinity, could result in a cumulatively considerable contribution to a significant cumulative impact related to cultural resources.	LSM	NI	LSM =/<	LSM =/<
Tribal Cultural Resources				
Impact TCR-1: Project-related activities could cause a substantial adverse change in the significance of a tribal cultural resource, as defined in Public Resources Code section 21074.	LSM	NI	LSM =/<	LSM =/<
Impact C-TCR-1: The proposed project, in combination with reasonably foreseeable future projects, could result in a cumulatively considerable contribution to a cumulative tribal cultural resources impacts.	LSM	NI	LSM =/<	LSM =/<
Noise				
Impact NO-1: Construction of the proposed project would result in a temporary or periodic increase in ambient noise levels.	LSM	NI	LSM <	LSM <
Impact NO-2: The proposed project would generate noise levels in excess of standards established in the local general plan or noise ordinance and could result in a substantial permanent increase in ambient noise levels in the project vicinity.	LSM	NI	LSM =/<	LSM =/<
Impact C-NO-1: Construction of the proposed project, in combination with reasonably foreseeable projects, would result in a significant cumulative impact related to noise and the project's contribution would be cumulatively considerable.	LSM	NI	LSM <	LSM <
Air Quality				
Impact AQ-3: Construction and operation of the proposed project would generate toxic air contaminants, including DPM, at levels that would expose sensitive receptors to substantial pollutant concentrations.	LSM	NI	LSM <	LSM <

Impact Statement	Proposed Project	Alternative A: No Project Alternative	Alternative B: Reduced Density Alternative	Alternative C: No Residential Parking, Tower Only Alternative
Impact C-AQ-1: The proposed project during construction and operations, in combination with reasonably foreseeable projects, would result in significant health risk impacts to sensitive receptors.	LSM	NI	LSM <	LSM <
Shadow				
Impact SD-1: The proposed project could create new shadow that could substantially and adversely affect the use and enjoyment of publicly accessible open spaces.	SU	NI	LS <	SU >
Impact C-SD-1: The proposed project, in combination with reasonably foreseeable projects, could create new shadow that could substantially and adversely affect the use and enjoyment of publicly accessible open spaces.	SU	NI	LS <	SU >

Notes:
NI (no impact); LS (less than significant); LSM (less than significant with mitigation); SU (significant and unavoidable, no feasible mitigation measures available) = (equal to); < (less than); > (greater than)

S.5 AREAS OF KNOWN CONTROVERSY AND ISSUES TO BE RESOLVED

The planning department prepared an initial study checklist and published a NOP for an EIR on October 2, 2019, thereby announcing its intent to prepare and distribute a focused EIR (the NOP and Initial Study checklist are presented as Appendix A to this EIR). Publication of the NOP and initial study checklist initiated a 30-day public review and comment period that began on October 3, 2019 and ended on November 1, 2019. Individuals and agencies that received these notices included owners of properties within 300 feet of the project site, potentially interested parties, and responsible agencies, including regional and state agencies. Five written communications were received during the public review period. Four of the five comments requested additional information, such as the project sponsor's email address and requests for a hard copy of the initial study document. The planning department provided such requested information to the respective commenters. The fifth comment received noted a concern with vehicular circulation to and from the project site and inquired if the proposed project would implement limitations on the use of vehicles during the morning and afternoon rush hours. Information regarding project site circulation is provided in Section E.5, Transportation and Circulation, of the initial study (Appendix A). As disclosed in the initial study, impacts related to transportation and circulation would be less than significant. Potential areas of controversy for the proposed project include the potential effects of the proposed project related to air quality, wind, shadow, and transportation and circulation.

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1.0 INTRODUCTION

This environmental impact report (EIR) analyzes the potential environmental effects associated with the 469 Stevenson Street Project (proposed project). This chapter describes the type, purpose, and function of the EIR, and describes the environmental review process for the project.

1.1 PROJECT SUMMARY

The project site is a through lot located at 469 Stevenson Street in the South of Market (SoMa) neighborhood of San Francisco (Assessor's Block 3704, Lot 45). The project site is approximately 28,790 square feet (0.66-acre) and currently developed as a public surface parking lot with 176 parking spaces.

The project sponsor, BUILD, is proposing to demolish the existing surface parking lot and construct a new 27-story mixed-use building that is approximately 274 feet tall (with an additional 10 feet for rooftop mechanical equipment). The proposed project would total approximately 535,000[5] gross square feet (gsf) and include 495 dwelling units, approximately 4,000 square feet of commercial retail use on the ground floor, and approximately 25,000 square feet of private and common open space.[6] The proposed 495 dwelling units consisting of approximately 192 studios, 33 junior one-bedroom units, 116 one-bedroom units, 96 two-bedroom units, 50 three-bedroom units, and 8 five-bedroom units would be available to rent. The proposed project would use the Individually Requested State Density Bonus Program[7] and provide affordable housing units onsite.

The proposed project would provide three below grade parking levels with 178 vehicular parking spaces, 200 class 1[8] bicycle spaces, and two service delivery loading spaces. Additionally, one on-site freight loading space would be located on the ground floor. Twenty-seven class 2[9] bicycle parking spaces would be placed along Jessie Street.

The proposed project would excavate 55,850 cubic yards of soil at the project site. The proposed project is anticipated to be constructed on a mat foundation and no pile driving or piers are proposed or required. Project construction would span approximately 36 months. Further details regarding the proposed project components that form the basis for the EIR analysis are discussed in depth in Chapter 2, Project Description.

[5] All numbers are rounded to the nearest thousand or hundred thousand.

[6] Since publication of the NOP and initial study on October 2, 2019, the project sponsor has made changes to the project description. These changes are described in section 2.7 of Chapter 2, Project Description, and have been incorporated into the analysis of potential impacts to air quality, wind, and shadow in Chapter 4, Environmental Setting and Impacts. Chapter 4 also includes an analysis of the revised project for the resource topics addressed in the initial study.

[7] City of San Francisco Planning Department, Individually Requested State Density Bonus Program, Informational and Supplemental Application Packet. http://forms.sfplanning.org/IndividuallyRequestedState_SupplementalApplication.pdf. Accessed September 18, 2019.

[8] Class 1 bicycle parking space(s) are spaces in secure, weather-protected facilities intended for use as long-term, overnight, and work-day bicycle storage by dwelling unit residents, non-residential occupants, and employees.

[9] Class 2 bicycle parking space(s) are bicycle racks located in a publicly-accessible, highly visible location intended for transient or short-term use by visitors, guests, and patrons to the building or use.

1.2 PURPOSE OF THIS EIR

An EIR is an informational document used by a lead agency when considering approval of a project. The purpose of an EIR is to provide public agencies and members of the public with detailed information regarding the environmental effects of implementing a proposed project. An EIR should analyze a project's physical environmental consequences, identify ways to reduce or avoid the project's potential physical environmental effects, and identify alternatives to the project that can avoid or reduce impacts. An EIR provides information to be used in the planning and decision-making process. It is not the purpose of an EIR to recommend approval or denial of a project.

This EIR analyzes the physical environmental effects associated with implementation of the proposed project. It has been prepared by the San Francisco Planning Department of the City and County of San Francisco (City), the lead agency for the proposed project, in compliance with the provisions of the California Environmental Quality Act (CEQA) and the CEQA Guidelines (California Code of Regulations Title 14, sections 15000 et seq. and California Public Resources Code sections 21000 et seq., respectively), as well as San Francisco Administrative Code chapter 31. The lead agency is the public agency that has principal responsibility for carrying out or approving a project.

As described by CEQA and the CEQA Guidelines, public agencies are charged with a duty to avoid or substantially lessen significant environmental effects, where feasible. In undertaking this duty, a public agency has an obligation to balance a project's significant effects on the environment with its benefits, including economic, social, technological, legal, and other non-environmental characteristics.

As defined in CEQA Guidelines section 15382, a "significant effect on the environment" is:

> "…a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. An economic or social change by itself shall not be considered a significant effect on the environment. A social or economic change related to a physical change may be considered in determining whether the physical change is significant."

CEQA requires an EIR to be prepared before a discretionary decision is made to approve a project that may cause a significant effect on the environment that cannot be mitigated. The EIR is a public information document for use by governmental agencies and the public to identify and evaluate potential environmental impacts of a project, identify mitigation measures to lessen or eliminate significant adverse impacts, and examine feasible alternatives to the project. The information contained in this EIR, along with other information available through the public review processes, will be reviewed and considered by the decision makers prior to a decision to approve, disapprove, or modify the proposed project or adopt an alternative to the proposed project.

1.3 TYPE OF EIR

This document is a project-level EIR, pursuant to CEQA Guidelines section 15161. A project-level EIR focuses on changes in the environment that would result from construction and operation of a specific project.

Furthermore, this EIR is also a focused EIR, pursuant to CEQA Guidelines section 15063(c)(3). An initial study was prepared for the proposed project in accordance with sections 15062 and 15082 and issued for public review on October 2, 2019. The initial study identified the topics for which the proposed project would result in less-than-significant impacts or impacts that could be reduced to less than significant with implementation of the mitigation measures identified in the initial study, and therefore do not require further analysis in this EIR. Thus, this EIR focuses the environmental analysis on those topics identified in the initial study with the potential to have significant environmental impacts.

Before the City can approve the project, it must certify that this EIR has been completed in compliance with CEQA, the CEQA Guidelines, and chapter 31 of the San Francisco Administrative Code, and that the information in the EIR reflects the City's independent judgment. CEQA requires decision-makers to balance the benefits of a project against its unavoidable environmental consequences. If environmental impacts are identified as significant and unavoidable, the City may still approve the project if it finds that social, economic, or other benefits outweigh the unavoidable impacts. The City would then be required to state in writing the specific reasons for approving the project, based on information in the EIR and other information sources in the administrative record. This reasoning is called a "statement of overriding considerations" (Public Resources Code section 21081; CEQA Guidelines section 15093).

1.4 ENVIRONMENTAL REVIEW PROCESS

1.4.1 Notice of Preparation of an EIR and Initial Study

In accordance with sections 15063 and 15082 of the CEQA Guidelines, the planning department published and distributed a notice of preparation (NOP) of an EIR and an initial study for the proposed project. The initial study was prepared to determine whether any aspect of the project, either individually or cumulatively, would cause a significant effect on the environment. The initial study narrowed the focus (or scope) of the environmental analysis by identifying which impacts would be less than significant (with or without mitigation) and therefore were adequately analyzed in the initial study, and which impacts require further study in the EIR. The initial study included the following findings:

- Impacts from the project related to aesthetics and parking are not applicable to the proposed project.[10]
- Impacts from the project related to land use and planning, population and housing, cultural resources, tribal cultural resources, transportation and circulation, odors, greenhouse gas

[10] Senate Bill 743 was signed into law on September 27, 2013; became effective on January 1, 2014; and amends CEQA by adding Public Resources Code section 21099 regarding analysis of aesthetics, parking, and transportation impacts for urban infill projects. Section 21099(d) provides that "aesthetics and parking impacts of a residential, mixed-use residential, or employment center project on an infill site located within a transit priority area shall not be considered significant impacts on the environment." Thus, aesthetics and parking are no longer to be considered in determining whether a project has the potential to result in significant environmental effects for projects that meet the following three criteria: (1) is located in a transit priority area; (2) is located on an infill site; and (3) is residential, mixed-use residential, or an employment center. The proposed project meets each of these three criteria: It is located near major transit routes and on an infill site that has been previously developed and surrounded by areas of either recently completed or planned urban development. Further, the proposed project is a mixed-use residential project. Therefore, this EIR does not consider aesthetics and the adequacy of parking in determining the significance of project impacts under CEQA.

(GHG) emissions, recreation, utilities and services systems, public services, biological resources, geology and soils, hydrology and water quality, hazards and hazardous materials, mineral resources, energy resources, agriculture and forestry resources, and wildfire would either be less than significant or less than significant with mitigation, or would have no impact.

- Impacts from the project related to air quality (all topics except odors), wind, and shadow would be potentially significant and require further evaluation in the EIR.

The NOP and initial study were circulated for a 30-day public review period starting on October 3, 2019 and ending on November 1, 2019. Five written communications were received during the public review period requesting additional information about the proposed project. One of these comments expressed concern about vehicular circulation to and from the project site. Information regarding project site circulation and the proposed project's transportation and circulation related impacts are provided in Section E.5, Transportation and Circulation, of the initial study (refer to Appendix A).

1.4.2 Draft EIR Public Review and Opportunities for Public Participation

The CEQA Guidelines and San Francisco Administrative Code chapter 31 encourage public participation in the planning and environmental review processes. The City will provide opportunities for the public to present comments and concerns regarding this EIR and its CEQA process. These opportunities include: (1) a 45-day public review and comment period, starting on March 12, 2020 and ending on April, 27, 2020 ; (2) a noticed public hearing before the San Francisco Planning Commission (planning commission) on the draft EIR on April 16, 2020 ; and (3) a noticed public hearing before the planning commission on the certification of the final EIR in year 2020.

The public is invited to submit written comments on the adequacy and accuracy of the draft EIR. The comments should address the sufficiency of the document with respect to identifying and analyzing possible significant environmental impacts and determining how they may be avoided or mitigated. CEQA Guidelines section 15096(d) requests that responsible agencies review the proposed project activities that are in their areas of expertise, required to be carried out or approved by the agencies, and subject to an exercise of powers by the agencies. The agencies are also requested to provide comments that are supported by either oral or written documentation.

All written comments or questions about the draft EIR should be addressed to:

San Francisco Planning Department
Attention: Jenny Delumo, EIR Coordinator
1650 Mission Street, Suite 400, San Francisco, CA 94103
CPC.469Stevenson@sfgov.org

Written comments must be received by 5:00 p.m. on April 27, 2020. Comments may also be submitted in person during the public hearing before the planning commission, which has been scheduled for April 16, 2020, at City Hall, Dr. Carlton B. Goodlett Place, Room 400, San Francisco, California. Please call (415) 558-6422 the week of the hearing for a recorded message with a more specific time.

The draft EIR is available for public review and comment on the planning department's "Environmental Review Documents" web page (https://sfplanning.org/environmental-review-documents). Copies of the draft EIR are also available at the Planning Department (1650 Mission Street,

Suite 400). Referenced materials in this EIR are available for review on the San Francisco Property Information Map, which can be accessed at https://sfplanninggis.org/pim/. Individual files can be viewed by clicking on the "Planning Applications" link, clicking the "More Details" link under the project's environmental record number 2017-014833ENV and then clicking on the "Related Documents" link. (call 415-575-9146 for questions related to review of materials). Referenced materials are also available for review by appointment at the planning department's office on the fourth floor of 1650 Mission Street. (call 415-575-9146 or email CPC.469Stevenson@sfgov.org to review the materials).

Comments are most helpful when they address the environmental analysis itself or suggest specific alternatives and/or additional measures to mitigate the significant environmental impacts of the proposed project. Members of the public are not required to provide personal identifying information when they communicate with the planning department or planning commission. All written or oral communications, including submitted personal contact information, may be made available to the public for inspection and copying upon request and may appear on the planning department's website or in other public documents.

1.4.3 Final EIR and EIR Certification

Following the close of the public review and comment period for this draft EIR, the City will prepare and publish a document titled "Responses to Comments." The responses to comments document will contain all written comments on this draft EIR and oral comments recorded at the public hearing on the draft EIR and written responses to those comments, along with copies of the letters or emails received, a transcript of the public hearing on the draft EIR, and any necessary revisions to the draft EIR. The draft EIR and the responses to comment document will constitute the final EIR. Not less than 10 days prior to the planning commission hearing to consider certification of the final EIR, the final EIR will be made available to the public and any board(s), commission(s) or department(s) that will carry out or approve the proposed project.

The planning commission, in an advertised public meeting, will consider the documents and, if found adequate, accurate, and objective, certify the final EIR, provided it (1) was completed in compliance with CEQA; and (2) reflects the lead agency's independent judgment and analysis. CEQA requires agencies to neither approve a project nor implement a project unless the project's significant environmental impacts have been reduced to a less-than-significant level, thereby essentially eliminating, avoiding, or substantially lessening the potentially significant impacts of the proposed project, except when certain findings are made. If an agency approves a project that would result in the occurrence of significant adverse impacts that cannot feasibly be mitigated to less-than-significant levels (that is, significant and unavoidable impacts), the agency must state the reasons for its action in writing; demonstrate that mitigation is infeasible, based on the EIR or other information in the record; and adopt a Statement of Overriding Considerations.

1.4.4 Mitigation Monitoring and Reporting Program

At the time of project approval, CEQA Guidelines require lead agencies to adopt a mitigation monitoring and reporting program (MMRP), a condition of project approval, to mitigate or avoid significant impacts on the environment (CEQA Guidelines section 21081.6; CEQA Guidelines section 15097). This EIR identifies and presents the mitigation measures that would form the basis of a mitigation monitoring and reporting program. Any mitigation measure and improvement measures

adopted by the lead agency and the City as conditions for approval of the project would be included in the MMRP.

1.5 ORGANIZATION OF THE DRAFT EIR

The EIR has been organized as follows:

- **Summary.** This chapter summarizes the EIR by providing a concise overview of the proposed project, the environmental impacts that would result from the proposed project, mitigation measures identified to reduce or eliminate the impacts, project alternatives and their comparative environmental effects, and areas of controversy and issues to be resolved.
- **Chapter 1, Introduction.** This chapter includes a discussion of the purpose of the EIR, a discussion of the environmental review process, a summary of the comments received on the scope of the EIR, and a brief outline of the document's organization.
- **Chapter 2, Project Description.** This chapter provides a detailed description of the proposed project, including the project's background and objectives, a summary of the changes to the project since publication of the initial study, the project location, the existing project site's land use characteristics, project components and characteristics, the construction schedule and anticipated activities, project approvals, a list of reasonably foreseeable cumulative projects, and the intended uses of the EIR.
- **Chapter 3, Applicable Plans.** This chapter provides a summary of the applicable plans of the City, as well as regional and state agencies, and identifies any potential project conflicts with those plans.
- **Chapter 4, Environmental Setting and Impacts.** This chapter provides a detailed analysis of the environmental impacts of the proposed project on the three resource topics that were identified in the initial study for further analysis. Each environmental topic contains a description of the environmental setting (or existing conditions), regulatory framework, and project-level and cumulative impacts. Each impact discussion includes the significance criteria used to determine the nature or magnitude of environmental impacts, significance conclusions, and feasible mitigation to avoid, minimize, or mitigate significant or potentially significant environmental impacts. The environmental topics included in this EIR are:
    - air quality (all topics except odors)
    - wind
    - shadow

  This chapter also contains a section that analyzes the environmental impacts of the revised project on the resource topics that were addressed in the initial study. The analysis provides the evidentiary basis that modifications to the project description since publication of the initial study would not change the impact conclusions for those topics addressed in the initial study.
- **Chapter 5, Other CEQA Issues.** Pursuant to Section 15126.2 of the CEQA Guidelines, this chapter summarizes any growth-inducing impacts that could result from the proposed project,

irreversible changes to the environment, and significant and unavoidable environmental impacts. This chapter also presents any areas of controversy left to be resolved.

- **Chapter 6, Alternatives.** This chapter analyzes alternatives to the proposed project, including the required No Project Alternative, and compares their environmental effects to those of the proposed project. It also identifies the environmentally superior alternative. Alternatives evaluated in this chapter include the following:
    - Alternative A: No Project Alternative
    - Alternative B: Reduced Density Alternative
    - Alternative C: No Residential Parking, Tower Only Alternative
- **Chapter 7, Report Preparers.** This chapter presents a list of persons involved in preparation of this EIR.
- **Appendices.** The following appendices are included in this EIR:
    - Appendix A, Notice of Preparation and Initial Study
    - Appendix B, Air Quality Technical Report
    - Appendix C, Wind Study for the 469 Stevenson Street Project
    - Appendix D, Shadow Analysis Report for the Proposed 469 Stevenson Street Project
    - Appendix E, Revised Transportation Analysis Memorandum
    - Appendix F, Revised Noise Analysis Memorandum
    - Appendix G, Revised Energy Calculations Memorandum
    - Appendix H, Greenhouse Gas Compliance Checklist

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2.0 PROJECT DESCRIPTION

This chapter provides an overview of the proposed project, including changes to the proposed project since publication of the initial study (Appendix A), the project sponsors' objectives, a description of the project location and existing conditions at the site, a description of the proposed project's characteristics, proposed construction schedule and anticipated activities, a list of reasonably foreseeable cumulative projects, and the required project approvals.

2.1 PROJECT OVERVIEW

The project site is a through lot located at 469 Stevenson Street in the South of Market (SoMa) neighborhood of San Francisco (Assessor's Block 3704, Lot 45). The project site is approximately 28,790 square feet (0.66-acre) and currently developed as a public surface parking lot with 176 parking spaces.

The project sponsor, BUILD, is proposing to demolish the existing surface parking lot and construct a new 27-story mixed-use building that is approximately 274 feet tall (with an additional 10 feet for rooftop mechanical equipment). The proposed project would total approximately 535,000[11] gsf and include 495 dwelling units, approximately 4,000 square feet of commercial retail use on the ground floor, and approximately 25,000 square feet of private and common open space. The proposed 495 dwelling units consisting of approximately 192 studios, 33 junior one-bedroom units, 116 one-bedroom units, 96 two-bedroom units, 50 three-bedroom units, and 8 five-bedroom units would be available to rent. The proposed project would use the Individually Requested State Density Bonus Program[12] and provide affordable housing units onsite.

The proposed project would provide three below grade parking levels with 178 vehicular parking spaces, 200 class 1[13] bicycle spaces, and two service delivery loading spaces. Additionally, one on-site freight loading space would be located on the ground floor. Twenty-seven class 2[14] bicycle parking spaces would be placed along Jessie Street.

The proposed project would require 55,850 cubic yards of excavation and is anticipated to be constructed on a mat foundation. No pile driving or piers are proposed or required. Project construction would span approximately 36 months.

[11] All numbers are rounded to the nearest thousand or hundred thousand.

[12] City of San Francisco Planning Department, Individually Requested State Density Bonus Program, Informational and Supplemental Application Packet. http://forms.sfplanning.org/IndividuallyRequestedState_SupplementalApplication.pdf. Accessed September 18, 2019.

[13] Class 1 bicycle parking space(s) are spaces in secure, weather-protected facilities intended for use as long-term, overnight, and work-day bicycle storage by dwelling unit residents, non-residential occupants, and employees.

[14] Class 2 bicycle parking space(s) are bicycle racks located in a publicly-accessible, highly visible location intended for transient or short-term use by visitors, guests, and patrons to the building or use.

2.2 PROJECT SPONSOR'S OBJECTIVES

The project sponsor has identified the following project objectives:

1. Redevelop an underutilized site in a transit-oriented, urban infill location with a range of dwelling units, ground-floor commercial retail uses, and open space amenities.

2. Build a substantial number of residential units onsite to help alleviate the current housing shortage in San Francisco and the greater Bay Area, and to contribute to the General Plan's Housing Element goals and the Association of Bay Area Government's (ABAG's) Regional Housing Needs Allocation for the City and County of San Francisco.

3. Promote the construction of affordable housing units in San Francisco by providing onsite inclusionary housing units.

4. Produce a high-quality architectural and landscape design that encourages variety, is compatible with its surrounding context and promotes sustainability through environmentally sensitive design features that meet or exceed the requirements of the San Francisco Public Utilities Commission's Non-Potable Water Ordinance as well as the City and County of San Francisco's Stormwater Management Requirements, Green Building Ordinance, and Better Streets Design Guidelines.

5. Develop the project site to encompass ample open space amenities for building residents and encourage use of common residential open space.

6. Provide off-street vehicle parking that is adequate for the occupancy proposed pursuant section 151.1 of the San Francisco Planning Code (planning code) and to meet investment capital parking requirements.

7. Design a project that incorporates building massing features, including massing articulation, that would improve the building's performance with respect to wind safety and comfort impacts.

8. Construct a high-quality project that includes a sufficient number of dwelling units and commercial space to make redevelopment of the site economically feasible by producing a reasonable return on investment for the project sponsor and its investors, attracting investment capital and construction financing, and generating sufficient revenue to provide onsite inclusionary housing units.

2.3 PROJECT LOCATION

The project site is located at 469 Stevenson Street in the SoMa neighborhood of San Francisco (Figure 1). As shown in Figure 2, the project site is a through lot with frontages on both Stevenson and Jessie streets and is located mid-block between Fifth and Sixth streets (Assessor's Block 3704, Lot 45). The project site is approximately 28,790 square feet (0.66-acre) and currently used as a public surface parking lot with 176 parking spaces. Access to the project site is currently available from the existing 24-foot-wide curb cut on Stevenson Street and the 12-foot-wide curb cut on Jessie Street. There is no existing vegetation on the project site. However, there are five trees adjacent to the east boundary of the project site on the Clearway Energy property. The topography of the site is generally level with a ground surface elevation of approximately 30 feet above mean sea level.

The project site is located within the C-3-G (Downtown-General) zoning district, which allows retail and high-density residential development, and a 160-F height and bulk district. This height and bulk designation allow for buildings up to 160 feet in height, and bulk limitations of 110 feet in length and 140 feet along the diagonal for buildings 80 feet in height or taller.

The project site is served by the city's transit network and is located less than one block south of the Powell Street Bay Area Rapid Transit (BART) station and the subsurface San Francisco Municipal Railway (Muni) lines. Additionally, there are several aboveground Muni bus lines that operate within 0.5 mile of the project site, including the 14-Mission, 27-Bryant, 45-Union/Stockton, and 8-Bayshore Express. The closest aboveground Muni stop is located about 300 feet north of the project site on Market Street and Sixth Street.

2.4 EXISTING SETTING

Land uses in the surrounding area consist of a mix of retail, commercial office, industrial, hotel, and residential uses. The east boundary of the project site is adjacent to Clearway Energy's thermal power station, Station T, which produces space heating, domestic hot water, air conditioning, and industrial process uses. The thermal power station is fully operational and includes six boilers and two gas stacks approximately 160 feet tall. Four buildings are adjacent to the west boundary of the project site, consisting of two 3-story hotels, a 3-story mixed-use building with commercial and hotel uses, and a 7-story mixed-use building with commercial and residential uses. Three buildings are located directly across from the project site on Stevenson Street. These buildings front Market Street and include two 7-story mixed-use buildings with commercial and office uses, and a 2-story commercial building. Four buildings are located directly across from the project site on Jessie Street consisting of automotive and office uses ranging from one to five-stories.

The average height of buildings in the immediate area ranges from one to seven stories, approximately 40 to 100 feet in height. The height of buildings in the area generally increases east of the project site along Market Street with the maximum building height allowed up to 400 feet.

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469 Stevenson Street Project

Case No. 2017-014833ENV

Figure 1: Project Site Location

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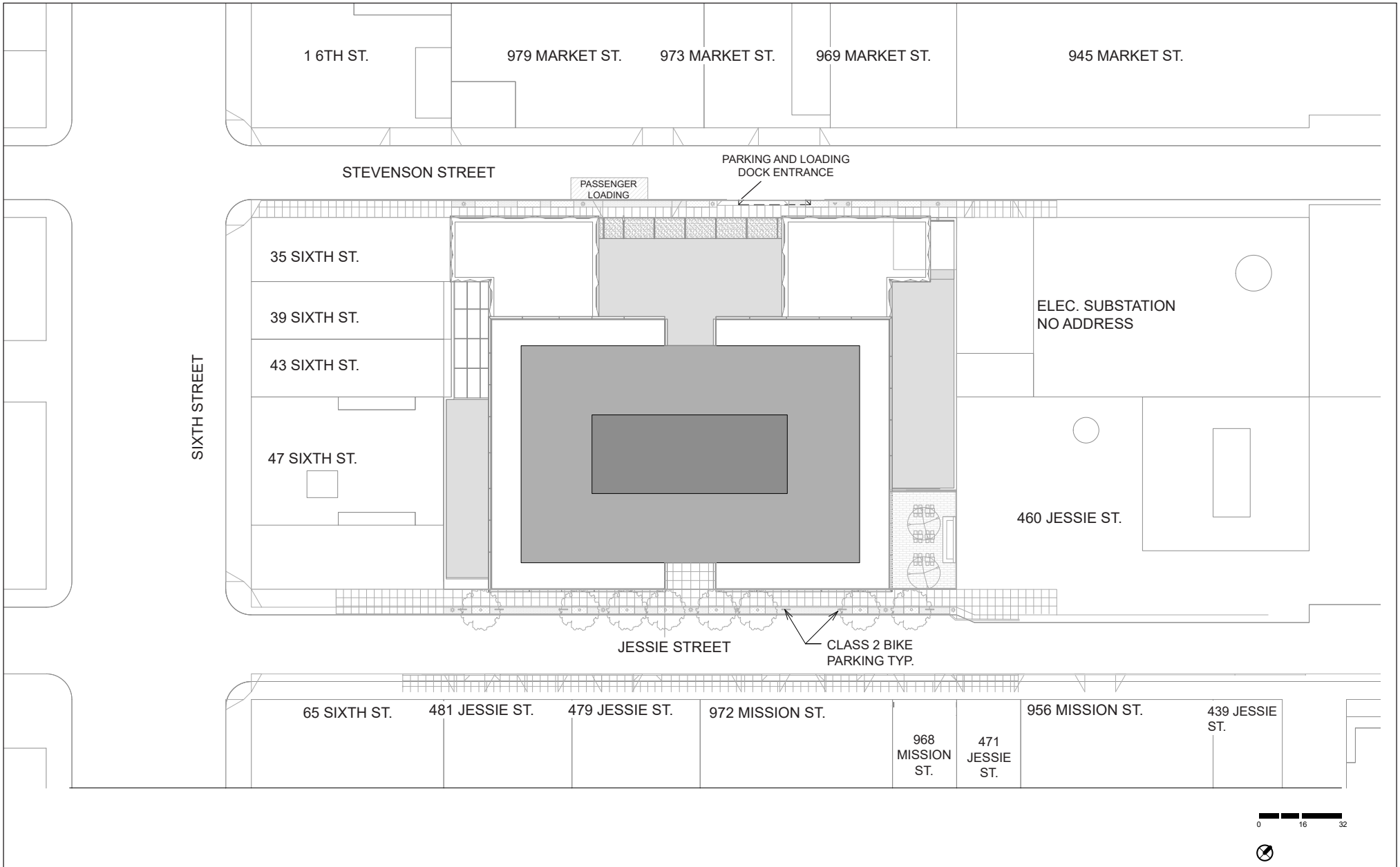

Source: Solomon Cordwell Buenz 2019

469 Stevenson Street Project

Case No. 2017-014833ENV

Figure 2: Proposed Project Site Plan

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The project site is within the SoMa and mid-market employment centers, and within walking distance to downtown. Class 2[15] and class 3[16] bicycle facilities currently run along Market Street in both directions. The nearest Bay Area bike share station is less than one block north of the project site at the northwest corner of Market and Fifth streets.

The nearest parks or public open spaces include Mint Plaza, about 0.1-mile to the northeast; Father Alfred E. Boeddeker Park, about 0.3-mile to the northwest; Gene Friend Recreation Center Park, about 0.3-mile to the southeast; Turk-Hyde Mini Park, about 0.4-mile to the north; Tenderloin Recreation Center, about 0.4-mile to the north; United Nations (UN) Plaza, about 0.4-mile to the northwest; Victoria Manalo Draves Park, about 0.5-mile to the south; Joseph L. Alioto Performing Arts Piazza, about 0.5-mile to the northwest; Union Square, about 0.7-mile to the north; and Yerba Buena Gardens open space and recreational facilities, about 0.5-mile northeast of the project site.

In addition, six projects within a 0.25-mile radius are currently under construction and therefore are considered part of the existing environmental conditions. These projects include the following:

- **5M Project, 925-927 Mission Street (Case No: 2011.0409E):** Involves retention and rehabilitation of two buildings on the site, demolition of six existing buildings on the site, and the construction of five new buildings. Buildings would range in height from approximately 50 feet to 400 feet. The total square footage of renovated existing buildings and new construction would include approximately 1.85 million gsf of new and existing uses, comprising 1,132,200 gsf of office uses, 552,800 gsf of residential uses (748 dwelling units), up to 146,900 gsf of active ground floor retail/office/cultural/educational uses, and 18,200 gsf of arts/cultural/educational uses. This project is about 600 feet southeast of the project site.
- **950-974 Market Street (Case No: 2013.1049E):** Involves demolition of the existing buildings and parking structure to construct an approximately 406,000 gsf building containing 242 dwelling units, a 232-room hotel, and approximately 16,600 gsf of retail uses, in a 12-story, 120-foot-tall building. This project is about 400 feet north of the project site.
- **1066 Market Street (Case No: 2013.1753E):** Involves demolition of the existing building and parking lot and construction of a new 12-story, 120-foot-tall, approximately 297,950 gsf residential building with ground floor retail space and two levels of subterranean parking. The mixed-use building would provide approximately 304 dwelling units and 4,540 gsf of ground-floor commercial retail space. This project is about 750 feet northwest of the project site.
- **Central Subway Project (Case No: 1996.281E):** Involves extension of the Muni Metro T Third Street Line through SoMa, Union Square, and Chinatown. Construction is currently under way and operations are expected to begin in 2021. Once the Central Subway is completed, the T

[15] Class 2 bicycle facilities are standard bike lanes within a portion of road reserved for the preferential or exclusive use of people biking, indicated by road markings. California Department of Transportation, A Guide to Bikeway Classification, July 2017. http://www.dot.ca.gov/d4/bikeplan/docs/caltrans-d4-bike-plan_bikeway-classification-brochure_072517.pdf. Accessed March 26, 2019.

[16] Class 3 bicycle facilities are typically wide travel lanes shared by bicyclists and vehicles. They are commonly marked with the standard or greenback sharrows and wayfinding signs to indicate shared use. California Department of Transportation, A Guide to Bikeway Classification, July 2017. http://www.dot.ca.gov/d4/bikeplan/docs/caltrans-d4-bike-plan_bikeway-classification-brochure_072517.pdf. Accessed March 26, 2019.

Third Line will travel mostly underground from the 4th Street Caltrain Station to Chinatown. Four new stations will be built along the 1.7-mile alignment: 4th and Brannan Station at 4th and Brannan streets, Yerba Buena/Moscone Station at 4th and Folsom streets, Union Square/Market Street Station on Stockton Street at Union Square, and Chinatown Station at Stockton and Washington streets.

- **Sixth Street Pedestrian Safety Project (Case No. 2014.1010E):** Alters Sixth Street between Market and Howard streets by reducing the number of vehicle lanes on Sixth Street from four lanes to three lanes; widening the sidewalks on both sides of Sixth Street; installing new corner curb bulbouts at all intersections; installing new traffic signals at the intersections of Sixth Street/Stevenson Street and Sixth Street/Natoma Street; installing new crosswalk striping at all alleys crossing Sixth street; and installing new roadway striping and streetscape improvements (e.g., decorative sidewalks, pedestrian lighting).

2.5 PROJECT CHARACTERISTICS

The proposed project would replace the existing 176 space surface parking lot with a 27-story (274 foot-tall with an additional 10 feet for rooftop mechanical equipment) mixed-use residential building of approximately 535,000 gsf. The proposed building would consist of residential and commercial retail uses above a three-level below grade parking garage. The proposed project would provide sidewalk landscaping improvements and open space consisting of solariums, courtyards, and balconies. The proposed project would connect to existing utility lines including sewer, water, electricity, and gas lines. Table 2.5-1, Project Summary, lists the characteristics of the individual project components. Figure 2 shows the proposed project site plan.

Table 2.5-1: Project Summary

Project Component	Gross Square Feet[1]
Residential	475,000
Retail	4,000
Vehicle Parking	56,000
Building Total	535,000
Common Residential Open Space[2]	11,000
Private Residential Open Space[3]	14,000
Open Space Total	25,000
Dwelling Unit Type	**Number of Units**
Studios	192
Junior one-bedroom	33
One-bedroom	116
Two-bedroom	96
Three-bedroom	50
Five-bedroom	8

Project Component	Gross Square Feet[1]
Total Dwelling Units	495
Parking Spaces	**Number of Spaces**
Residential Parking Spaces	178
Retail Parking Spaces	0
Total Parking Spaces	178
Bicycle Parking	**Number of Spaces**
Bicycle (class 1)	200
Bicycle (class 2)	27

Notes:

[1] All numbers are rounded to the nearest thousand or hundred thousand.

[2] Common residential open space consists of the lounge solarium, approximately 4,000 square feet; fitness solarium, approximately 6,000 square feet; and a ground floor courtyard, approximately 1,000 square feet. Common usable open space as defined in section 135(a) of the planning code pertains to areas jointly used by residents of the project.

[3] Private balconies would be provided to 22 dwelling units on the 2nd, 6th, and 27th floors.

The project proposes to use the Individually Requested State Density Bonus Program[17] and must provide at least 11 percent of the base[18] project's residential units as very low affordable dwelling units onsite in order to qualify for a 35 percent increase in density. The project proposes to provide 19 percent of the base project's residential units as very low affordable dwelling units onsite.

The project sponsor will also be requesting waivers from height, bulk, and other physical constraints of the planning code and is reserving its right to use the incentives afforded by providing affordable dwelling units onsite, as allowed by the Individually Requested State Density Bonus Program.

2.5.1 Residential Component

The proposed project would provide approximately 495 dwelling units within approximately 475,000 square feet of residential space. Levels 2 through 5 would contain 21 units consisting of 6 studios, 3 junior one-bedroom units, 6 one-bedroom units, 2 two-bedroom units, 2 three-bedroom units, and 2 five-bedroom units. Level 6 would contain 19 units consisting of 6 studios, 3 junior one-bedroom units, 6 one-bedroom units, 2 two-bedroom units, and 2 three-bedroom units. Levels 7 through 26 would contain 19 units consisting of 8 studios, 1 junior one-bedroom unit, 4 one-bedroom units, 4 two-bedroom units, and 2 three-bedroom units. The 27th level would include 2 junior one-bedroom units, 6 one-bedroom units, and 4 two-bedroom units. The project floor plans are depicted in Figure 3 through Figure 8.[19] The building elevations are depicted in Figure 9 and Figure 10.

[17] City of San Francisco Planning Department, Individually Requested State Density Bonus Program, Informational and Supplemental Application Packet. http://forms.sfplanning.org/IndividuallyRequestedState_SupplementalApplication.pdf. Accessed September 18, 2019.

[18] In order to determine how much of a density bonus state law will allow, the density allowed by current controls ("base density" or "base project") must first be calculated. The base density is the maximum gross residential density allowed pursuant to the site's zoning requirements.

[19] The project floor plans presented in Figures 3 through 8 are representative; therefore, the exact configurations may change.

2.5.2 Commercial Retail Component

The proposed project would include two commercial retail spaces on the ground floor along Jessie Street. The commercial retail spaces would total approximately 4,000 square feet (Figure 3).

2.5.3 Building Features

The proposed project would incorporate building massing features, including massing articulation, to improve the building's performance with respect to wind safety and comfort to meet the wind hazard requirements of planning code section 148. The proposed project would also include a 12-foot tall glass wind screen along the full perimeter of the private open space areas on the second and sixth levels to further reduce wind speeds and enhance pedestrian safety and comfort.

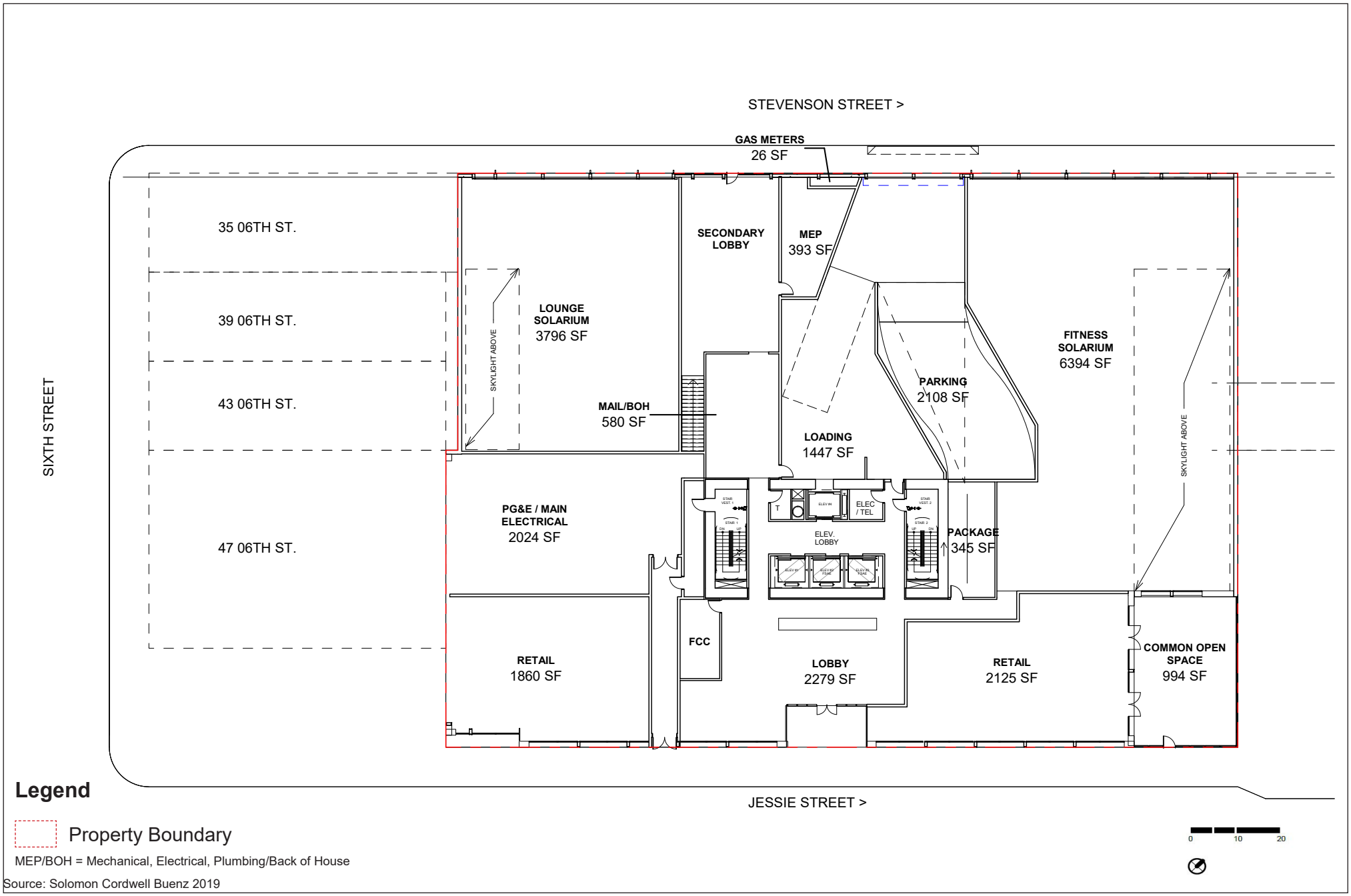
The proposed heating, ventilation, and air conditioning (HVAC) equipment would be located on the roof and concealed behind a 10-foot tall roof screen (Figure 8). The HVAC system is required to be designed to include a MERV-13 filtration system in accordance with Health Code article 38. The proposed project would include one emergency back-up generator within the building's main electrical room on the ground floor (Figure 3).

The proposed project would comply with the San Francisco Green Building Ordinance by meeting the Leadership in Energy and Environmental Design (LEED) Silver certification requirements and incorporating building materials, fixtures, and landscaping that promote energy efficiency and water conservation. The proposed project would also designate at least 8 percent of the total parking spaces for low-emitting, fuel efficient, and carpool/van pool vehicles.

2.5.4 Open Space, Landscaping, and Stormwater Retention

Open Space

The proposed project would provide approximately 11,000 square feet of common open space. Common open space areas would consist of a fitness solarium, approximately 6,000 square feet; a lounge solarium, approximately 4,000 square feet; and a courtyard area on the ground floor, approximately 1,000 square feet. In addition, the proposed project would include approximately 14,000 square feet of private open space. Private open space would consist of balconies for 22 dwelling units. The private balconies would be provided for units on the 2nd, 6th, and 27th floors.



Source: Solomon Cordwell Buenz 2019

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Figure 3: Ground Floor Plan

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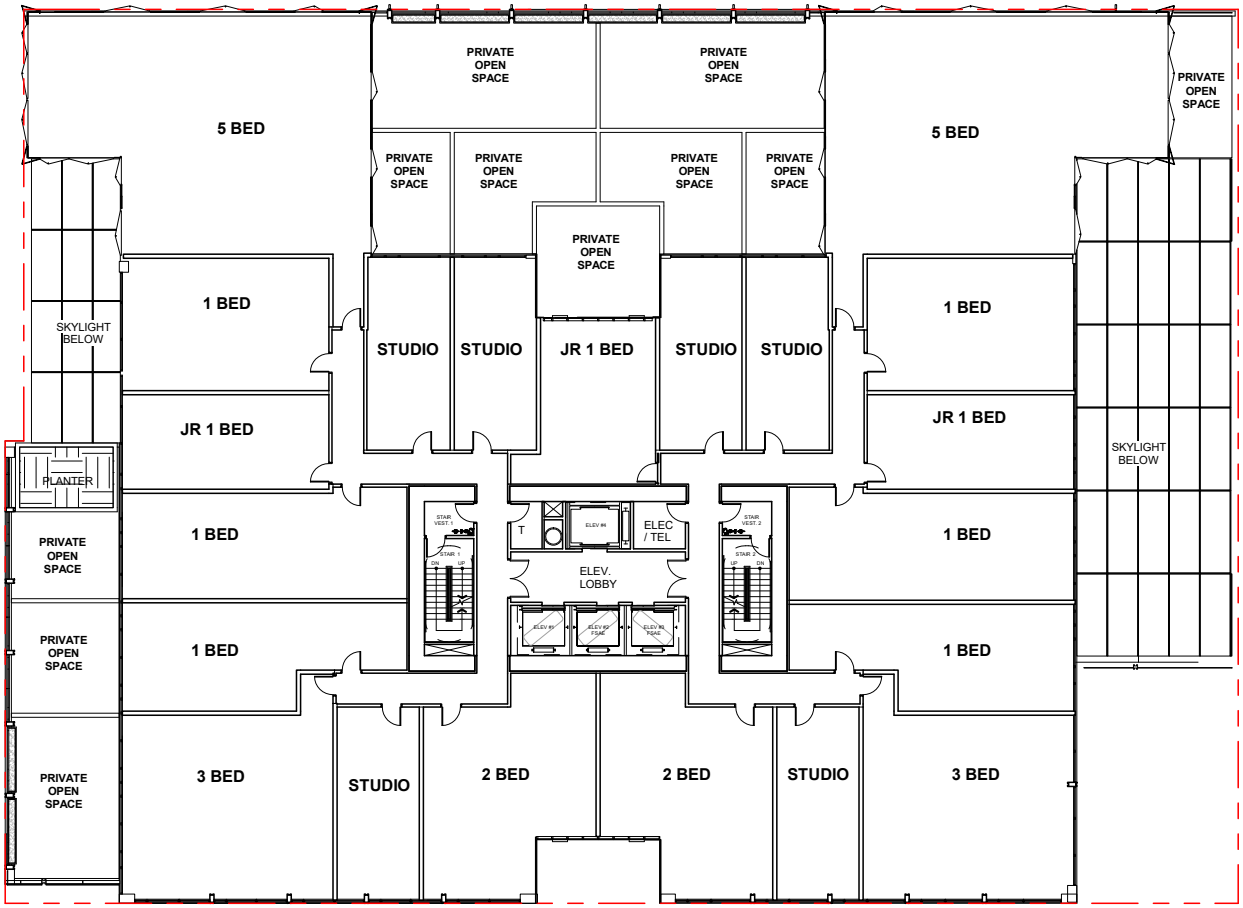

Legend

Property Boundary

Source: Solomon Cordwell Buenz 2019

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469 Stevenson Street Project

Case No. 2017-014833ENV

Figure 4: Level 2 Plan

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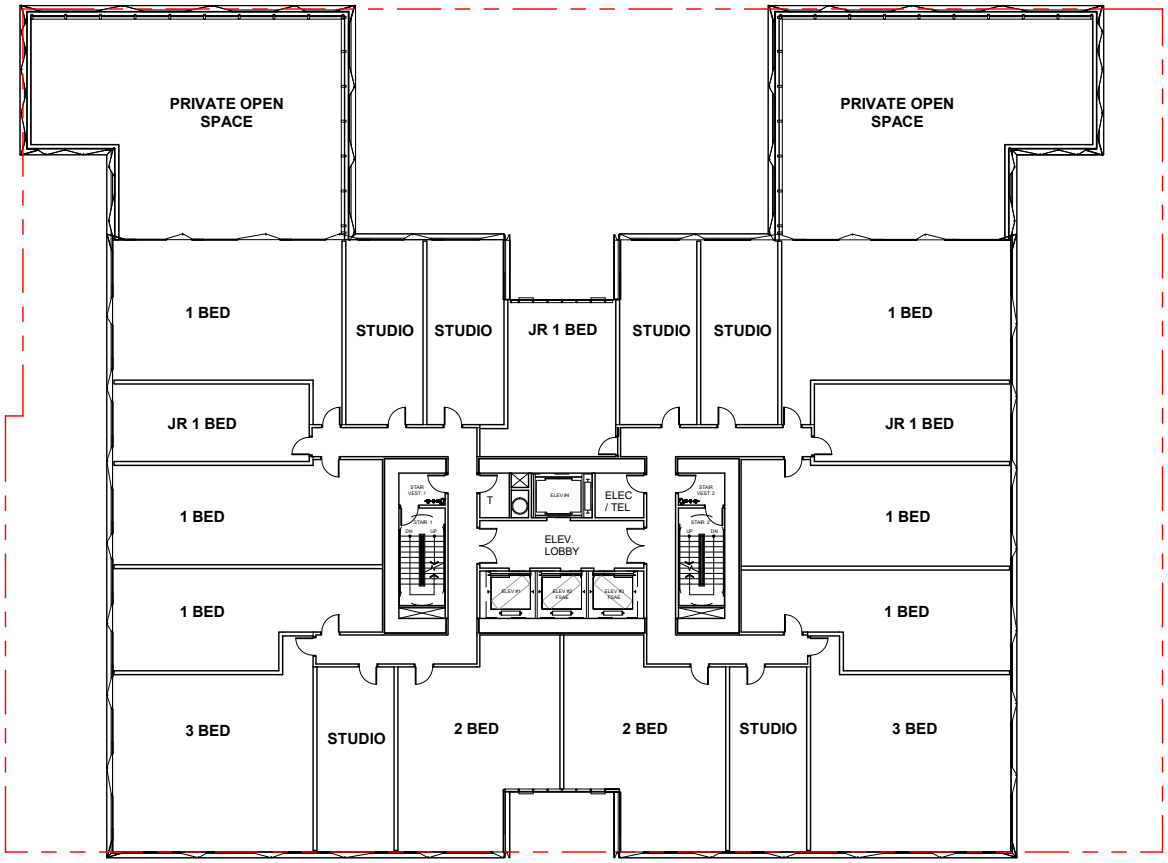

Legend

Property Boundary

Source: Solomon Cordwell Buenz 2019

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469 Stevenson Street Project

Case No. 2017-014833ENV

Figure 5: Level 6 Plan

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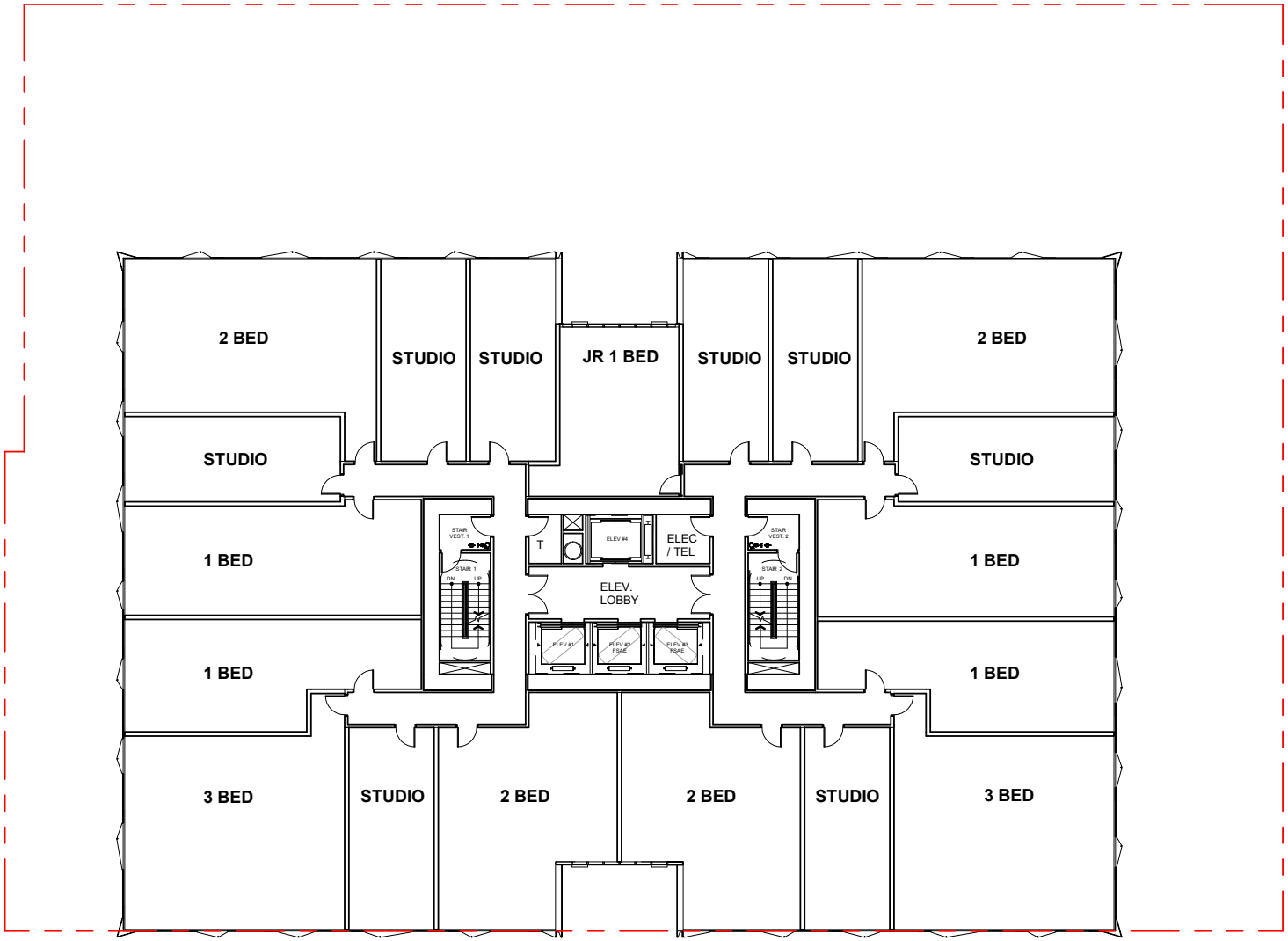

Legend

Property Boundary

Source: Solomon Cordwell Buenz 2019

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469 Stevenson Street Project

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Figure 6: Levels 7 through 26 Plan

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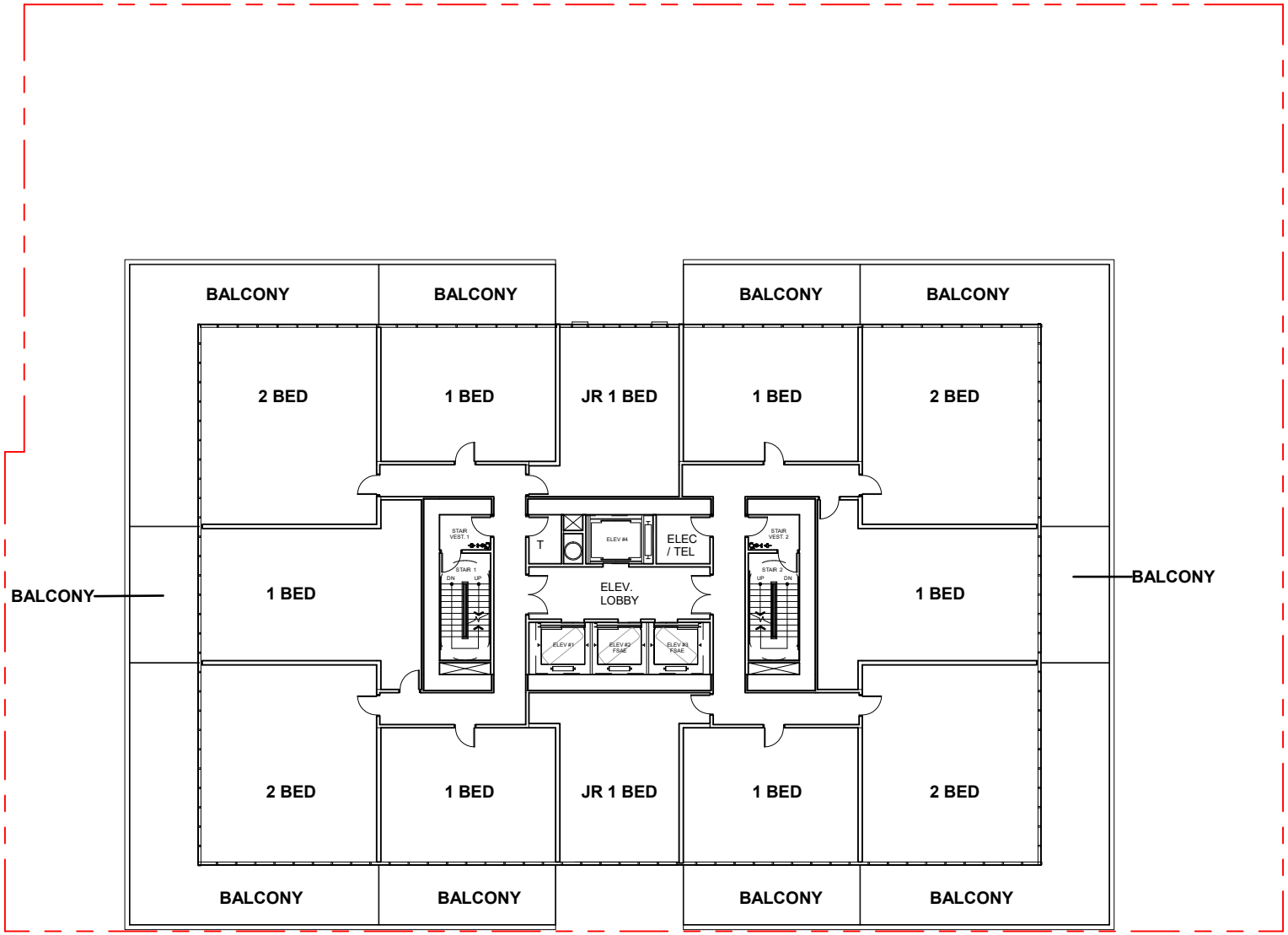

Legend

Property Boundary

Source: Solomon Cordwell Buenz 2019

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Figure 7: Level 27 Plan

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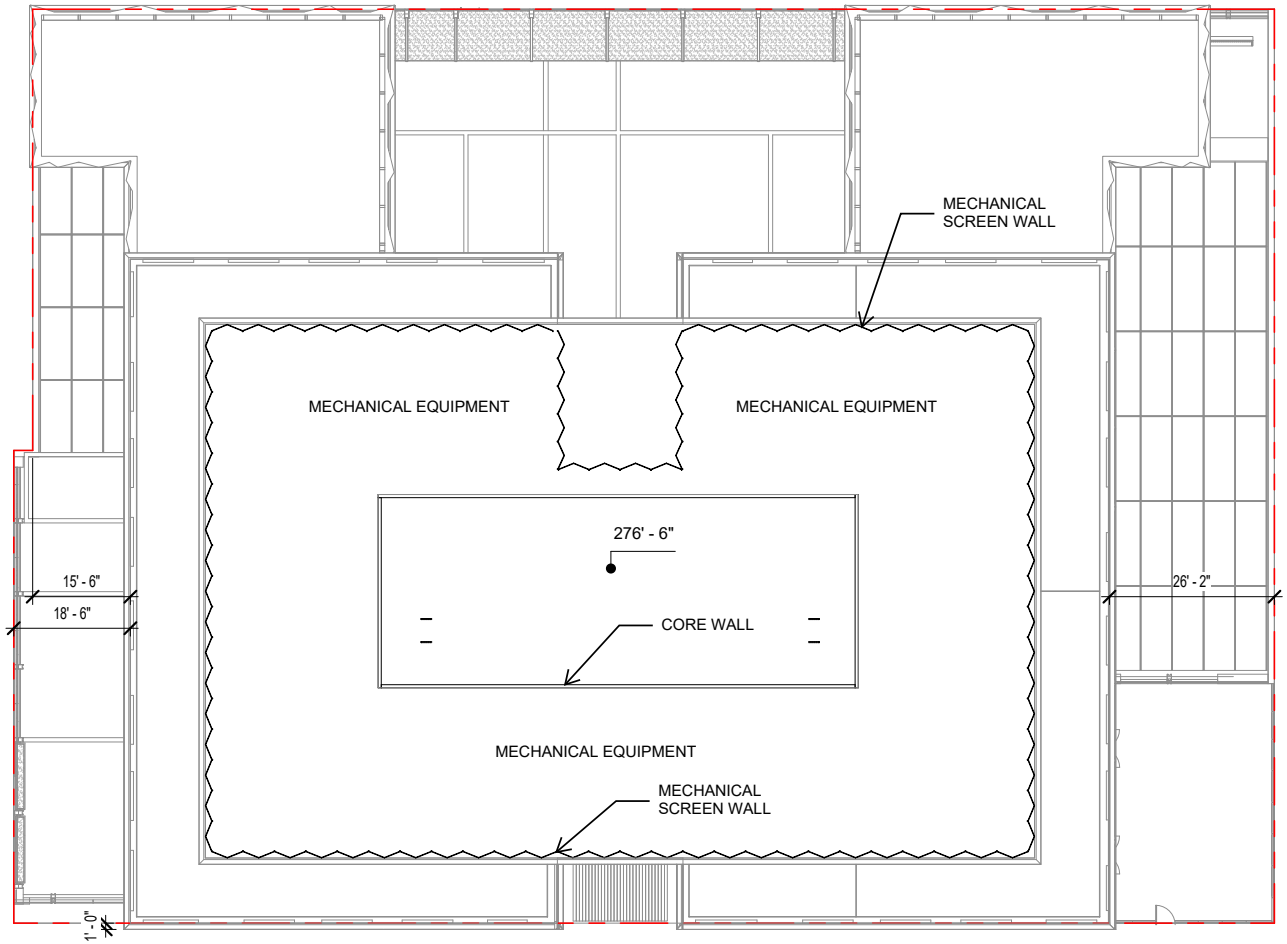

Legend

Property Boundary

Source: Solomon Cordwell Buenz 2019

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Figure 8: Roof Plan

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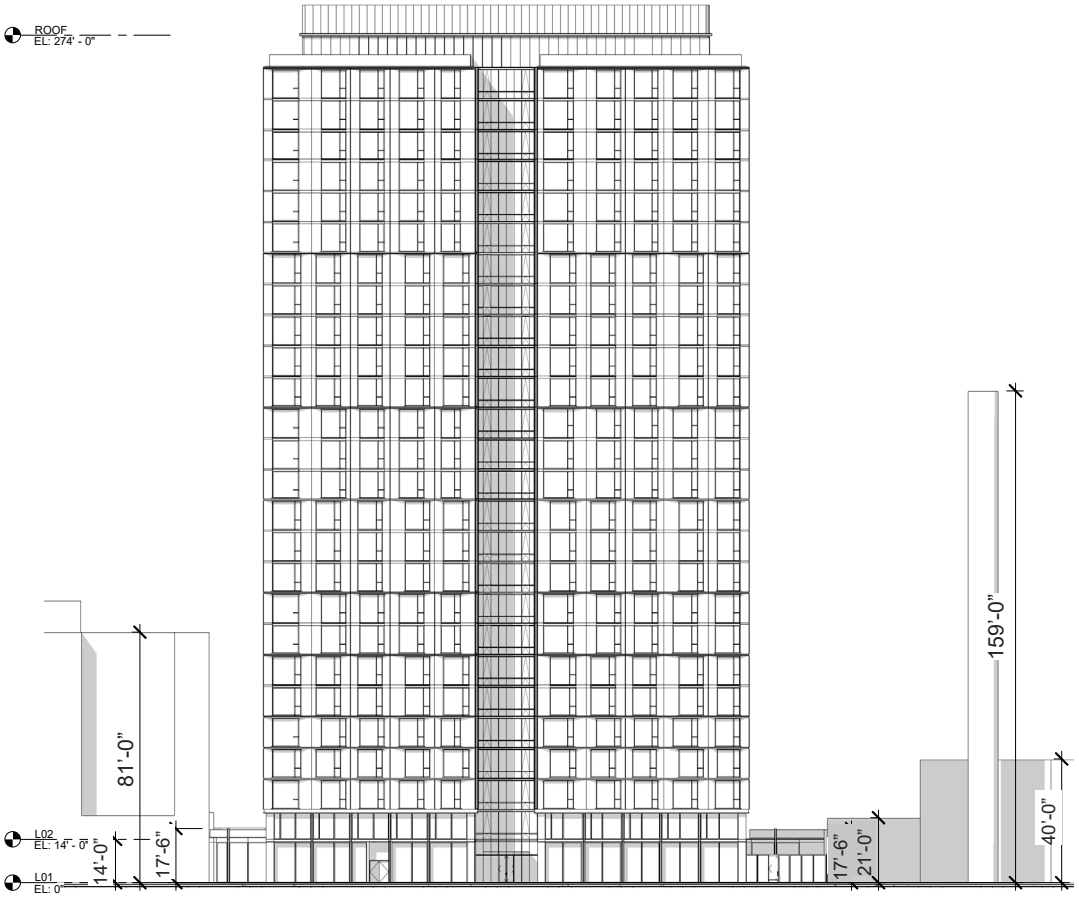
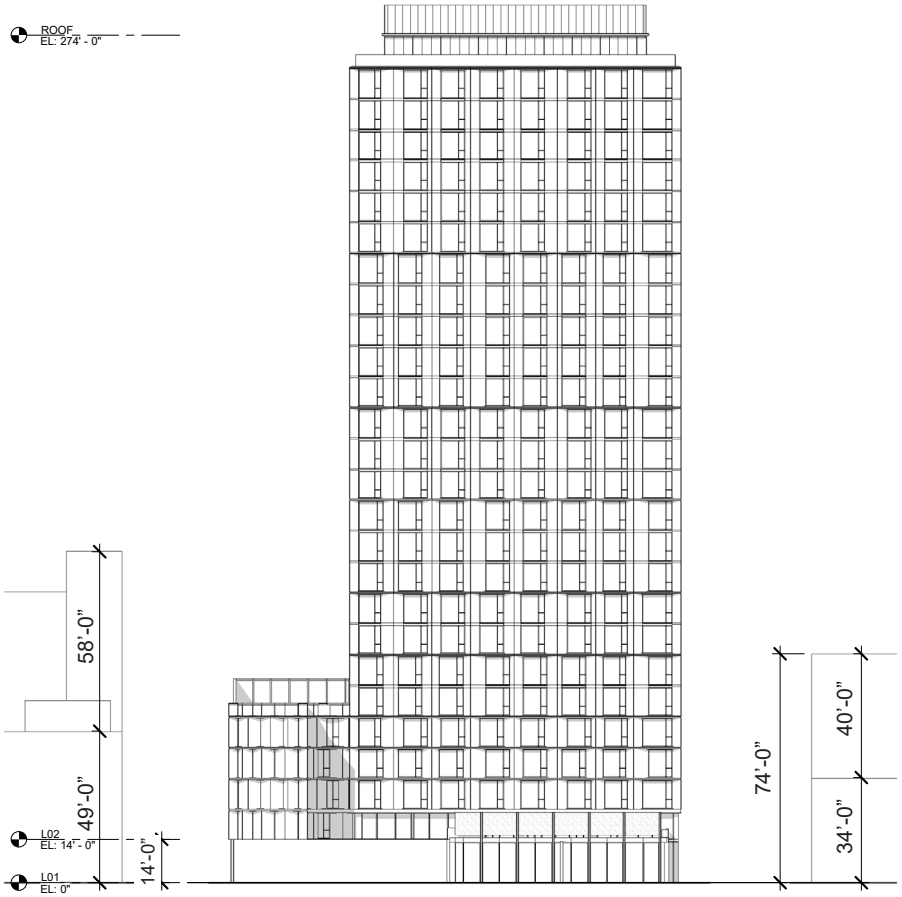


SOUTH ELEVATION - JESSE STREET



WEST ELEVATION

0 20 40

Source: Solomon Cordwell Buenz 2019

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Figure 9: South and West Elevations

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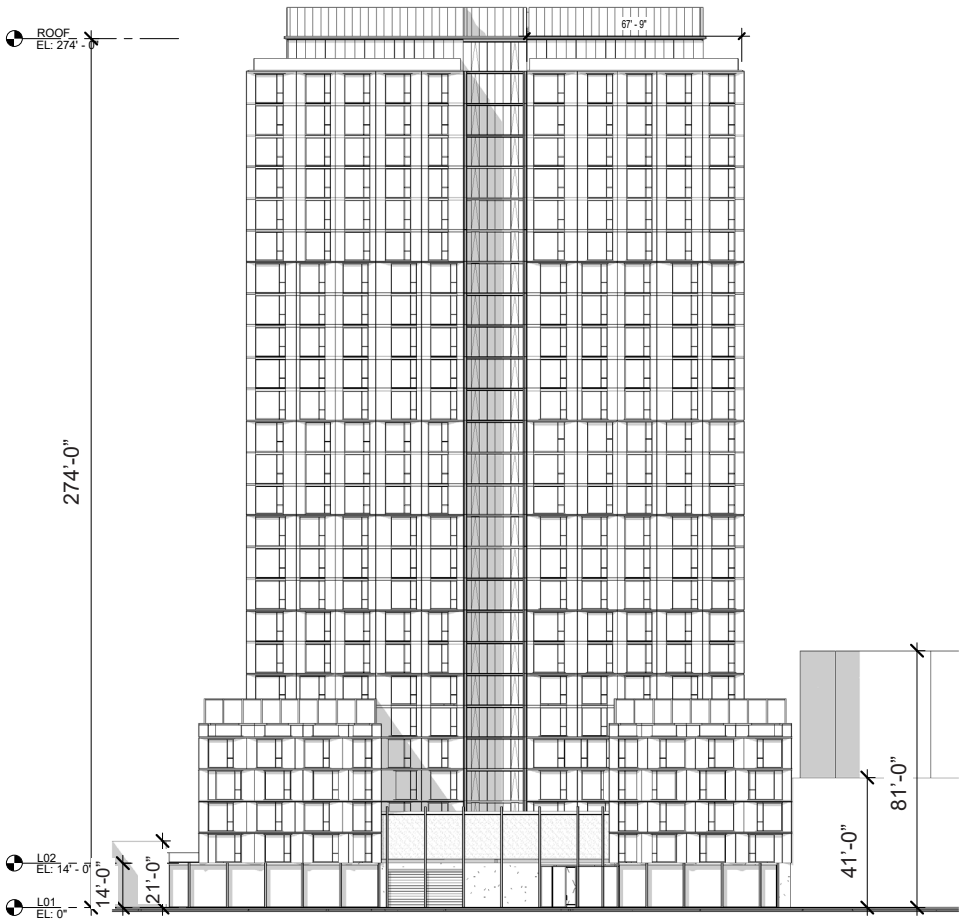
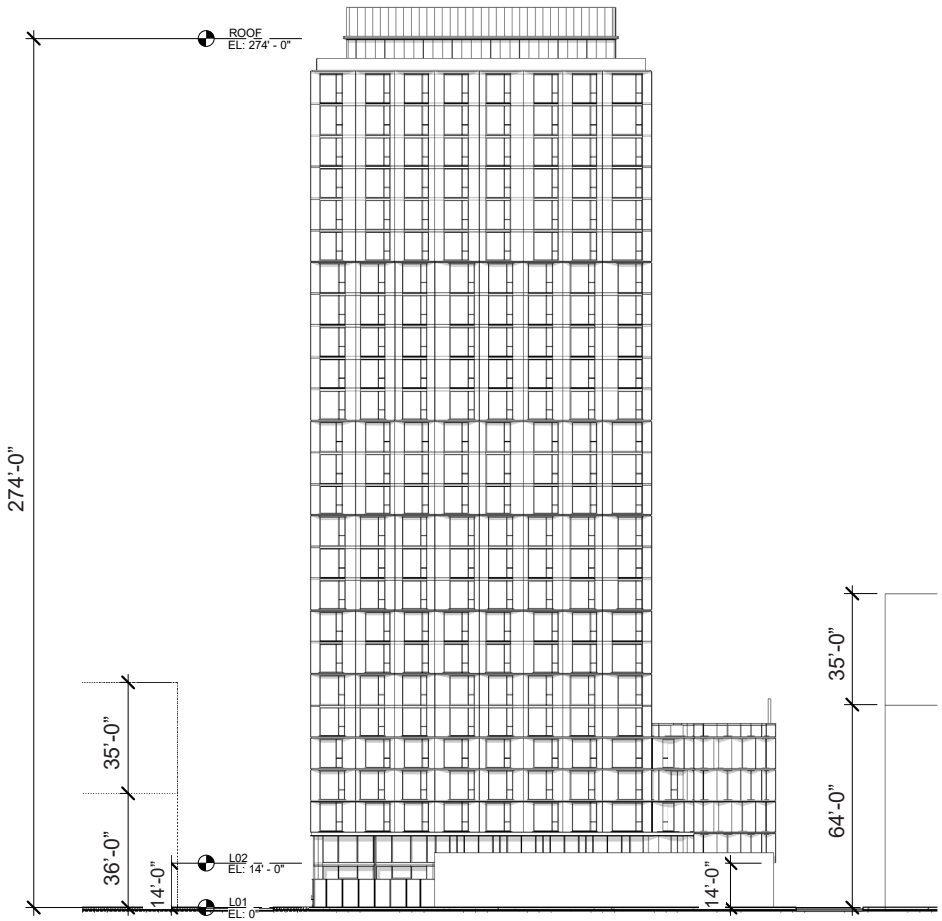


NORTH ELEVATION - STEVENSON STREET



EAST ELEVATION

0 20 40

Source: Solomon Cordwell Buenz 2019

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Figure 10: North and East Elevations

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Landscaping

Landscaping at the project site would include approximately eight street tree planting areas along Jessie Street. Due to the narrow sidewalks along Stevenson Street, street trees cannot be planted. Therefore, the proposed project would instead provide seven vegetated landscape strips along Stevenson Street. Trees would also be planted in the building's outdoor courtyard. Raised planters would be provided in the private balcony areas on the 2nd, 6th, and 27th floors. An 18-foot-tall "green screen" made from plants grown on a vertical trellis would be placed around the private balconies on the second floor. The landscape plans for the proposed project are provided on Figure 11 through Figure 14.

Stormwater Retention

Landscaped areas along Jessie Street and Stevenson Street would retain and treat runoff before entering the city's stormwater system. The proposed project would also incorporate the following low impact design measures to reduce the amount of stormwater entering into the city's combined sewer system: vegetated sidewalk planting areas, roof drains to direct runoff from flow-through-planters, permeable pavement, and a rainwater cistern.

Streetscape and Sidewalk Improvements

The proposed project would provide sidewalk improvements along Stevenson Street and Jessie Street in accordance with the city's Better Streets Plan. These sidewalk improvements would include enhanced sidewalk paving, tree planting areas along Jessie Street, landscaped strips along Stevenson Street, bicycle racks, and relocation of one existing streetlight along Jessie Street to Stevenson Street near the driveway entrance. The proposed project would not alter the existing sidewalk widths on Stevenson Street or Jessie Street. The proposed project would also not result in any new bus stops or changes to existing bus stops in the vicinity of the project site.

The proposed project would relocate the existing commercial loading zone (yellow curb) west of the project site and convert the existing street parking to (white curb) passenger loading. In addition, some of the existing street parking on Stevenson Street would be converted to passenger loading. The passenger loading zone on Stevenson Street is proposed near a pedestrian entrance for the project. The passenger and commercial loading zones are shown on Figure 11.

2.5.5 Parking, Loading, and Bicycle Facilities

Site Access and Circulation

The proposed project would remove the existing 24-foot-wide curb cut on Stevenson Street and 12-foot-wide curb cut on Jessie Street and replace them with a new, single 24-foot wide driveway on Stevenson Street. This driveway would provide vehicle access to the parking garage and the onsite commercial loading area for both the residential and commercial retail components of the proposed project.

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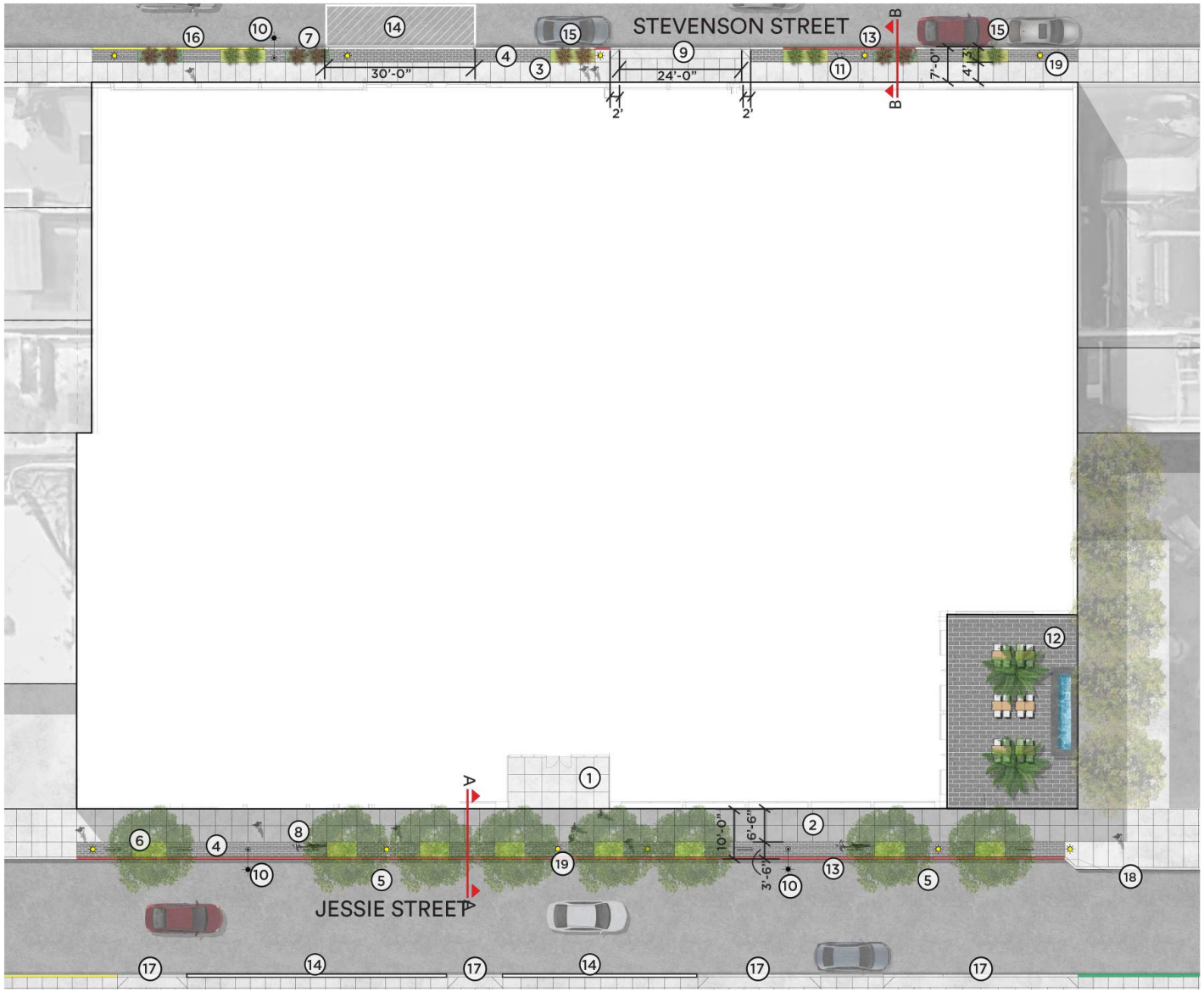

LEGEND

1. Entry Door to Lobby
2. 10'-0" wide Sidewalk
3. 7'-0" wide Sidewalk
4. Enhanced Paving
5. Street Tree
6. 3'-0" x 7'-0" Street Tree Planting Area
7. 2'-6" x 9'-0" Landscape Strip
8. Class 2 Bike Rack
9. 24' Wide Driveway w/ Wings
10. Existing Street Light
11. Fire Hydrant
12. Outdoor Courtyard
13. Red Curb
14. Passenger Loading Zone
15. Street Parking
16. Commercial Loading Zone
17. Existing Driveway
18. Existing Curb
19. Pedestrian Lighting Poles

0 10 20

Source: Solomon Cordwell Buenz 2019

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Figure 11: Ground Floor Landscape Plan

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LEGEND

1. Private Patio w/ Pedestal Pavers
2. 18'-0" high Green Screen
3. Skylight
4. Raised Planter
5. Movable Furniture
6. Planter pots

0 10 20

Source: Solomon Cordwell Buenz 2019

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Figure 12: Level 2 Landscape Plan

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LEGEND

1. Private Patio w/ Pedestal Pavers
2. 12'-0" high Glass Wind Screen
3. Raised Tree Planter
4. Raised Planter
5. Movable Furniture
6. Festival Lights

0 10 20

Source: Solomon Cordwell Buenz 2019

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Figure 13: Level 6 Landscape Plan

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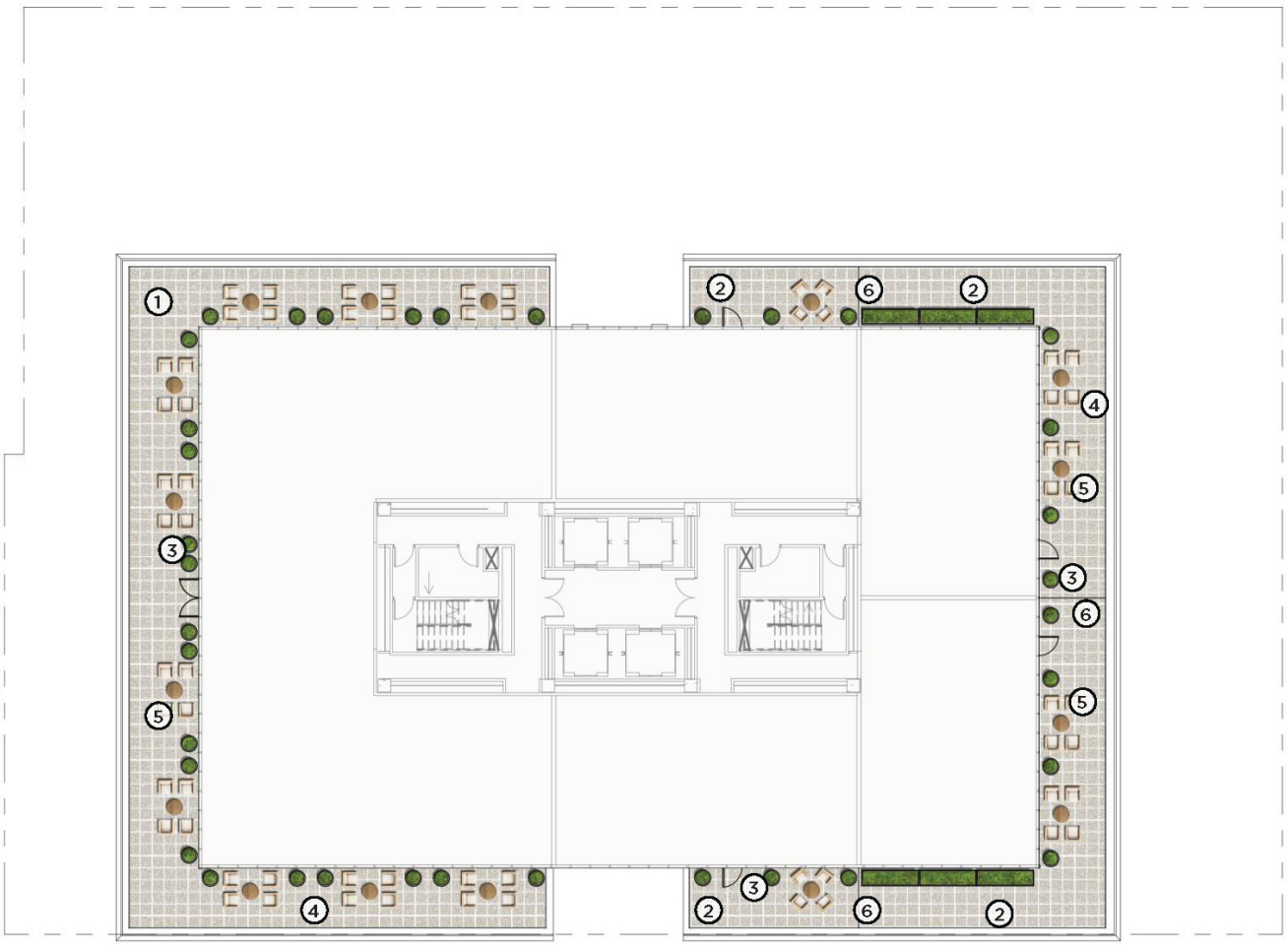

LEGEND

1. Common Open Space w/ Pedestal Pavers
2. Private Balcony w/ Pedestal Pavers
3. Planter Pots
4. Access for window washing at perimeter
5. Movable Furniture
6. Private Screens with Gates

0 10 20

Source: Solomon Cordwell Buenz 2019

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Figure 14: Level 27 Landscape Plan

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Stevenson Street and Jessie Street are each currently eastbound one-way roads and the proposed project would not result in a change of this designation. Vehicles would have to turn on Stevenson Street from Sixth Street and turn right to enter the garage. Vehicles exiting the garage would have to turn right onto Stevenson Street to reach Fifth Street. Each parking garage level would contain a central set of elevators and stairs to access the building's ground floor. The ground floor would contain a separate set of elevators and stairs to access the upper residential floors. Additionally, residents would be able to enter the building at the street level from the main lobby doorway on Jessie Street, or from the second lobby doorway on Stevenson Street.

Vehicle Parking

The proposed project would include approximately 56,000 square feet of off-street vehicular parking space, with a total of 178 parking spaces at a proposed parking ratio of 0.36 space per unit. Per sections 155(i) and 166 of the planning code, the proposed project would provide at least 9 accessible parking spaces and 3 car-share spaces. In addition, at least 8 percent of the total proposed parking spaces would be designated for low-emitting, fuel efficient, and carpool/van pool vehicles. The parking spaces would be reserved for residents only.

The off-street loading area for freight deliveries would be within the parking garage and accessed by the driveway on Stevenson Street. One freight loading space would be located on the ground floor and two service vehicle parking spaces would also be provided on the first parking level. The site plans for the ground-floor freight loading and three-level parking garage are depicted in Figure 3 and Figure 15 through Figure 17.

Bicycle Parking

The proposed project would provide 200 class 1 and 27 class 2 bicycle parking spaces. The class 1 bicycle parking spaces would be provided in a designated 3,400-square-foot room on the first parking garage level, which would be equipped with space efficient bicycle racks (Figure 15). The class 2 bicycle parking spaces would consist of bicycle racks installed along the sidewalk on Jessie Street.

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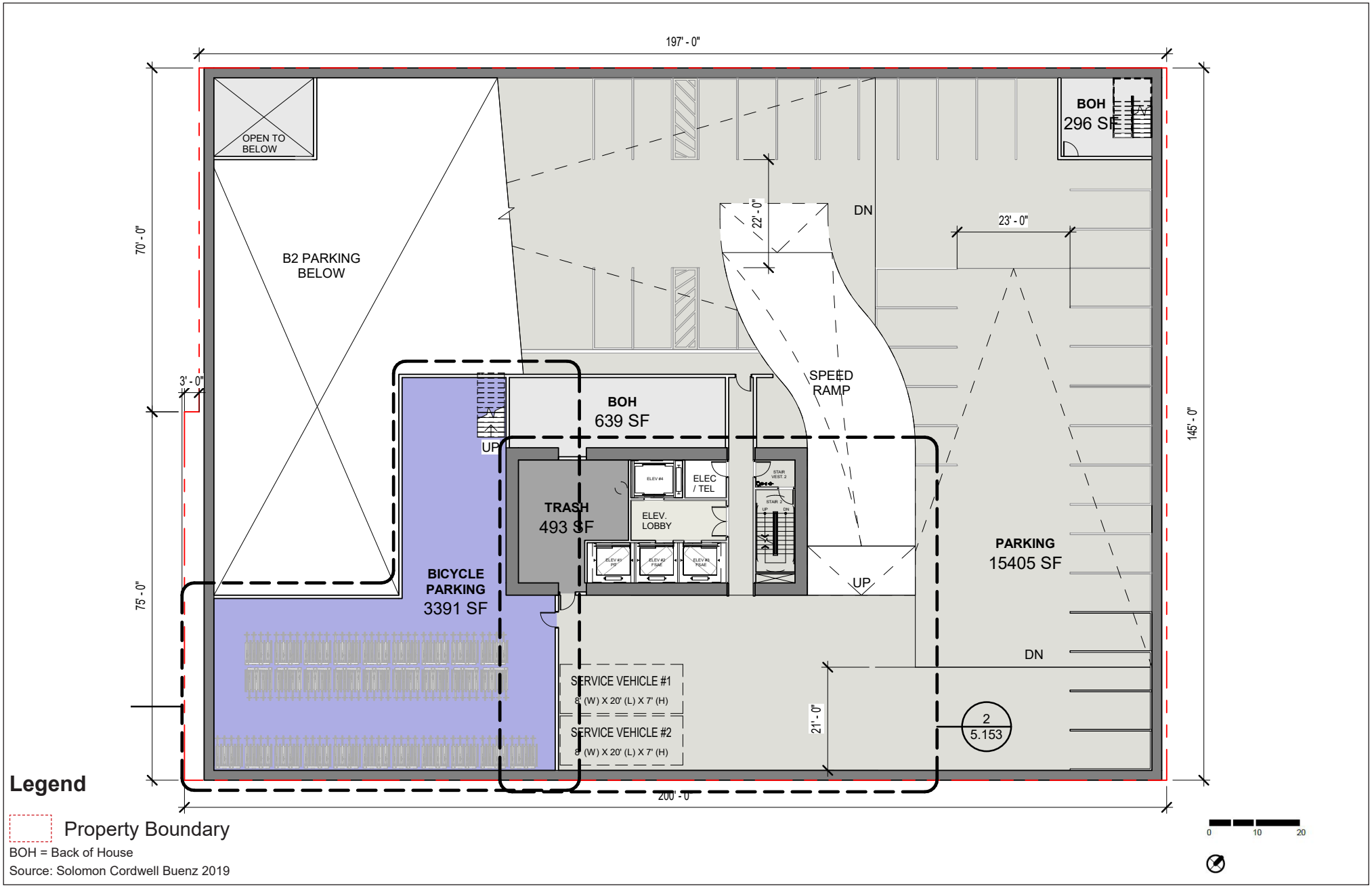

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Figure 15: Parking Garage Plan - Level 1

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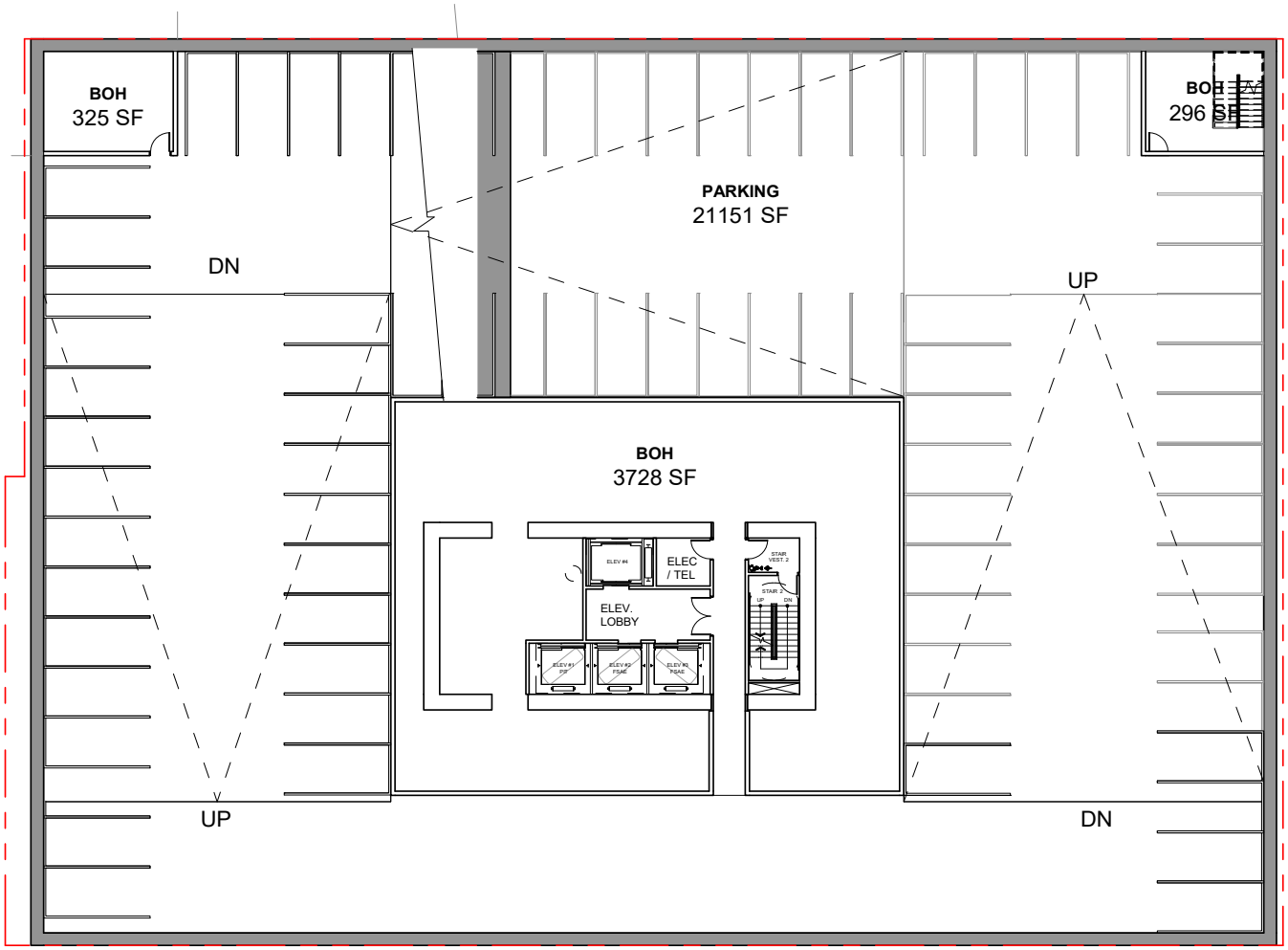

Legend

Property Boundary

BOH = Back of House

Source: Solomon Cordwell Buenz 2019

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469 Stevenson Street Project

Case No. 2017-014833ENV

Figure 16: Parking Garage Plan - Level 2

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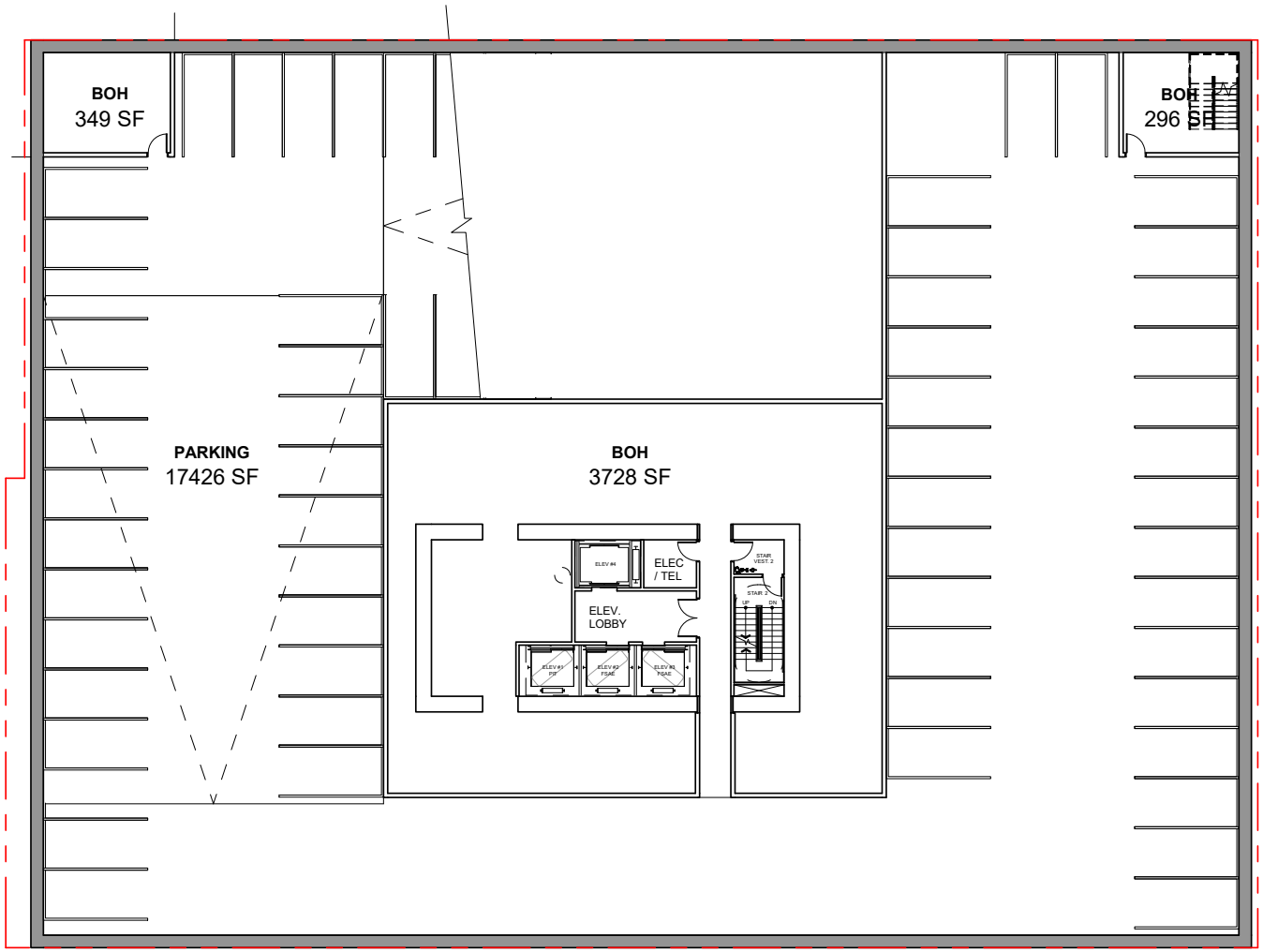

Legend

Property Boundary

BOH = Back of House

Source: Solomon Cordwell Buenz 2019

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469 Stevenson Street Project

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Figure 17: Parking Garage Plan - Level 3

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2.5.6 Transportation Demand Management Plan

The project sponsor proposes the following transportation demand management (TDM) measures for the proposed project. Additional TDM measures that are proposed are included in the project's TDM application.[20] The TDM measures are subject to review and approval as part of the planning department's approvals:

1. ACTIVE-1: Improve Walking Conditions (Option D): The project would provide streetscape improvement elements consistent with the Better Streets Plan.

2. ACTIVE-2: Bicycle Parking (Option A): The project would provide class 1 bicycle parking spaces as required by the planning code.

3. ACTIVE-4: Bike Share Membership (Location B). The project would offer one complimentary bike share membership to each dwelling unit and/or employee, at least once annually, for the life of the project.

4. ACTIVE-5A: Bicycle Repair Station: The project would provide an indoor bicycle repair station in the below grade parking level that is equipped with tools and supplies necessary to perform basic bicycle maintenance.

5. ACTIVE-5B: Bicycle Maintenance Services. The property owner shall offer bicycle maintenance services to each dwelling unit and/or employee, at least once annually, for 40 years.

6. ACTIVE-6: Fleet of Bicycles: The project would provide five shared bicycles for building residents, visitors, or employees to use.

7. CSHARE-1: Carshare (Option E): The project would provide one car-share membership for each dwelling unit and reserve three parking spaces for car-share services.

8. DELIVERY-1: Delivery Supportive Amenities: The project would facilitate delivery support amenities by providing an area for receipt of deliveries that offers one of the following: (1) clothes lockers for delivery services; (2) temporary storage for package deliveries, laundry deliveries, and other deliveries; or, (3) providing temporary refrigeration for grocery deliveries.

9. FAMILY-1: Family TDM – Amenities (Option A + B): The project would provide family amenities that include onsite storage for family gear, utility carts, and cargo bicycles.

10. FAMILY-3: Family TDM Package. The project would include CSHARE-1 Option E and FAMILY-1, Options A and B.

[20] San Francisco Planning Department, Transportation Demand Management Program Application, submitted August 29, 2018.

11. HOV-1: Contributions or Incentives for Sustainable Transportation (Option A). The project would offer contributions or incentives to each dwelling unit and employee, at least once annually, for the life of the project. The project would provide at least 25 percent (Muni M pass = $81/month. As such, $81 x 25% = $20.25/month/DU) contribution or incentive.

12. INFO-1: Multimodal Wayfinding Signage. The project would provide multimodal wayfinding signage that can withstand weather elements in key locations. That is, the signs shall be located externally and/or internally so that the residents, tenants, employees, and visitors are directed to transportation services and infrastructure, including: transit, bike share, car-share, bicycle parking and amenities, showers and lockers, taxi stands, and carpool/shuttle/vanpool pick-up/drop-off locations.

13. INFO-2: Real Time Transportation Information Displays. The project would provide real time transportation information on displays in prominent locations on the project site to highlight sustainable transportation options and support informed trip-making.

14. INFO-3: Tailored Transportation Marketing Services (Option C). The project would provide individualized, tailored marketing and communication campaigns, including incentives to encourage the use of sustainable transportation modes.

15. LU-2: Onsite Affordable Housing (Option B). The project would use the Individually Requested State Density Bonus Program and provide at least 11 percent of the base[21] project's residential units as very low affordable dwelling units onsite in order to qualify for a 35 percent increase in density. The project would provide 19 percent of the base project's residential units as very low affordable dwelling units onsite.

16. PKG-1: Unbundle Parking (Location E). The project would lease or sell all parking spaces separately from the rental for the life of the project, so that tenants have the option of renting or buying a parking space at an additional cost, and would, thus, experience a cost savings if they opt not to rent or purchase parking.

17. PKG-4: Parking Supply (Option A). The project would provide off-street private vehicular parking (Accessory Parking) in an amount no greater than the off-street parking rate for the neighborhood (neighborhood parking rate), based on the transportation analysis zone for the project site.

[21] In order to determine how much of a density bonus state law will allow, the density allowed by current controls ("base density" or "base project") must first be calculated. The base density is the maximum gross residential density allowed pursuant to the site's zoning requirements.[22] The initial study incorrectly stated that the construction schedule would start in 2020 and end in 2023; however, the analysis presented in the initial study relied on the correct construction schedule that would start in 2021 and end in 2024.

2.6 CONSTRUCTION ACTIVITIES AND SCHEDULE

The proposed project is anticipated to be constructed on a mat foundation and no pile driving or piers are proposed or required. To accommodate the below-grade parking and foundation, the proposed project would entail excavation to a maximum depth of 55 feet below ground surface (bgs). The entire 0.66-acre project site would be permanently disturbed and approximately 55,850 cubic yards of soil would be excavated and hauled offsite for disposal and recycling.

Construction of the proposed project is anticipated to begin in 2021 and be completed by 2024,[22] requiring approximately 36 months of construction. Construction activities would include site preparation/demolition, excavation and shoring, building construction, architectural coating, and sitework/paving. Construction would generally occur between the hours of 7:00 a.m. and 8:00 p.m. up to seven days a week. However, during the total 36-month construction phase, nighttime construction work may be required on up to five (5) nights and include the following activities:

1. Erection and dismantling of the tower crane;
2. Miscellaneous utility work;
3. Fire alarm testing; and
4. Concrete pour for the mat slab foundation.

This required nighttime work would occur at different times throughout the 36-month construction period and not for five (5) sequential nights. Depending on the construction phase, the number of onsite construction workers would range from approximately 15 to 75 workers per day.

Construction equipment and materials would be staged primarily onsite, although it is expected portions of the sidewalks along Stevenson Street and Jessie Street would be used for staging of materials, requiring temporary partial sidewalk closures. Additionally, both Stevenson Street and Jessie Street would require occasional closures to allow for project construction activities, such as installation of the tower crane, mat foundation construction, or material deliveries. During this time, both streets would not be entirely closed or closed at the same time. It is not expected that construction activities would block Jessie Street for more than one week at a time. Jessie Street could be used for temporary staging of the tower crane; however, that has not been determined. It is anticipated that construction activities would only block 100 feet of Jessie Street for the width of the sidewalk and one travel lane primarily for the tower crane erection and dismantling.

2.7 CHANGES TO THE PROPOSED PROJECT SINCE PUBLICATION OF THE NOP AND INITIAL STUDY

The planning department published a NOP and initial study on October 2, 2019, announcing its intent to prepare and distribute a focused EIR for the proposed project (Appendix A). Since publication of the NOP and initial study, the project sponsor has made changes to the project description. These changes

[22] The initial study incorrectly stated that the construction schedule would start in 2020 and end in 2023; however, the analysis presented in the initial study relied on the correct construction schedule that would start in 2021 and end in 2024.

are summarized in Table 2.7-1 and have been incorporated into the environmental impact analysis presented in Chapter 4, Environmental Setting and Impacts.

Table 2.7-1: Summary of Changes to the Proposed Project

Project Component	Previously Proposed Project (gsf)[1] (initial study)	Proposed Project (gsf)[1] (EIR)
Residential	460,500	475,000
Retail	4,000	4,000
Vehicle Parking	77,500	56,000
Building Total	542,000	535,000
Common Residential Open Space[2]	14,000	11,000
Private Residential Open Space[3]	11,000	14,000
Open Space Total	25,000	25,000
Dwelling Unit Type	**Number of Units**	**Number of Units**
Studio	--	192
Junior one-bedroom	--	33
One-bedroom	358	116
Two-bedroom	54	96
Three-bedroom	42	50
Five-bedroom	8	8
Total Dwelling Units	462	495
Parking Spaces	**Number of Spaces**	**Number of Spaces**
Residential Parking Spaces	171	178
Retail Parking Spaces	0	0
Total Parking Spaces	171	178
Bicycle Parking	**Number of Spaces**	**Number of Spaces**
Bicycle (class 1)	192	200
Bicycle (class 2)	25	27

Notes:

[1] All numbers are rounded to the nearest thousand or hundred thousand.

[2] Common residential open space consists of the lounge solarium, approximately 4,000 square feet; fitness solarium, approximately 6,000 square feet; and ground floor courtyard, approximately 1,000 square feet. Common usable open space as defined in section 135(a) of the planning code pertains to areas jointly used by residents of the project.

[3] Private balconies would be provided to 22 dwelling units, each on the 2nd, 6th, and 27th floors.

The proposed project would still be approximately 274 feet tall (with an additional 10 feet for rooftop mechanical equipment) and include three levels of below-grade parking. The proposed project would also continue to use the Individually Requested State Density Bonus Program and provide affordable

housing units onsite. The environmental impacts of these project description changes are addressed in Chapter 4; however, these changes would not result in any new significant environmental impacts or necessitate implementation of additional or considerably different mitigation measures than those identified in the initial study.

The initial study incorrectly stated on pages 54 and 108 that the construction schedule would start in 2020 and end in 2023, requiring approximately 36 months of construction. However, the analysis presented in the initial study relied on the correct construction schedule, which would start in 2021 and end in 2024 and require approximately 36 months of construction. The proposed construction activities would not change from what was evaluated in the initial study.

2.8 PROJECT APPROVALS

The following is a preliminary list of the anticipated approvals required for the proposed project; the list is subject to change. These approvals may be reviewed in conjunction with the required environmental review but may not be granted until after the required environmental review is completed.

2.8.1 Planning Commission

- Approval of an Individually Requested State Density Bonus project with up to two incentives/concessions and unlimited waivers from the following requirements: height, bulk, floor area ratio, and dwelling unit exposure.
- Adoption of findings and a statement of overriding considerations under the California Environmental Quality Act (CEQA)
- Approval of a Downtown Project Authorization (planning code section 309)
- Approval of Conditional Use Authorization (planning code section 124[f])
- Approval of a TDM Plan (planning code section 169)

2.8.2 Actions by Other City Departments

Department of Building Inspection

- Review and approval of demolition, grading, nighttime construction, and building permits

San Francisco Public Works

- If sidewalk(s) are used for construction staging and pedestrian walkways are constructed in the curb lane(s), approval of a street space permit from the Bureau of Street Use and Mapping
- Approval of an encroachment permit or a street improvement permit for streetscape improvements
- Approval of the placement of bicycle racks in the public right-of-way
- Approval of a new curb cut and removal of existing curb cuts
- Approval of a permit for nighttime construction

San Francisco Municipal Transportation Agency

- Approval of modifications to color curb designations for on-street parking and loading spaces
- Approval of a special traffic permit from the Sustainable Streets Division if sidewalk(s) are used for construction staging and pedestrian walkways are constructed in the curb lane(s)

San Francisco Public Utilities Commission

- Review and approval of stormwater design features, including a stormwater control plan, in accordance with city's 2016 Stormwater Management Requirements and Design Guidelines
- Review and approval of the project's landscape and irrigation plans per the Water Efficient Irrigation Ordinance and the San Francisco Public Utilities Commission (SFPUC) Rules and Regulations Regarding Water Service to Customers
- Review and approval of groundwater dewatering wells (if they are to be used during construction), per San Francisco Health Code article 12B (Soil Boring and Well Regulation Ordinance) (joint approval with the San Francisco Department of Public Health)

San Francisco Department of Public Health

- Review and approval of a site mitigation plan, in accordance with San Francisco Health Code article 22A (Maher Ordinance)
- Review and approval of a construction dust control plan, in accordance with San Francisco Health Code article 22B (Construction Dust Control Ordinance)
- Review and approval of groundwater dewatering wells (if they are to be used during construction) (joint approval with the SFPUC)
- Approval of an enhanced ventilation proposal in compliance with San Francisco Health Code article 38
- Approval to operate an alternative water source system under San Francisco Health Code article 12C

2.8.3 Actions by Other Government Agencies

- Approval of any necessary air quality permits for installation, operation, and testing (e.g., Authority to Construct/Permit to Operate) of individual air pollution sources, such as the proposed backup emergency diesel generator and any necessary boilers (Bay Area Air Quality Management District)

3.0 APPLICABLE PLANS

In accordance with CEQA Guidelines section 15125(d), this chapter provides a summary of relevant city and regional plans that are applicable to the proposed project, with a focus on the project's potential inconsistencies with those plans. Inconsistency with a plan does not necessarily result in a significant impact pursuant to CEQA. To result in an impact under CEQA, the inconsistency must be related to a direct or indirect physical impact on the environment and result in a significant, adverse impact. The potential physical impacts on the environment that may result from an inconsistency with a plan are discussed in Chapter 4, Environmental Setting and Impacts, or in the NOP and initial study prepared for this project (Appendix A).

Relevant city plans discussed in this chapter include the San Francisco General Plan and the San Francisco Planning Code, which includes the Accountable Planning Initiative. The chapter also discusses the regional plans that are applicable to the project, including the Bay Area Air Quality Management District's (air district) 2017 Bay Area Clean Air Plan, Plan Bay Area 2040, and the Regional Water Quality Control Board's San Francisco Bay Basin (Region 2) Water Quality Control Plan.

The determination of a project's consistency with an applicable local general plan, policy, or regional plan is ultimately made independent of the environmental review process by the project decision makers when they decide whether to approve or disapprove a project. The analysis in this chapter is intended to provide decision makers with a synopsis of relevant planning and policy considerations. The analysis presented is intended to supplement the decision makers' own understanding of the various and often competing policy considerations.

3.1 SAN FRANCISCO PLANS AND POLICIES

3.1.1 San Francisco General Plan

The San Francisco General Plan, as adopted by the planning commission and the board of supervisors, contains the comprehensive, long-term land use policy for San Francisco. The general plan serves as a guide to protect, preserve, and enhance the desirable quality and unique character of the city; improve the city as a place for living, commerce, and industry; coordinate the city's land use and circulation patterns for efficient functioning and the convenience and wellbeing of its residents, workers, and visitors; and coordinate the city's growth and development with adjoining jurisdictions. The general plan contains the following elements: housing, commerce and industry, recreation and open space, community facilities, transportation, community safety, environmental protection, urban design, air quality, and arts. In addition, the general plan includes a land use index that cross references the policies related to land use.

The general plan elements that are particularly relevant to planning considerations associated with this project include the urban design element and the air quality element, as the potentially significant environmental impacts analyzed in this draft EIR are air quality, wind, and shadow. The general plan also contains several area plans, which provide more specific policy direction for certain neighborhoods. Among these is the Downtown Area Plan, which encompasses the project site. The Downtown Area Plan contains objectives and policies that address retail space, housing, open space, and urban form.

As discussed below, the proposed project would not substantially conflict with any goals, policies, or objectives of the general plan, including those of the Downtown Area Plan. The compatibility of the proposed project with general plan goals, policies, and objectives that do not relate to physical environmental issues will be considered by decision makers when deciding whether to approve or disapprove the proposed project. Any potential conflicts identified as part of the project deliberation process would not alter the physical environmental effects of the proposed project.

Urban Design Element

The urban design element of the general plan focuses on the physical character and order of the city and is concerned both with development and preservation. Its goal is to protect public views of open space and water bodies, and to protect and enhance the aesthetic character of San Francisco. The urban design element includes a map titled "Street Areas Important to Urban Design and Views" which identifies particular street segments throughout the city possessing street views of important buildings, streets that define the city form, or streets that extend the effect of public open space. The map identifies Market Street as having "Street View of Important Building" and as one of the "Streets that Define the City Form." The project site and Market Street are visually disconnected by existing buildings. As such, the proposed project would not be inconsistent with policies addressing street views from Market Street.

The proposed project is an infill development on an existing surface parking lot. The proposed project would construct a new mixed-use building that is 274-feet tall (with an additional 10 feet for rooftop mechanical equipment). The urban design element includes policy 3.1,[23] policy 3.5,[24] and policy 3.6[25] which encourages new development to consider its scale in relation to the existing height and bulk of structures in the area. The proposed project would exceed the existing 160-foot height limit as set forth in the planning code and height maps and would be taller than surrounding structures. However, the proposed project is requesting a 35 percent increase in density and waivers from height and bulk would be part of the planning approvals. The proposed project may be potentially inconsistent with policy 3.5 in that the proposed building would be about 88 feet taller than the tallest of the immediately surrounding buildings. However, the proposed heights would be allowed with application of the Individually Requested State Density Bonus Program.

The proposed project would be potentially inconsistent with policy 3.4, which encourages building forms to respect and improve the integrity of open spaces and other public areas. The associated physical environmental impacts that could result from this potential inconsistency are discussed in Section 4.4, Shadow, in this EIR.

[23] Policy 3.1: Promote harmony in the visual relationships and transitions between new and older buildings.

[24] Policy 3.5: Relate the height of buildings to important attributes of the city pattern and to the height and character of existing development.

[25] Policy 3.6: Relate the bulk of buildings to the prevailing scale of development to avoid an overwhelming or dominating appearance in new construction.

Air Quality Element

The general plan includes the 1997 air quality element, which focuses on adherence to regulatory air quality standards and the reduction of air pollution. Objectives applicable to the proposed project are provided in Section 4.2, Air Quality, of this EIR. Implementation of the proposed project would not conflict with the Air Quality Element. Refer to Section 4.2, Air Quality, for a more detailed discussion of the proposed project's air quality impact.

3.1.2 Downtown Area Plan

The General Plan also includes area plans that outline the goals and objectives for specific geographic planning areas. The project site is within the SoMa neighborhood, an area governed by San Francisco's Downtown Plan. The Downtown Plan is intended to maintain a compact downtown core and direct growth to areas with developable space and easy transit accessibility so that downtown encompasses a compact mix of activities, historical values, and distinctive architecture and urban forms that engender a special excitement reflective of a world city. Centered on Market Street, the Downtown Plan covers an area that is roughly bounded by Van Ness Avenue to the west, Steuart Street to the east, Folsom Street to the south, and Market Street, Sutter Street and Washington Street to the north.

The Downtown Area Plan contains objectives and policies that address the following issues: provision of space for commerce, housing, and open space; preservation of the past; urban form; and movement to, from, and within the downtown area. The proposed project is potentially inconsistent with policy 14.1, which promotes building forms that will maximize the sun access to open spaces and other public areas. Additionally, the proposed project could potentially conflict with policy 14.2, which promotes building forms that will minimize the creation of surface winds near the base of buildings. The associated physical environmental impacts that could result from these inconsistencies are discussed in Section 4.3, Wind, and Section 4.4, Shadow, in this EIR.

3.1.3 Accountable Planning Initiative

In November 1986, San Francisco voters approved Proposition M, the Accountable Planning Initiative, which added section 101.1 to the planning code to establish eight priority policies. The priority policies are also incorporated into the preamble to the general plan, which provides that the priority policies "shall be the basis upon which inconsistencies in the general plan are resolved." The priority policies are related to: (1) preservation and enhancement of neighborhood-serving retail uses and future opportunities for resident employment in and ownership of such businesses; (2) conservation and protection of existing housing and neighborhood character to preserve the cultural and economic diversity of neighborhoods; (3) preservation and enhancement of affordable housing (Appendix A, Initial Study; Section E.2, Population and Housing, Question 2b); (4) discouragement of commuter automobiles that impede Muni transit service or that overburden streets or neighborhood parking (Appendix A, Initial Study; Section E.5, Transportation and Circulation, Question 5a); (5) protection of industrial and service land uses from commercial office development and enhancement of resident employment and business ownership; (6) maximization of earthquake preparedness (Appendix A, Initial Study; Section E.15, Geology and Soils, Questions 15a through 15d); (7) preservation of landmarks and historic buildings (Appendix A, Initial Study; Section E.3, Cultural Resources, Question 3a); and (8) protection of parks and open space and their access to sunlight and vistas (Appendix A, Initial Study; Section E.11, Recreation, Question 11a; and Section 4.4, Shadow).

Prior to issuing a permit for any project that requires an initial study under CEQA; prior to issuing a permit for any demolition, conversion, or change of use; and prior to taking any action that requires a finding of consistency with the San Francisco General Plan, the city is required to find that the proposed project or legislation is consistent with the priority policies. As noted above, the determination of a project's consistency with the general plan is ultimately made independent of the environmental review process by the project decision makers when they decide whether to approve or disapprove a project. The environmental analysis of the proposed project as discussed in the topical sections of Chapter 4, Environmental Setting and Impacts, and in the initial study in Appendix A of this EIR may aid decision makers in their determination of the project's consistency related to the general plan and priority policies.

3.1.4 Planning Code

The planning code incorporates by reference the city's zoning maps and governs allowable uses, densities, and the configuration of buildings in San Francisco. Permits to construct new buildings (or to alter or demolish existing ones) may not be issued unless either the proposed action conforms to the planning code or an exception is granted pursuant to provisions of the planning code. The following section describes the project's consistency with its applicable land use districts, and the bulk, height, and other regulations assigned to the project site.

Allowable Uses and Density

The proposed project would be constructed in the C-3-G zoning district. Pursuant to section 210.2 of the planning code, the C-3-G District "is composed of a variety of uses: retail, offices, hotels, entertainment, clubs and institutions, and high-density residential. Many of these uses have a citywide or regional function, although the intensity of development is lower here than in the downtown core area." The project site is also within the SoMa neighborhood, a rapidly changing neighborhood as its old industrial areas have been redeveloped into new residential uses, convention centers, and office parks.

The proposed project's commercial and residential uses are permitted uses in the C-3-G zoning district. The proposed project includes a request for additional exceptions to permit construction such as waivers from height, bulk, and other physical constraints of the planning code, as allowed under the Individually Requested State Density Bonus Program. These exceptions, including the applicable planning code sections, are described in detail in Section 2.7, Project Approvals.

Affordable Housing

The project proposes to use the Individually Requested State Density Bonus Program and must provide at least 11 percent of the base[26] project's residential units as very low affordable dwelling units onsite in order to qualify for a 35 percent increase in density. The project proposes to provide 19 percent of

[26] In order to determine how much of a density bonus state law will allow, the density allowed by current controls ("base density" or "base project") must first be calculated. The base density is the maximum gross residential density allowed pursuant to the site's zoning requirements.

the base project's residential units as very low affordable dwelling units onsite. Therefore, the proposed project would comply with the city's Residential Inclusionary Affordable Housing Program requirements (planning code sections 415, et seq.), by including the applicable required number of units per current legislation.

Height and Bulk

The project site is within the 160-F Height and Bulk District. This height and bulk district allow for buildings up to 160 feet in height. For buildings over 80 feet in height, all portions of structures above the podium height are subject to the bulk restrictions in section 270(a) of the planning code. The proposed project is requesting a 35 percent increase in density and waivers from height and bulk, in exchange for providing affordable dwelling units. As a result, a waiver requesting exceedance of the maximum height and bulk limits would be included in the motions as part of the project's approval. The environmental effects of the project's proposed height and bulk are evaluated in the topical sections of Chapter 4, Environmental Setting and Impacts, and in the initial study (Appendix A).

Floor Area Ratio

Floor area ratio (FAR) is a measure of building intensity based on the ratio between the total floor area to be built on a site and the size of that site. In the C-3-G District, a base 6:1 FAR is allowed under planning code section 124, with a FAR of up to 9:1 with the purchase of transfer development rights (TDR). The proposed project would have a FAR of approximately 19:1. The project sponsor is requesting a waiver from the FAR limits under the Individually Requested State Density Bonus Program.

Other Planning Code Requirements

Setbacks and Open Space Requirements

The proposed project would not provide setbacks as required by planning code sections 132.1 and 134. The proposed project is requesting a waiver from the rear yard requirements in planning code section 134(g) under the Individually Requested State Density Bonus Program.

The proposed project would provide 14,000 square feet of private open space and11,000 square feet of common usable open space. Private open space would consist of private balcony spaces for 22 dwelling units. The private balconies would be provided on the 2nd, 6th, and 27th floors. The common usable open space would consist of the ground floor courtyard and solariums.

Rooftop Screening

Planning Code section 141 specifies that mechanical equipment and appurtenances must not be visible from any point at or below the roof level of the subject building. The proposed project's HVAC equipment would be located on the roof and concealed behind a 10-foot tall roof screen.

Ground-Level Wind Reduction

Pursuant section 148 of the planning code, buildings in the C-3 zoning districts are to be shaped or to incorporate other wind-baffling measures so that they will not cause ground-level wind currents to

exceed more than 10 percent of the time year round, between 7:00 a.m. and 6:00 p.m., the comfort level of 11 miles per hour (mph) equivalent wind speed in areas of substantial pedestrian use and 7 mph equivalent wind speed in public seating areas.

When preexisting ambient wind speeds exceed the comfort level, or when a proposed building or addition may cause ambient wind speeds to exceed the comfort level, the building is to be designed to reduce the ambient wind speeds to meet the requirements. The proposed project would incorporate a 12-foot tall glass wind screen along the full perimeter of the private open space areas on the second and sixth levels to further reduce wind speeds and enhance pedestrian safety and comfort. In addition, per section 148, "no exception shall be granted, and no building or addition shall be permitted that causes equivalent wind speeds to reach or exceed the hazard level of 26 miles per hour for a single hour of the year." A wind analysis has been prepared for the proposed project and its results are further discussed in Section 4.3, Wind, in this EIR.

Shadow Reduction

According to section 147 of the planning code, new buildings and additions to existing buildings in the C-3, South of Market Mixed Use, and Eastern Neighborhoods Mixed Use Districts where the building height exceeds 50 feet shall be shaped, consistent with the dictates of good design and without unduly restricting the development potential of the site in question, to reduce substantial shadow impacts on public plazas and other publicly accessible spaces other than those protected under section 295.

In determining the impact of shadows, the following factors shall be taken into account: the amount of area shadowed, the duration of the shadow, and the importance of sunlight to the type of open space being shadowed. Determinations under section 147 with respect to C-3 Districts, the zoning district in which the project site is located, shall be made in accordance with the provisions of section 309 of the planning code. A shadow analysis has been prepared for the proposed project and its results are further discussed in Section 4.4, Shadow, in this EIR.

Street Trees

The project site currently does not contain any trees or landscaping and no street trees are present along the project site's frontages. Planning code section 138.1(c)(1) requires that the project sponsor plant and maintain street trees as set forth in Article 16, sections 805(a) and (d) and 806(d) of the public works code. The proposed project would comply with section 138.1(c)(1) by providing approximately eight street trees along Jessie Street and seven vegetated landscape strips along Stevenson Street.

Parking and Loading Requirements

According to section 151.1 of the planning code, there is no minimum requirement for off-street vehicular parking in the C-3-G district. Maximum off-street parking is limited to 1 parking space for two dwelling units (a ratio of 0.5 parking spaces per unit). The proposed project would include a total of 178 parking spaces at a proposed parking ratio of 0.36 space per unit. At least nine of these parking spaces would be Americans with Disabilities Act (ADA)-compliant and three would be car-share spaces.

The proposed project would provide one loading space on the ground floor for freight deliveries, adjacent to the parking garage ramp on Stevenson Street. Two service vehicle parking spaces would also be provided on the first parking garage level.

For new residential buildings containing more than 100 dwelling units, planning code section 155.2 requires one secure (class 1) bicycle parking space for each unit for the first 100 units and one secure space for each four units above that, along with one class 2 space for each 20 units. In addition, the proposed project would include 4,000 square feet of commercial retail space, which requires one class 1 bicycle parking space for every 7,500 square feet of occupied floor area and a minimum of two class 2 bicycle parking spaces. As such, the proposed project would be required to provide 200 class 1 bicycle parking spaces and 27 class 2 bicycle parking spaces.

The proposed project would be consistent with the planning code requirements and provide 200 class 1 bicycle parking spaces on the first level of the parking garage, and 27 class 2 bicycle parking spaces along the sidewalk on Jessie Street.

Transportation Demand Management Plan

The San Francisco Planning Code requires certain new development projects to incorporate design features, incentives, and tools that reduce vehicle miles traveled (VMT) (section 169). Development projects must choose measures from a menu of options to develop an overall TDM plan. Some options in the menu overlap with requirements elsewhere in the planning code (e.g., bicycle parking, car-share parking). Each development project's TDM plan requires routine monitoring and reporting to the planning department to demonstrate compliance.

The project has submitted a TDM plan application[27] that complies with the city requirement by encouraging a reduction in the number of person trips by automobile through key design features that promote walking as well as transit and bicycle use in general. Section 2.5.6 in Chapter 2, Project Description, lists the proposed project's TDM measures.

3.2 REGIONAL PLANS AND POLICIES

3.2.1 2017 Bay Area Clean Air Plan

The air district adopted the 2017 Bay Area Clean Air Plan: Spare the Air, Cool the Climate, A Blueprint for Clean Air and Climate Protection in the Bay Area, on April 19, 2017, to provide a regional strategy for improving Bay Area air quality and meeting public health goals. The control strategy described in the 2017 Bay Area Clean Air Plan includes a wide range of control measures to reduce emissions and lower ambient concentrations of harmful pollutants, safeguard public health by reducing exposure to air pollutants that pose the greatest health risk, and reducing GHG emissions to protect the climate. The 2017 Bay Area Clean Air Plan addresses four categories of pollutants: ground-level ozone and its key precursors, reactive organic gases (ROG) and oxides of nitrogen; particulate matter, primarily particulate matter 2.5 microns in diameter or less ($PM_{2.5}$) and precursors to secondary $PM_{2.5}$; air toxics; and GHGs. The control measures are categorized according to an economic sector framework that

[27] San Francisco Planning Department, Transportation Demand Management Program Application, submitted August 29, 2018.

includes stationary sources as well as sectors related to transportation, energy, buildings, agriculture, natural and working lands, waste management, and water. Refer to Section 4.2, Air Quality, for a discussion of the proposed project's compliance with the 2017 Bay Area Clean Air Plan.

3.2.2 Plan Bay Area 2040

Plan Bay Area 2040 is a state-mandated, integrated long-range transportation and land use plan. As required by Senate Bill 375, all metropolitan regions in California must complete a sustainable communities strategy or alternative planning strategy as part of a regional transportation plan. This strategy integrates transportation, land use, and housing to meet GHG reduction targets set by the California Air Resources Board (air board). Plan Bay Area 2040 meets those requirements. In addition, the plan sets a roadmap for future transportation investments and identifies what it would take to accommodate expected growth. The plan neither funds specific transportation projects nor changes local land use policies.

In the Bay Area, the Metropolitan Transportation Commission (MTC) and ABAG adopted the latest plan in 2017. MTC and ABAG forecast that the Bay Area will see increases in population as well as the number of jobs and households between 2010 and 2040. The population is estimated to increase from 7.2 million to 9.6 million, the number of jobs is forecast to increase from 3.4 million to 4.7 million, and the number of households is expected to increase from 2.6 million to 3.4 million. To meet the GHG reduction targets, the plan identified priority development areas (PDAs), areas within existing communities that local city or county governments have identified and approved for future growth. These areas are typically accessible by transit and located near established job centers, shopping districts, and other services. The proposed project would be consistent with the goals of Plan Bay Area 2040 by creating housing within the Downtown/Van Ness/Geary PDA, an existing neighborhood and near transit.

3.2.3 Water Quality Control Plan for the San Francisco Bay Basin

The San Francisco Bay Basin (Region 2) Water Quality Control Plan guides planning within the San Francisco Bay Basin. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes implementation programs to achieve water quality objectives. As described in Section E.16, Hydrology and Water Quality, in the initial study (Appendix A), the proposed project would not result in significant water quality effects; therefore, the proposed project would not be inconsistent with the basin plan.

4.0 ENVIRONMENTAL SETTING AND IMPACTS

4.1 INTRODUCTION

4.1.1 Overview

This chapter provides an analysis of the physical environmental impacts of implementing the proposed project, as described in Chapter 2, Project Description. It describes the environmental setting, assesses impacts (offsite, onsite, construction-related, operational, direct, and indirect) and cumulative impacts, and identifies mitigation measures to reduce or avoid identified significant environmental impacts.

4.1.2 Scope of Analysis

The environmental setting discussion describes the current physical conditions, or baseline conditions, in the project area. The baseline used for environmental impact analysis under CEQA reflects the conditions present at the time the NOP for this EIR was published. As discussed in Chapter 1, Introduction, the project's NOP and initial study were published on October 2, 2019. The initial study (Appendix A) concluded that many of the physical environmental impacts of the proposed project would result in no impact or less-than-significant impacts, and that mitigation measures agreed to by the project sponsor and required as conditions of approval would reduce significant impacts to a less-than-significant level. CEQA does not require further assessment of a project's less-than-significant impacts or those that can be reduced to less than significant with mitigation, which were identified in the initial study for the following environmental topics:

- land use and planning (all topics)
- population and housing (all topics)
- cultural resources (all topics)
- tribal cultural resources (all topics)
- transportation and circulation (all topics)
- noise (all topics)
- air quality (odors)
- greenhouse gas emissions (all topics)
- recreation (all topics)
- utilities and service systems (all topics)
- public services (all topics)
- biological resources (all topics)
- geology and soils (all topics)
- hydrology and water quality (all topics)
- hazards and hazardous materials (all topics)
- mineral resources (all topics)
- energy resources (all topics)
- agriculture and forestry resources (all topics)
- wildfire (all topics)

As discussed in Chapter 1, Introduction, and in the initial study, impacts from the project related to aesthetics and parking are not applicable to the proposed project. [28]

The initial study determined that the proposed project could result in potentially significant impacts related to the following topics, which are addressed in this EIR:

- air quality (all topics except odors)
- wind (all topics)
- shadow (all topics)

Subsequent to publication and circulation of the NOP and initial study, the project sponsor revised the proposed project (see Chapter 2, Project Description). The environmental impacts of these project description changes are addressed in Section 4.5, pp 4-99; however, these changes would not result in any new significant environmental impacts or necessitate implementation of additional or considerably different mitigation measures than those identified in the initial study.

4.1.3 CEQA Methodological Requirements

CEQA Guidelines section 15151 describes standards for the preparation of an adequate EIR. The specific standards under section 15151 are listed below.

- An EIR should be prepared with a sufficient degree of analysis to provide decision makers with information that enables them to make a decision that intelligently takes into account environmental consequences of the project.
- An evaluation of the environmental impacts of a project need not be exhaustive; rather, the sufficiency of an EIR is to be reviewed in light of what is reasonably feasible.
- Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among the experts.

In practice, the above points indicate that EIR preparers should adopt a reasonable methodology upon which to estimate impacts. This approach means making reasonable assumptions, using the best information available. In some cases, when information is limited or there are variations in project characteristics, EIR preparers will employ a "reasonable worst-case analysis" to capture the largest expected change from existing baseline conditions resulting from implementation of a project.

[28] Pursuant to Public Resources Code section 21099(d), aesthetics and parking are not considered in determining whether a project has the potential to result in significant environmental effects for projects that meet the following three criteria: (1) is located in a transit priority area; (2) is located on an infill site; and (3) is residential, mixed-use residential, or an employment center. The proposed project meets each of these three criteria: It is located near major transit routes and on an infill site that has been previously developed and surrounded by areas of either recently completed or planned urban development. Further, the proposed project is a mixed-use residential project. Therefore, this EIR does not consider aesthetics and the adequacy of parking in determining the significance of project impacts under CEQA.

4.1.4 Format of Environmental Analysis

Each environmental topic analyzed in this chapter includes the following subsections:

- **Introduction.** This subsection includes a brief description of the types of impacts that are analyzed as well as a summary of the impacts that were scoped out in the initial study (e.g., impacts that were determined to result in a less-than-significant impact or no impact).
- **Environmental Setting**. This subsection presents a description of existing baseline physical conditions on the project site and in the surroundings (e.g., existing land uses, existing wind environment, open space areas) at time of issuance of the NOP (with respect to each resource topic), with enough detail and breadth to allow a general understanding of the environmental impacts of the proposed project.
- **Regulatory Framework.** This subsection describes the relevant federal, state, and local regulatory requirements that are directly applicable to the environmental topic being analyzed.
- **Impacts and Mitigation Measures.** This subsection describes the physical environmental impacts (e.g., the changes to baseline physical environmental conditions) that could result from implementation of the proposed project, as well as any mitigation measures that could avoid, eliminate, or reduce identified significant impacts. This subsection begins with a listing of the significance criteria that have been developed by the planning department for use in determining whether an impact is significant. Environmental topic sections also include an "Approach to Analysis" subsection. This discussion explains the parameters, assumptions, and data used in the analysis.

  Under the "Impact Evaluation" discussion, the impact analysis for each topic begins with an impact statement that reflects one or more of the applicable significance criteria. Some significance criteria may be combined in a single impact statement, if appropriate. Each impact statement is keyed to a subject area abbreviation (e.g., AQ for Air Quality) and an impact number (e.g., 1, 2, 3) for a combined alpha-numeric code (e.g., Impact AQ-1, Impact AQ-2, etc.).

  When potentially significant impacts are identified, mitigation measures are presented that would avoid, eliminate, or reduce significant adverse impacts of the project. All mitigation measures will be required as conditions of project approval. Each mitigation measure corresponds to the impact statement and has an "M" in front to signify it is a mitigation measure (e.g., Mitigation Measure M-AQ-1 for a mitigation measure that corresponds to Impact AQ-1). If there is more than one mitigation measure for the same impact statement, the mitigation measures are numbered with a lowercase letter suffix (e.g., Mitigation Measures M-AQ-1a and M-AQ-1b).

4.1.5 Significance Determinations

A "significant effect" is defined by CEQA Guidelines Section 15382 as "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. An economic or social change by itself shall not be considered a significant effect on the environment [but] may be considered in determining whether the physical change is significant."

The significance criteria used in this EIR are based on the planning department's guidance regarding the thresholds of significance for assessing the severity of the environmental impacts of the proposed project. The planning department's guidance is based on CEQA Guidelines Appendix G, with some modifications. The level of significance of the impact is indicated in parentheses at the end of the impact statement based on the following terms:

- **No Impact –** No adverse physical changes (or impacts) to the environment are expected.
- **Less than Significant –** Impact that would not exceed the defined significance criteria or would be eliminated or reduced to a less-than-significant level through compliance with existing local, state, and federal laws and regulations.
- **Less than Significant with Mitigation –** Impact that is reduced to a less-than-significant level through implementation of the identified mitigation measures.
- **Significant and Unavoidable with Mitigation –** Impact that exceeds the defined significance criteria and cannot be reduced to less-than-significant levels through compliance with existing local, state, and federal laws and regulations and/or implementation of all feasible mitigation measures.
- **Significant and Unavoidable –** Impact that exceeds the defined significance criteria and cannot be eliminated or reduced to a less-than-significant level through compliance with existing local, state, and federal laws and regulations and for which there are no feasible mitigation measures.

4.1.6 Cumulative Impacts

Cumulative impacts, as defined in CEQA Guidelines section 15355, refer to two or more individual effects that, when taken together, are "considerable" or that compound or increase other environmental impacts. A cumulative impact from several projects is the change in the environment that would result from the incremental impact of the project when added to the impact of closely related past, present, and reasonably foreseeable future projects. Pertinent guidance for cumulative impact analysis is provided in CEQA Guidelines section 15130:

- An EIR shall discuss cumulative impacts of a project when the project's incremental effect is "cumulatively considerable" (e.g., the incremental effects of an individual project are considerable when viewed in connection with the effects of past, current, and probable future projects, including those outside the control of the agency, if necessary).
- An EIR should not discuss impacts that do not result in part from the project evaluated in the EIR. A project's contribution is less than cumulatively considerable, and thus not significant, if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact.
- The discussion of impact severity and likelihood of occurrence need not be as detailed as the discussion of effects attributable to the project alone.
- The focus of the analysis should be on the cumulative impact to which the identified other projects contribute rather than the attributes of the other projects that do not contribute to the cumulative impact.

The cumulative impact analysis for each individual resource topic is described in each resource section immediately following the description of the direct project impacts and identified mitigation measures.

Approach to Cumulative Impact Analysis

Two approaches to a cumulative impact analysis are provided in CEQA Guidelines section 15130(b)(1):

- The analysis can be based on a list of reasonably foreseeable future projects that could produce closely related impacts and combine with those of a proposed project, or
- A summary of projections contained in a general plan or related planning document can be used to determine cumulative impacts. The following factors were used to determine an appropriate level for cumulative analysis in this EIR:
    - **Similar Environmental Impacts.** A relevant project contributes to effects on resources that are also affected by the proposed project. A relevant future project is defined as one that is "reasonably foreseeable," such as a project with an application on file at the approving agency or approved funding.
    - **Geographic Scope and Location.** A relevant project is within the geographic area where effects could combine. The geographic scope varies on a resource-by-resource basis. For example, the geographic scope for evaluating cumulative effects on regional air quality consists of the affected air basin, whereas the cumulative effects of construction noise are limited to combined noise from the project and nearby projects.
    - **Timing and Duration of Implementation.** Effects associated with activities for a relevant project (e.g., short-term construction or demolition, long-term operations) would most likely coincide with the timing of related effects from the proposed project.

The analyses in this EIR and initial study employ a list-based approach and projections-based approach, depending on the environmental topic analyzed. For instance, the cumulative analysis of shadow impacts considers individual projects that are anticipated to shade the same open spaces as the proposed project. Such projects in combination with the proposed project may result in cumulative shadow effects.

Cumulative Setting

Cumulative projects within a 0.25-mile radius of the project site are listed below in Table 4.1-1 and mapped on Figure 18. These cumulative projects are projects that are currently under review by the planning department or a building permit is on file or has been approved by the San Francisco Department of Building Inspection (building department).

Table 4.1-1: Cumulative Projects within 0.25-Mile Radius of the Proposed Project

Map No. Address (Case No.)	Description	Dwelling Units	Retail/ Commercial (gsf)	Office (gsf)	Hotel (gsf)	PDR[1] (gsf)	Group Housing Rooms	Status
1. 1025 Howard Street (2015-005200ENV)	Demolition of an existing building and construction of a new 8-story hotel with a ground floor retail space and below ground parking.	--	2,445	--	77,510 173 rooms	--	--	Under review
2. 1055 Market Street (2014.0408E)	Demolition of an existing commercial building and construction of a 10-story hotel with a ground floor retail space.	--	2,187	--	71,534 160 rooms	--	--	Approved - not yet under construction.
3. 1082 Howard Street (2015-010371ENV)	Demolition of a 2-story retail sales building and construction of a 9-story multi-family residential building.	9	--	--	--	--	--	On Hold
4. 1088 Howard Street (2017-009796ENV)	The proposed project would preserve the existing one story over mezzanine industrial building and construct an approximately 20,402 gsf, 74-foot-tall residential addition.	24	--	--	--	--	--	Under Review
5. 1125 Market Street (2013.0511E)	Construction of a 12-story, 138,101 sf building containing 181 hotel rooms, 5,587 sf of restaurant/retail, and a 18,737 sf co-working space/office.	--	5,587	18,737	95,506 181 rooms	--	--	Under Review
6. 219 Sixth Street (2017-001590CUA)	Change of use that would result in a net increase of 9 rooms.	--	--	--	--	--	9 guest rooms	On Hold
7. 270 Turk Street (2017-015701PRJ)	Addition of four accessory dwelling units at the basement level of the building.	4	--	--	--	--	--	Under Review
8. 415-417 Tehama Street (2017-016278PRJ)	Construction of one accessory dwelling unit.	1	--	--	--	--	--	Under Review

Map No. Address (Case No.)	Description	Dwelling Units	Retail/ Commercial (gsf)	Office (gsf)	Hotel (gsf)	PDR[1] (gsf)	Group Housing Rooms	Status
9. 457-475 Minna Street (2018-016055PRJ)	Demolition of an existing 2-story building and proposed merger of four lots and construction of a new 16-story, 270-room group housing building.	--	--	--	--	--	270	Under Review
10. 481-483 Tehama Street (2015-006765 ENV)	Proposed demolition of an existing 2-story building. Construction of a new 4-story residential/ PDR building.	6	--	--	--	1,790	--	Approved – not yet under construction.
11. 527 Stevenson Street (2018-012429ENV)	Demolition of an existing 1-story commercial building and new construction of a 7-story commercial building.	--	--	7,062	--	--	--	Under Review
12. 57 Taylor Street aka 111 Turk Street (2015-007525ENV)	Subdivision of parcel containing a mixed-use residential and retail building and a surface parking lot. Demolition of a portion of the existing structure (vacant retail space). New construction of a 12-story over basement mixed-use residential group housing with ground floor retail.	--	11,000	--	--	--	77	Under Review
13. 611 Minna Street (2018-009426PRJ)	Addition of two new studio accessory dwelling units at the basement level of an existing 12-unit building.	2	--	--	--	--	--	Approved – not yet under construction.
14. 921 Howard Street (2017-000275ENV)	Construction of a new, 18-story, 180-foot-tall mixed-use residential tower and podium.	205	4,999	--	--	--	--	Under Review
15. 984 Folsom Street (2017-013741ENV)	Demolition of a 3-story building and construction of a new 8-story building with a restaurant on the ground floor and group housing on the remaining seven floors.	--	9,115	--	--	--	111	Under Review

Map No. Address (Case No.)	Description	Dwelling Units	Retail/ Commercial (gsf)	Office (gsf)	Hotel (gsf)	PDR[1] (gsf)	Group Housing Rooms	Status
16. 996 Mission Street (2015-015253 ENV)	Demolition of 2-story existing residential hotel building. New construction of an 8-story hotel (2 floors residential hotel units, 5 floors tourist hotel) with ground floor retail.	--	--	--	5,645 (105 rooms)	--	--	Under Review
17. Better Market Street (2014.0012E)	The multi-agency project would replace and upgrade aging infrastructure – including streetlights, traffic signals, streetcar tracks, overhead wires, and underground utilities.	--	--	--	--	--	--	Approved - implementation of near-term improvements[3] beginning January 2020; full construction beginning late 2020 or early 2021.
18. Fifth Street Improvement Project[2]	This project involves bicycle and pedestrian safety improvements along Fifth Street between Townsend and Market streets in the SoMa neighborhood.	--	--	--	--	--	--	Approved – construction of near-term improvements in Fall 2019

Notes:

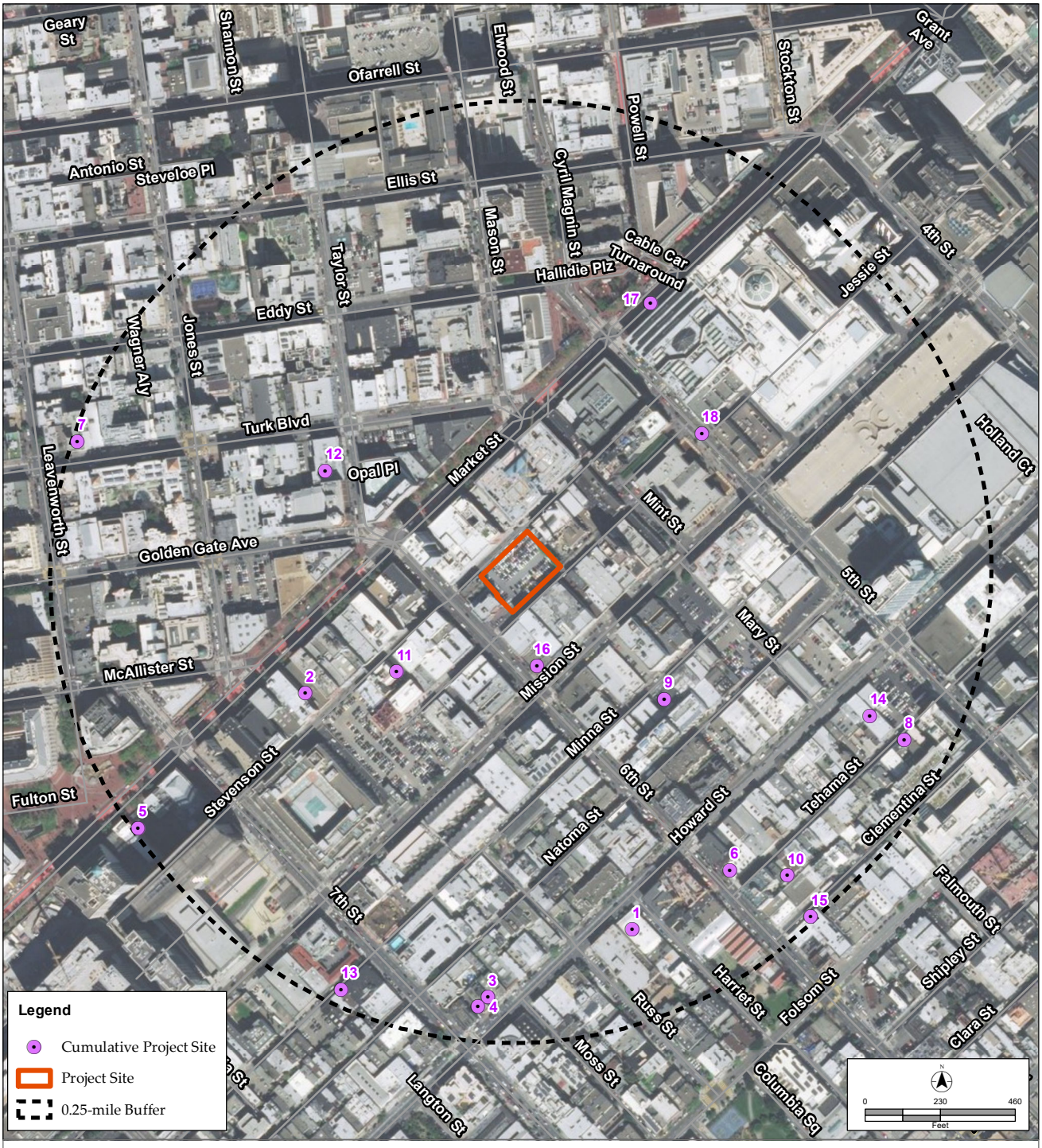
[1] PDR – Production, Distribution, Repair

[2] The Fifth Street Improvement Project was considered in the cumulative transportation analysis in Section E.5, Transportation and Circulation, of the initial study; however, this project was not included in this list of cumulative projects provided in the initial study.

[3] Better Market Street near-term improvements include the following changes within the project corridor: a car-free zone westbound from Steuart Street to Van Ness Avenue and eastbound from 10th Street to Main Street; new passenger and commercial loading zones on cross streets; peak-hour loading restrictions on Market Street; extending the existing transit-only lane east from Third to Main Street and making it available to Muni only; painted safety zones at eight intersections; bicycle intersection improvements; vehicle circulation changes to sections of Ellis, Jones, 2nd and Steuart streets.

Sources:

San Francisco Planning Department. 2019. San Francisco Planning Department – Permits in my Neighborhood Map. https://sfplanning.org/resource/permits-my-neighborhood. San Francisco Public Works Department. 2019. Projects Database. https://sfpublicworks.org/projects.



1. 1025 Howard Street
2. 1055 Market Street
3. 1082 Howard Street
4. 1088 Howard Street
5. 1125 Market Street
6. 219 Sixth Street
7. 270 Turk Street
8. 415-417 Tehama Street
9. 457-475 Minna Street
10. 481-483 Tehama Street
11. 527 Stevenson Street
12. 57 Taylor Street (aka 111 Turk Street)
13. 611 Minna Street
14. 921 Howard Street
15. 984 Folsom Street
16. 996 Mission Street
17. Better Market Street
18. Fifth Street Improvement Project

Source: City of San Francisco

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469 Stevenson Street Project

Case No. 2017-014833ENV

Figure 18: Cumulative Projects

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4.2 AIR QUALITY

4.2.1 Introduction

This section discusses existing air quality conditions in the project area, presents the regulatory framework for air quality management, and analyzes the potential for the proposed project to affect existing air quality conditions, both regionally and locally, from activities that emit criteria and non-criteria air pollutants. It also analyzes the types and quantities of emissions that would be generated both on a temporary basis from construction activities and over the long term from operation of the proposed project. The analysis determines whether the emissions would be significant in relation to applicable air quality standards and identifies feasible mitigation measures for significant adverse impacts, if required. This section also includes an analysis of cumulative air quality impacts. As discussed in Section E.7, Air Quality, of the initial study (Appendix A), construction and operation of the proposed project would not be expected to generate substantial odors, either individually or cumulatively. Therefore, this topic is not discussed further in this EIR. Emissions of GHGs and potential impacts on climate change, as well as City and state goals regarding GHG emissions, are discussed in the initial study (Appendix A, Section E.8, Greenhouse Gas Emissions).

The analysis in this section is based on a review of existing air quality conditions in the Bay Area and air quality regulations administered by the U.S. Environmental Protection Agency (U.S. EPA), the air board, and the air district. This analysis includes methodologies identified in the air district's *CEQA Air Quality Guidelines*[29] and its companion documentation. Calculations were prepared to quantitatively assess the air pollutant emissions from the proposed project (Appendix B); this information forms the basis of much of the assessment of air quality impacts presented herein.

The air quality impact methodologies and approach to analysis (described under Approach to Analysis and in "Air Quality Scope of Work" included in the EIR as Appendix B) are based on an approximately 36-month construction duration and six-phases of construction.

4.2.2 Environmental Setting

Climate and Meteorology

The project site is located within the San Francisco Bay Area Air Basin (air basin). The air basin's moderate climate steers storm tracks away from the region for much of the year, although storms affect the region from November through April. San Francisco's proximity to onshore breezes stimulated by the Pacific Ocean provides for generally good air quality in the city. Annual temperatures in the project area average in the mid-50s (degrees Fahrenheit), generally ranging from the low 40s on winter mornings to the low-70s during summer afternoons. Daily and seasonal changes in temperature are small because of the moderating effects of the nearby San Francisco Bay. In contrast to the steady temperature regime, rainfall is highly variable and confined almost exclusively to the "rainy" period from November through April. Precipitation may vary widely from year to year because a shift in the annual storm track of a few hundred miles can mean the difference between a very wet year and

[29] Air District, *CEQA Air Quality Guidelines*, updated May 2017, http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en, accessed October 2, 2018

drought conditions. Atmospheric conditions such as wind speed, wind direction, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants regionally. The project area is within the Peninsula climatological subregion. Marine air traveling through the Golden Gate is a dominant weather factor that affects the dispersal of air pollutants within the region. Wind measurements recorded on the San Francisco mainland indicate a prevailing wind direction from the west and an average annual wind speed of 8.7 miles per hour.[30] Increased temperatures create conditions in which ozone formation can increase.

Ambient Air Quality – Criteria Air Pollutants

As required by the 1970 federal Clean Air Act, the U.S. EPA initially identified six criteria air pollutants that are pervasive in urban environments and for which state and federal health-based ambient air quality standards have been established. The U.S. EPA calls these pollutants "criteria air pollutants" because it has regulated them by developing specific public-health-based and welfare-based criteria for setting permissible levels. Ozone, carbon monoxide (CO), particulate matter, nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead were the six criteria air pollutants originally identified by the U.S. EPA. Since adoption of the 1970 act, subsets of particulate matter have been identified for which permissible levels have been established. These include particulate matter of 10 microns in diameter or less (PM_{10}) and $PM_{2.5}$.

The air district is the regional agency with jurisdiction for regulating air quality within the nine-county air basin. The region's air quality monitoring network provides information on ambient concentrations of criteria air pollutants at various locations in the San Francisco Bay Area. Table 4.2-1, Summary of San Francisco Air Quality Monitoring Data (2014–2018), presents a 5-year summary of the highest annual criteria air pollutant concentrations recorded at the air quality monitoring station operated and maintained by the air district at 16th and Arkansas streets (Potrero Hill), approximately 3 miles southeast of the project site. Table 4.2-1 also compares measured pollutant concentrations with the most stringent applicable ambient air quality standards (state and federal). These concentrations are health-based standards established with an ample margin of safety. To determine attainment of air quality standards, exceedances are assessed on a region-wide basis. Concentrations shown in boldface type indicate only a localized exceedance of the standard.

[30] National Oceanic and Atmospheric Administration, National Centers for Environmental Information, 2018.

Table 4.2-1: Summary of San Francisco Air Quality Monitoring Data (2014-2018)

Pollutant	Most Stringent Applicable Standard	Number of Days Standards Were Exceeded and Maximum Concentrations Measured				
		2014	**2015**	**2016**	**2017**	**2018**
Ozone						
Maximum 1-hour Concentration (ppm)	>0.09[b]	0.079	0.085	0.070	0.087	0.065
Days 1-hour Standard Exceeded		0	0	0	0	0
Maximum 8-hour Concentration (ppm)	>0.070[c]	0.069	0.067	0.057	0.054	.049
Days 8-hour Standard Exceeded		0	0	0	0	0
Carbon Monoxide (CO)						
Maximum 1-hour Concentration (ppm)	>20[b]	1.6	1.8	1.7	2.5	1.9
Days 1-hour Standard Exceeded		0	0	0	0	0
Maximum 8-hour Concentration (ppm)	>9.0[b]	1.2	1.3	1.1	1.4	1.6
Days 8-hour Standard Exceeded		0	0	0	0	0
Respirable Particulate Matter (PM_{10})						
Maximum 24-hour Concentration (μg/m^3)	>50[b]	36	47	29	**77**	43
Days 24-hour Standard Exceeded		0	0	0	2	0
Fine Particulate Matter ($PM_{2.5}$)						
Maximum 24-hour Concentration (μg/m^3)	>35[c]	33	35	20	**50**	**177**
Days 24-hour Standard Exceeded		0	0	0	7	14
Annual Average (μg/m^3)	>12[b,c]	7.7	9.6	7.5	9.7	11.7
Nitrogen Dioxide (NO_2)						
Maximum 1-hour Concentration (ppm)	>0.100[c]	0.08	0.07	0.06	0.07	0.07
Days 1-hour Standard Exceeded		0	0	0	0	0

Source: Air District, Bay Area Air Pollution Summary, 2013-2018, http://www.baaqmd.gov/about-air-quality/air-quality-summaries

Notes: **Bold** values are in excess of applicable standard; ppm = parts per million; μg/m^3 = micrograms per cubic meter; > = greater than.

a. Number of days exceeded is for all days in a given year, except for PM_{10}, which has been monitored every 12 days as of January 2013.

b. State standard not to be exceeded.

c. Federal standard not to be exceeded.

μg/m^3 = micrograms per cubic meter

ppm = parts per million

Ozone

Ozone is a secondary air pollutant that is produced in the atmosphere through a complex series of photochemical reactions involving ROGs (also sometimes referred to as "volatile organic compounds" [VOCs] by some regulatory agencies) and oxides of nitrogen (NO_X) in the presence of sunlight. The main sources of ROG and NO_X, often referred to as "ozone precursors," are combustion processes (including combustion within motor vehicle engines) and the evaporation of solvents, paints, and fuels. In the Bay Area, automobiles are the single largest source of ozone precursors. Ozone is referred to as a "regional air pollutant" because its precursors are transported and diffused by wind concurrently with ozone production through a photochemical reaction process. Ozone causes eye irritation, airway constriction, and shortness of breath and can aggravate existing respiratory diseases, such as asthma, bronchitis, and emphysema. According to published data, and as shown in Table 4.2-1, the most stringent applicable standards for ozone (state 1-hour standard of 0.09 part per million [ppm] and the federal 8-hour standard of 0.075 ppm) were not exceeded in San Francisco between 2014 and 2018. In 2015, the U.S. EPA strengthened the 8-hour ozone standard to 0.070 ppm, and the new standard became effective December 28, 2015.

Carbon Monoxide

CO is an odorless, colorless gas, usually formed as the result of the incomplete combustion of fuels. The single largest source of CO is motor vehicles; the highest emissions occur during low travel speeds, stop-and-go driving, cold starts, and hard acceleration. Exposure to high concentrations of CO reduces the oxygen-carrying capacity of the blood and can cause headaches, nausea, dizziness, and fatigue; impair central nervous system function; and induce angina (chest pain) in persons with serious heart disease. Very high levels of CO can be fatal. As shown in Table 4.2-1, the more stringent state CO standards were not exceeded between 2014 and 2018. Measurements of CO indicate hourly maximums ranging between 8 and 10 percent of the more stringent state standard and maximum 8-hour CO levels that are approximately 12 to 16 percent of the allowable 8-hour standard.

Particulate Matter

Particulate matter is a class of air pollutants that consists of a complex mix of solid and liquid airborne particles from human-made and natural sources. Regulated particulate matter is measured in two size ranges: PM_{10} and $PM_{2.5}$. In the Bay Area, motor vehicles generate about one-half of the air basin's particulates through tailpipe emissions as well as brake pad and tire wear. Wood burning in fireplaces and stoves, industrial facilities, and ground-disturbing activities such as construction are other sources of such fine particulates. These fine particulates are small enough to be inhaled into the deepest parts of the human lung and can cause adverse health effects. According to the air board, studies in the United States and elsewhere "have demonstrated a strong link between elevated particulate levels and premature deaths, hospital admissions, emergency room visits, and asthma attacks," and studies of children's health in California have demonstrated that particle pollution "may significantly reduce lung function growth in children."[31] The air board also reports that statewide attainment of particulate matter standards could prevent thousands of premature deaths, lower hospital admissions for

[31] California Air Resources Board, Recent Research Findings: Health Effects of Particulate Matter and Ozone Air Pollution, November 2007, p. 1.

cardiovascular and respiratory disease and asthma-related emergency room visits, and avoid hundreds of thousands of episodes of respiratory illness in California.[32]

Among the criteria pollutants that are regulated, particulates appear to represent a serious ongoing health hazard. As long ago as 1999, the air district was reporting, in its CEQA Air Quality Guidelines, that studies had shown that elevated particulate levels contribute to the death of approximately 200 to 500 people per year in the Bay Area. $PM_{2.5}$ is of concern because epidemiological[33] studies have demonstrated that people who live near freeways, especially people who live within 500 feet of freeways or high-traffic roadways, have poorer health outcomes, including increased asthma symptoms and respiratory infections and decreased pulmonary function and lung development in children.[34]

As shown in Table 4.2-1, the state 24-hour PM_{10} standard was exceeded on two monitored occasions between 2014 and 2018 in San Francisco (both in 2017 during the wildfire period in the counties to the north of San Francisco). The federal 24-hour $PM_{2.5}$ standard was exceeded on 21 monitored occasions between 2014 and 2018. The federal and state annual average standards were not exceeded between 2014 and 2018. However, with the 2017 fires in the counties to the north of San Francisco, the federal 24-hour $PM_{2.5}$ standard was exceeded on up to seven days just in the first part of the month of October 2017 in certain counties. Similar air quality patterns due to wildfires occurred in 2018. The 24-hour $PM_{2.5}$ standard was exceeded 14 times in the Bay Area in 2018. During the November 2018 wildfire period, the Bay Area experienced unhealthy air quality for nearly two weeks. The AQI in San Francisco reach 218 during the November wildfire period. These levels of $PM_{2.5}$ in many counties have been the highest levels recorded in recent times. As a result, the Air Quality Index (AQI) in several neighboring counties reached the "very unhealthy" designation,[35] ranging from 201 to 300. During that period the air district issued "Spare the Air" alerts and recommended that individuals stay inside with windows closed and refrain from substantial outdoor activity.

[32] Ibid.

[33] Epidemiology is a branch of medical science that deals with the incidence, distribution, and control of disease in a population.

[34] San Francisco Department of Public Health, Assessment and Mitigation of Air Pollutant Health Effect from Intra-urban Roadways: Guidance for Land Use Planning and Environmental Review, May 2008, p. 7

[35] Daily air quality data were queried during the period of fire (approximately November 8 to 25, 2018) for AQI information, with particulate matter concentrations at monitoring stations from the air district's Air Quality Monitoring Data web page. Air District, Air Quality Monitoring Data, http://www.baaqmd.gov/ about-air-quality/current-air-quality/air-monitoring-data?DataViewFormat=daily&DataView=aqi&ParameterId =316, accessed October 16, 2019.

Nitrogen Dioxide

NO_2 is a reddish-brown gas that is a byproduct of combustion processes. Automobiles and industrial operations are the main sources of NO_2. Aside from its contribution to ozone formation, NO_2 can increase the risk of acute and chronic respiratory disease and reduce visibility. NO_2 may be visible as a coloring component of the air on high-pollution days, especially in conjunction with high ozone levels. The current state 1-hour standard for NO_2 (0.18 ppm) is being met in San Francisco. In 2010, the U.S. EPA implemented a new 1-hour NO_2 standard (0.10 ppm), which is presented in Table 4.2-2, State and Federal Ambient Air Quality Standards and Attainment Status for the air basin. Currently, the air board is recommending that the air basin be designated as an attainment area for the new standard.[36] As shown in Table 4.2-1, this new federal standard was not exceeded at the San Francisco station between 2014 and 2018.

The U.S. EPA has also established requirements for a new monitoring network to measure NO_2 concentrations near major roadways in urban areas with a population of 500,000 or more. Sixteen new near-roadway monitoring sites are required in California, three of which are in the Bay Area. These monitors are located in Berkeley, Oakland, and San Jose. The Oakland station commenced operation in February 2014, the San José station in March 2015, and the Berkeley station in July 2016. The new monitoring data may result in a need to change area designations in the future. The air board will revise the area designation recommendations, as appropriate, once the new monitoring data become available.

[36] California Air Resources Board, Recommended Area Designations for the 2010 Nitrogen Dioxide Standards, Technical Support Document, January 2011, https://www.arb.ca.gov/desig/NO2_Enclosure_1.pdf, accessed October 16, 2019.

Table 4.2-2: State and Federal Ambient Air Quality Standards and Attainment Status For the San Francisco Bay Area Air Basin

Pollutant	Averaging Time	State (CAAQS)[a,h]		Federal (NAAQS)[b,h]	
		Standard	Attainment Status	Standard	Attainment Status
Ozone	1-hour[f]	0.09 ppm	N	NA	See Note c
	8-hour[d,e]	0.70 ppm	N	0.070 ppm	N
Carbon Monoxide (CO)	1-hour	20 ppm	A	35 ppm	A
	8-hour	9 ppm	A	9 ppm	A
Nitrogen Dioxide (NO_2)	1-hour	0.18 ppm	A	0.100 ppm	A
	Annual	0.030 ppm	NA	0.053 ppm	A
Sulfur Dioxide (SO_2)	1-hour	0.25 ppm	A	0.075 ppm	See Note g
	24-hour	0.04 ppm	A	0.14 ppm	See Note g
	Annual	NA	NA	0.03 ppm	See Note g
Particulate Matter (PM_{10})[i]	24-hour	50 μg/m^3	N	150 μg/m^3	U
	Annual	20 μg/m^3	N	NA	NA
Particulate Matter ($PM_{2.5}$)[i]	24-hour	NA	NA	35 μg/m^3	N
	Annual	12 μg/m^3	N	12 μg/m^3	U/A
Sulfates	24-hour	25 μg/m^3	A	NA	NA
Lead	30-day	1.5 μg/m^3	A	NA	NA
	Calendar-quarter	NA	NA	1.5 μg/m^3	A

Source: Air District, Standards and Attainment Status, last updated January 5, 2017, http://www.baaqmd.gov/about-air-quality/research-and-data/air-quality-standards-and-attainment-status. Accessed January 10, 2020.

Notes:

A = Attainment; N = Non-attainment; U = Unclassified; NA = Not Applicable, no applicable standard; ppm = parts per million; μg/m^3 = micrograms per cubic meter.

a. CAAQS = California ambient air quality standards. CAAQS for ozone, CO (except Lake Tahoe), SO2 (1-hour and 24-hour standards), NO_2, particulate matter, and visibility-reducing particles are values that are not to be exceeded. All other state standards shown are values not to be equaled or exceeded.
b. NAAQS = national ambient air quality standards. NAAQS, other than ozone and particulates and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The 8-hour ozone standard is attained when the 3-year average of the fourth-highest daily concentration is 0.07 ppm or less. The 24-hour PM10 standard is attained when the 3-year average of the 99th percentile of monitored concentrations is less than the standard. The 24-hour $PM_{2.5}$ standard is attained when the 3-year average of the 98th percentile is less than the standard.
c. The U.S. EPA revoked the national 1-hour ozone standard on June 15, 2005.
d. This federal 8-hour ozone standard was approved by the U.S. EPA in October 2015 and became effective on December 28, 2015.
e. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm. An area will meet the standard if the fourth-highest maximum daily 8-hour ozone concentration per year, averaged over 3 years, is equal to or less than 0.070 ppm. The U.S. EPA made recommendations on attainment designations for California on October 3, 2016. After the final designations were made, San Francisco county was determined to be not in attainment.
f. To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010).
g. On June 2, 2010, the U.S. EPA established a new 1-hour SO2 standard, effective August 23, 2010, which is based on the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations. The existing 0.030 ppm annual and 0.14 ppm 24-hour SO2 NAAQS, however, must continue to be used until 1 year following U.S. EPA initial designations of the new 1-hour SO2 NAAQS. The U.S. EPA classified the air basin as being in attainment/unclassifiable in January 2018 (Federal Register Vol. 83, No. 6, pp. 1098–1172).
h. State standard = annual geometric mean; national standard = annual arithmetic mean.
i. In June 2002, the air board established new annual standards for $PM_{2.5}$ and PM_{10}.

Sulfur Dioxide

SO_2 is a colorless, acidic gas with a strong odor. It is produced by the combustion of sulfur-containing fuels such as oil, coal, and diesel. SO_2 has the potential to damage materials and can cause health effects at high concentrations. It can irritate lung tissue and increase the risk of acute and chronic respiratory disease.[37] Pollutant trends suggest that the air basin currently meets and will continue to meet the state standard for SO_2 for the foreseeable future. In 2010, the U.S. EPA implemented a new 1-hour SO_2 standard, which is presented in Table 4.2-2. The U.S. EPA initially designated the air basin as an attainment area for SO_2. Similar to the new federal standard for NO_2, the U.S. EPA established requirements for a new monitoring network to measure SO_2 concentrations beginning in January 2013.[38] No additional SO_2 monitors are required for the Bay Area because the air district's jurisdiction has never been designated as a non-attainment area for SO_2, and no state implementation plans or maintenance plans have been prepared for SO_2.[39]

Lead

Leaded gasoline (phased out from use in automobiles in the United States beginning in 1973), paint (on older houses, cars), smelters (metal refineries), and manufacturers of lead storage batteries have been the primary sources of lead in the atmosphere. Lead has a range of adverse neurotoxic health effects, which put children at special risk. Some lead-containing chemicals cause cancer in animals. Lead levels in the air have decreased substantially since leaded gasoline in automobiles was eliminated.

Ambient lead concentrations are monitored only on an as-warranted, site-specific basis in California. On October 15, 2008, the U.S. EPA strengthened the national ambient air quality standard for lead by lowering it from 1.50 $\mu g/m^3$ to 0.15 $\mu g/m^3$ on a rolling three-month average. The U.S. EPA revised the monitoring requirements for lead in December 2010.[40] These requirements focused on airports and large urban areas and increased the number of monitors nationally by 76. In the Bay Area, lead monitoring stations are located at Reid-Hillview Airport and at 158 East Jackson Street, both in San José. Another lead monitoring station, at San Carlos Airport, was discontinued as of April 11, 2017.

Air Quality Index

The U.S. EPA developed the AQI to make the public health impacts of air pollution concentrations easily understandable. The AQI, much like an air quality "thermometer," translates daily air pollution

[37] Air District, CEQA Air Quality Guidelines, May 2017, p. C-16, http://www.baaqmd.gov/ ~/media/files/-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en, accessed October 16, 2019.

[38] U.S. EPA, Fact Sheet: Revisions to the Primary National Ambient Air Quality Standard, Monitoring Network, and Data Reporting Requirements for Sulfur Dioxide, June 2, 2010, https://www.epa.gov/sites/production/ files/2016-05/documents/final_primary_naaqs_factsheet.pdf, accessed October 16, 2019.

[39] Air District, 2013 Air Monitoring Network Plan, July 2014, p. 27, http://www.baaqmd.gov/~/media//Technical%20Services/2013_Network_Plan.ashx?la=en, accessed October 16, 2019.

[40] U.S. EPA, Fact Sheet: Revisions to Lead Ambient Air Quality Monitoring Requirements, https://www.epa.gov/sites/production/files/2016-03/documents/leadmonitoring_finalrule_factsheet.pdf, accessed October 16, 2019.

concentrations into a number on a scale between 0 and 500, then assigns the number to one of the following six color-coded ranges that rank air quality:

A. **Good (Green, AQI = 0–50):** Air quality is considered satisfactory, and air pollution poses little or no risk.

B. **Moderate (Yellow, AQI = 51–100):** Air quality is acceptable; however, for some pollutants, there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution. Unusually sensitive people should consider reducing prolonged or heavy outdoor exertion.

C. **Unhealthy for Sensitive Groups (Orange, AQI = 101–150):** Although the general public is not likely to be affected at this AQI range, people with lung disease, as well as older adults and children, are at a greater risk from exposure to ozone, whereas persons with heart and lung disease, older adults, and children are at greater risk from the presence of particles in the air. Active children and adults, as well as people with respiratory disease, such as asthma, should limit prolonged or heavy outdoor exertion.

D. **Unhealthy (Red, AQI = 151–200):** Everyone may begin to experience some adverse health effects, and members of the sensitive groups may experience more serious effects. Active children and adults, as well as people with respiratory disease, such as asthma, should avoid prolonged outdoor exertion; everyone else, especially children, should limit prolonged outdoor exertion.

E. **Very Unhealthy (Purple, AQI = 201–300):** The rating of "very unhealthy" air quality would trigger a health alert, signifying that everyone may experience more serious health effects. Active children and adults, as well as people with respiratory disease, such as asthma, should avoid prolonged outdoor exertion; everyone else, especially children, should limit outdoor exertion.

F. **Hazardous (Maroon, AQI = 301–500):** The rating of "hazardous" air quality would trigger health warnings regarding emergency conditions. The entire population is more likely to be affected. Everyone, especially children, should limit outdoor exertion.

The AQI numbers refer to specific amounts of pollution in the air. They are based on the federal air quality standards for ozone, CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$. In most cases, the federal standard for these air pollutants corresponds to the number 100 on the AQI chart. If the concentration of any of these pollutants rises above its respective standard, the air quality can be unhealthy for the public. In determining the air quality forecast, local air districts, including the Bay Area Air Quality Management District, use the anticipated concentration measurements for each of the major pollutants, convert them into AQI numbers, then determine the highest AQI for each zone in a district.

Readings below 100 on the AQI scale would not typically affect the health of the general public (although readings in the moderate range of 50 to 100 may affect unusually sensitive people). Levels above 300 rarely occur in the United States, and readings above 200 have not occurred in the Bay Area in decades, with the exception of the October 2017 wildfires north of San Francisco and the November

2018 wildfires in Butte County.[41] As a result of both wildfires, the AQI in San Francisco and several neighboring counties reached the "very unhealthy" designation, ranging from 201 to 300.[42] During these periods, the air district issued "Spare the Air" alerts and recommended that individuals stay inside with the windows closed and refrain from any outdoor activity.

AQI statistics over recent years indicate that air quality in the Bay Area is predominantly in the "Good" or "Moderate" categories and healthy on most days for most people. AQI ozone statistics for the air basin are shown in Table 4.2-3, Ozone Air Quality Index Statistics for the air basin. The air basin had a total of nine orange-level (unhealthy for sensitive groups) days in 2014, 12 days in 2015, 11 days in 2016, three days in 2017, and two days in 2018. In 2014, 2016, and 2018, ozone levels in the air basin were in the red-level (unhealthy) range one day per year; in 2017, four days had ozone levels that were in the unhealthy range.

Table 4.2-3: Ozone Air Quality Index Standards for the San Francisco Bay Area Air Basin

Air Quality Index Levels	Number of Days by Year				
	2014	2015	2016	2017	2018
Unhealthy for Sensitive Groups (Orange)	9	12	11	3	2
Unhealthy (Red)	1	0	1	4	1

Source: Air District, Air Monitoring Data, https://sfgov.org/scorecards/environment/days-epa-air-quality-index-rating-good, accessed October 15, 2019

Toxic Air Contaminants and Local Health Risks and Hazards

In addition to criteria air pollutants, individual projects may emit toxic air contaminants (TACs). TACs collectively refer to a diverse group of air pollutants that are capable of causing chronic (i.e., of long duration) and acute (i.e., severe but short term) adverse effects on human health, including carcinogenic effects.[43] Human health effects of TACs include birth defects, neurological damage, cancer, and death. There are hundreds of different types of TACs with varying degrees of toxicity. Individual TACs vary greatly in the health risk they present; at a given level of exposure, one TAC may pose a hazard that is many times greater than another.

Unlike criteria air pollutants, TACs are not subject to ambient air quality standards but are regulated by the air district using a risk-based approach to determine which sources and pollutants to control as well as the degree of control. A health risk assessment is an analysis that estimates human health

[41] Air District, Spare the Air, http://sparetheair.org/Stay-Informed/Todays-Air-Quality/Air-Quality-Index.aspx, accessed October 16, 2019.

[42] Air District, Air Monitoring Data, http://www.baaqmd.gov/about-air-quality/current-air-quality/air-monitoringdata?DataViewFormat=monthly&DataView=aqi&StartDate=11/1/2018&ParameterId=316, accessed October 16, 2019.

[43] "Carcinogenic" indicates that scientific studies have shown that exposure to a substance or mixture of substances at certain levels for some period of time has the potential to promote the formation of cancer.

exposure to toxic substances and, when considered together with information regarding the toxic potency of the substances, provides quantitative estimates of health risks.[44]

Exposures to fine particulate matter ($PM_{2.5}$) are strongly associated with mortality, respiratory diseases, and impaired lung development in children as well as other end results, such as hospitalization for cardiopulmonary disease.[45] In addition to $PM_{2.5}$, diesel particulate matter (DPM), a byproduct of diesel fuel combustion, is also of concern. The air board identified DPM as a TAC in 1998, based primarily on evidence demonstrating cancer effects in humans.[46] The estimated cancer risk from exposure to diesel exhaust is much higher than the risk associated with any other TAC routinely measured in the region.

San Francisco Modeling of Air Pollution Exposure Zones

In an effort to identify areas of San Francisco most adversely affected by sources of TACs, San Francisco partnered with the air district to inventory and assess air pollution and exposures from vehicles, stationary sources, and area sources within San Francisco. Citywide air quality dispersion modeling was conducted using AERMOD[47] to assess emissions from the following primary sources: vehicles on local roadways, permitted stationary sources, port and maritime sources, and Caltrain. Emissions of PM_{10} (DPM is assumed equivalent to PM_{10}), $PM_{2.5}$, and total organic gases were modeled on a 20- by 20-meter receptor grid covering the entire city. The citywide modeling results represent a comprehensive assessment of existing cumulative exposures to air pollution throughout the city. The methodology and technical documentation for modeling citywide air pollution is available in the *San Francisco Citywide Health Risk Assessment: Technical Support Documentation*.[48]

Model results were used to identify areas in the city with poor air quality, termed Air Pollutant Exposure Zones (APEZs), based on the following health-protective criteria: (1) cumulative $PM_{2.5}$ concentrations greater than 10 micrograms per cubic meter ($\mu g/m^3$) and/or (2) an excess cancer risk

[44] In general, a health risk assessment is required if the air district concludes that projected emissions of a specific air toxic compound from a proposed new or modified source suggest a potential public health risk. The applicant is then subject to a health risk assessment for the source in question. Such an assessment generally evaluates chronic, long-term effects as well as maximum short-term effects, estimating the increased risk of cancer or hazard index as a result of exposure to one or more TACs.

[45] San Francisco Department of Public Health, Assessment and Mitigation of Air Pollutant Health Effects from Intra-Urban Roadways: Guidance for Land Use Planning and Environmental Review, May 2008

[46] California Air Resources Board, Fact Sheet: The Toxic Air Contaminant Identification Process: Toxic Air Contaminant Emissions from Diesel-fueled Engines, October 1998.

[47] AERMOD is U.S. EPA's preferred or recommended steady-state air dispersion plume model. Dispersion modeling uses mathematical formulations to characterize the atmospheric processes that disperse a pollutant emitted by a source. Based on emissions and meteorological inputs, a dispersion model can be used to predict concentrations at selected downwind receptor locations. These air quality models are used to determine compliance with National Ambient Air Quality Standards and other regulatory requirements, such as the New Source Review regulation. For more information on AERMOD, and to download the AERMOD Implementation Guide, see https://www.epa.gov/scram/air-quality-dispersion-modelingpreferred-and-recommended-models, accessed October 16, 2019.

[48] San Francisco Department of Public Health, and San Francisco Planning Department, San Francisco Citywide Health Risk Assessment: Technical Support Documentation, draft February 2020, https://www.sfdph.org/dph/files/EHSdocs/AirQuality/Air_Pollutant_Exposure_Zone_Technical_Documentation_2020.pdf, accessed February 21, 2020.

from the contribution of emissions from all modeled sources greater than 100 per 1 million persons exposed.

An additional health vulnerability layer was incorporated in the APEZ for those San Francisco ZIP codes in the worst quintile of Bay Area health vulnerability scores (ZIP codes 94102, 94103, 94110, 94124, and 94135). In these areas, the standard for identifying areas within the zone were lowered to (1) cumulative $PM_{2.5}$ concentrations greater than 9 μg/m^3, and/or (2) excess cancer risk from the contribution of emissions from all modeled sources greater than 90 per 1 million persons exposed.

Lastly, all parcels within 500 feet of a major freeway were also included in the APEZ, consistent with findings in the air board's Air Quality and Land Use Handbook: A Community Health Perspective, which suggests air pollutant levels decrease substantially at approximately 500 feet from a freeway.[49]

The project site is located within an area that meets the APEZ criteria. The highest existing background cancer risk values on the project site is 323 in 1 million, with background values ranging from 90 to 670 in 1 million within 1,000 meters of the site. The highest background $PM_{2.5}$ concentration is 11.86 μg/m^3 on the project site, with background values varying between 1.29 and 20.73 μg/m^3 within 1,000 meters of the site. The nearest offsite sensitive receptors[50] within an APEZ are the residential hotels located adjacent to the project site. Permitted stationary sources of emissions within or near 1,000 feet of the project site contributing to these risks and $PM_{2.5}$ concentrations include Clearway Energy, which supplies heating services to buildings in a two-square-mile area of the central business district of San Francisco, California. Station T located at 460 Jessie Street, and adjacent to the project site's eastern property line, houses six steam boilers. All boilers are fueled 100 percent by natural gas; however, No. 2 diesel is available as a backup fuel on some units. As a permitted source, the emissions from Station T are included in the citywide health risk modeling and are part of the existing health risk described above. Vehicle emissions along the following major roadways also contribute to these risks and $PM_{2.5}$ concentrations: Market, Mission, and 6th streets. There are no other sources of mobile activity or otherwise "non-permitted" sources (e.g., rail yards, trucking distribution facilities, and high-volume fueling stations) within 1,000 feet of the project site.

Fine Particulate Matter

In April 2011, the U.S. EPA published the Policy Assessment for the Particulate Matter Review of the National Ambient Air Quality Standards. In this document, the U.S. EPA concludes that the then-current federal annual $PM_{2.5}$ standard of 15 μg/m^3 should be revised to a level within the range of 13 to 11 μg/m^3, with evidence strongly supporting a standard within the range of 12 to 11 μg/m^3. APEZs for San Francisco are based on the health-protective $PM_{2.5}$ standard of 11 μg/m^3, as supported by the U.S. EPA's Policy Assessment for the Particulate Matter Review of the National Ambient Air Quality Standards, although lowered to 10 μg/m^3 to account for uncertainty in accurately predicting air pollutant concentrations using emissions modeling programs.

[49] California Air Resources Board, Air Quality and Land Use Handbook: A Community Health Perspective, April 2005, http://www.arb.ca.gov/ch/handbook.pdf, accessed October 16, 2019.

[50] The air district defines sensitive receptors as children, adults, and seniors who occupy or reside in residential dwellings, schools, daycare centers, hospitals, or senior-care facilities.

Excess Cancer Risk

The 100-per-1-million-persons-exposed (100 excess cancer risk) criterion discussed in San Francisco Modeling of Air Pollution Exposure Zones is based on U.S. EPA guidance for conducting air toxic analyses and making risk management decisions at the facility and community-scale level.[51] As described by the air district, the U.S. EPA considers a cancer risk of 100 per 1 million or less to be within the "acceptable" range of cancer risk. Furthermore, in the 1989 preamble to the benzene National Emissions Standards for Hazardous Air Pollutants rulemaking,[52] the U.S. EPA states that it "…strives to provide maximum feasible protection against risks to health from hazardous air pollutants by (1) protecting the greatest number of persons possible to an individual lifetime risk level no higher than approximately one in one million and (2) limiting to no higher than approximately one in ten thousand [100 in one million] the estimated risk that a person living near a plant would have if he or she were exposed to the maximum pollutant concentrations for 70 years." The 100-per-1-million-excess-cancer-cases criterion is also consistent with the ambient cancer risk in the most pristine portions of the Bay Area, based on the air district's regional modeling.[53]

Toxic Air Contaminant Monitoring

In addition to monitoring criteria pollutants, both the air district and the air board operate TAC monitoring networks in the air basin. These stations measure 10 to 15 TACs, depending on the station. The TACs selected for monitoring are those that traditionally have been found in the highest concentrations in ambient air and therefore can produce significant risk. The air district's ambient TAC monitoring station nearest to the project site is at 10 Arkansas Street, approximately 3 miles southeast of the project site. The ambient concentrations of carcinogenic TACs measured at the Arkansas Street station are presented in Table 4.2-4, 2017 Annual Average Ambient Concentrations of Carcinogenic Toxic Air Contaminants. The estimated cancer risk from a lifetime exposure (70 years) to these substances is also shown in Table 4.2-4.

When TAC measurements at this station are compared to ambient concentrations of various TACs for the Bay Area as a whole, the cancer risks associated with mean TAC concentrations in San Francisco are similar to those for the Bay Area as a whole. Therefore, the estimated average lifetime cancer risk resulting from exposure to TAC concentrations monitored at the San Francisco station does not appear to be any greater than that for the Bay Area as a region.

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[51] Air District, Revised Draft Options and Justification Report, California Environmental Quality Act Thresholds of Significance, December 2009, p. 67, http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ proposed-thresholds-of-significance-dec-7-09.pdf?la=en, accessed October 16, 2019.

[52] 54 Federal Register 38044, September 14, 1989.

[53] Air District, Revised Draft Options and Justification Report, California Environmental Quality Act Thresholds of Significance, December 2009, p. 67, http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ proposed-thresholds-of-significance-dec-7-09.pdf?la=en, accessed October 16, 2019.

Table 4.2-4: 2017 Annual Average Ambient Concentrations of Carcinogenic Toxic Air Contaminants

Gaseous TACs (ppb)	Concentration	Cancer Risk per Million
Acetaldehyde	0.69	10
Benzene	0.216	56
1,3-butadiene	0.036	39
Carbon tetrachloride	*	*
Chloroform	0.028	2
Para-dichlorobenzene	*	*
cis-1,3-dichloropropene	0.05	10
trans-1,3-dichloropropene	.05	10
Ethyl benzene	0.11	3
Ethylene dibromide	*	*
Ethylene dichloride	*	*
Formaldehyde	1.64	35
Methyl tertiary-butyl ether (MTBE)	*	*
Methylene chloride	0.114	1
Perchloroethylene	0.009	1
Trichloroethylene	0.010	0.3
Polycyclic Aromatic Hydrocarbons (ng/m^3)		
Benzo(a)pyrene	*	*
Benzo(b)fluoranthene	*	*
Benzo(k)fluoranthene	*	*
Dibenz(a,h)anthracene	*	*
Indeno(1,2,3-cd)pyrene	*	*
Particulate TACs (ng/m^3)		
Arsenic	0.92	9
Beryllium	0.150	1
Cadmium	0.70	9
Chromium (hexavalent)	*	*
Lead	*	*
Nickel	3.2	2
Total Risk for All TACs		188

Source: California Air Resources Board, Annual Toxics Summaries by Monitoring Site, 2017.

Notes: TACs = toxic air contaminants; ppb = part per billion; ng/m^3 = nanograms per cubic meter; *= indicates that insufficient or no data were available to determine the value.

a. Measured at air district monitoring station at 10 Arkansas Street in San Francisco.

b. The potential cancer risk estimates reflect the risk assessment methodology finalized by the Office of Environmental Health Hazard Assessment on March 6, 2015. Information on the agency's new risk assessment methodology can be found at http://www.oehha.ca.gov/air/hot_spots/hotspots2015.html.

Roadway-Related Pollutants

Motor vehicles are responsible for a large share of air pollution, especially in California. Vehicle tailpipe emissions contain diverse forms of particles and gases, and vehicles also contribute to particulates by generating road dust through tire wear. Epidemiological studies have demonstrated that people living close to freeways or busy roadways have poorer health outcomes, including increased asthma symptoms and respiratory infections, and decreased pulmonary function and lung development in children. Air pollution monitoring conducted in conjunction with epidemiological studies has confirmed that roadway-related health effects vary with modeled exposure to particulate matter and NO_2. In traffic-related studies, the additional non-cancer health risk attributable to roadway proximity was seen within 1,000 feet of the roadway and strongest within 300 feet.[54] As a result, the air board recommends that new sensitive land uses not be located within 500 feet of a freeway or urban roads carrying 100,000 vehicles per day.

Diesel Particulate Matter

The air board identified DPM as a TAC in 1998 based primarily on evidence demonstrating cancer effects in humans. The exhaust from diesel engines includes hundreds of different gaseous and particulate components, many of which are toxic. Mobile sources such as trucks and buses are among the primary sources of diesel emissions, and concentrations of DPM are higher near heavily traveled highways. The air board estimated that, as of 2000, the average Bay Area cancer risk from exposure to DPM, based on a population-weighted average ambient DPM concentration, is approximately 480 in 1 million, which is much higher than the risk associated with any other toxic air pollutant routinely measured in the region. The statewide risk from DPM, as determined by the air board, declined from 750 in 1 million in 1990 to 570 in 1 million in 1995; by 2000, the air board estimated the average statewide cancer risk from DPM at 540 in 1 million.[55,56]

In 2000, the air board approved a comprehensive Diesel Risk Reduction Plan to reduce diesel emissions from both new and existing diesel-fueled vehicles and engines. Subsequent regulations approved by the air board apply to new trucks and diesel fuel. With new controls and fuel requirements, a medium heavy-duty or heavy heavy-duty truck built in 2010 or later would have particulate exhaust emissions that are more than 50 times lower than a medium heavy-duty or heavy heavy-duty truck built before 1990.[57] The regulations are anticipated to result in an 80 percent decrease in statewide diesel health risk

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[54] California Air Resources Board, Air Quality and Land Use Handbook: A Community Health Perspective, April 2005, https://www.arb.ca.gov/ch/handbook.pdf, accessed October 16, 2019.

[55] California Air Resources Board, California Almanac of Emissions and Air Quality – 2009 Edition, Table 5-44 and Figure 5-12, http://www.arb.ca.gov/aqd/almanac/almanac09/chap509.htm, accessed October 16, 2019.

[56] This calculated cancer risk value from ambient air exposure in the Bay Area can be compared against the lifetime probability of being diagnosed with cancer in the United States from all causes, which for men is more than 40 percent (based on a sampling of 17 regions nationwide), or more than 400,000 in 1 million, according to the American Cancer Society. American Cancer Society, Lifetime Risk of Developing or Dying from Cancer, last revised March 23, 2016, http://www.cancer.org/cancer/cancerbasics/ lifetime-probability-of-developing-or-dying-from-cancer, accessed October 16, 2019.

[57] Pollution Engineering, New Clean Diesel Fuel Rules Start, July 2006; Air Resources Board, Methods to Find the Cost-Effectiveness of Funding Air Quality Projects for Evaluating Motor Vehicle Registration Fee Projects and Congestion Mitigation and Air Quality Improvement Projects, Table 5-A, https://www.arb.ca.gov/planning/ tsaq/eval/evalTables.pdf, accessed October 16, 2019.

in 2020 compared with the diesel risk in 2000. Despite notable emission reductions, the air board recommends that proximity to sources of DPM emissions be considered in the siting of new sensitive land uses. The air board notes that these recommendations are advisory and should not be interpreted as defined "buffer zones" and that local agencies must balance other considerations, including transportation needs, the benefits of urban infill, community economic development priorities, and other quality-of-life issues. The position of the air board is that, with careful evaluation of exposure and health risks, as well as affirmative steps to reduce risks where necessary, infill, mixed-use, higher-density, and transit-oriented development, as well as other concepts that benefit regional air quality, can be compatible with protecting the health of individuals at the neighborhood level.[58]

Sensitive Receptors

Air quality does not affect every individual in the population in the same way, and some groups are more sensitive to adverse health effects than others. The population subgroups that are sensitive to the health effects of air pollutants include the elderly and the young; those with higher rates of respiratory disease, such as asthma and chronic obstructive pulmonary disease; and those with other environmental or occupational health exposures (e.g., indoor air quality) that affect cardiovascular or respiratory diseases. The air district defines sensitive receptors as children, adults, and seniors who occupy or reside in residential dwellings, schools, daycare centers, hospitals, or senior-care facilities. Workers are not considered sensitive receptors because all employers must follow regulations set forth by the Occupational Safety and Health Administration to ensure the health and well-being of their employees.[59]

Existing sensitive receptors evaluated in this analysis include a representative sample of known residents (children and adults) in the surrounding neighborhood approximately 3,280 feet (1,000 meters) surrounding the project site. The closest residential receptors are located adjacent to the project site on Sixth Street. The closest non-residential sensitive receptors include the De Marillac Academy, located approximately 1,157 feet west of the project site and the San Francisco Christian Academy located approximately 1,237 feet northwest. The citywide modeling effort, discussed under San Francisco Modeling of Air Pollution Exposure Zones (below), evaluated all sensitive receptors as residential receptors because they have longer exposure durations based on the recommended health risk methodology from the Office of Environmental Health Hazard and Assessment, and are therefore expected to have greater health impacts.

4.2.3 Regulatory Framework

Federal Regulations

Federal Clean Air Act

The 1970 Clean Air Act (last amended in 1990) requires that regional planning and air pollution control agencies prepare a regional air quality plan to outline the measures by which both stationary and

[58] California Air Resources Board, Air Quality and Land Use Handbook: A Community Health Perspective, April 2005, http://www.arb.ca.gov/ch/handbook.pdf, accessed October 16, 2019.

[59] Air District, Recommended Methods for Screening and Modeling Local Risks and Hazards, May 2011, p. 12

mobile sources of pollutants are planned to be controlled in order to achieve all standards by the deadlines specified in the act. These ambient air quality standards are intended to protect the public health and welfare, and they specify the concentration of pollutants (with an ample margin of safety) to which the public can be exposed without adverse health effects. They are designed in consideration of those segments of the public that are most susceptible to respiratory distress, including asthmatics, the very young, the elderly, people who are weak from other illness or disease, and persons who engage in strenuous work or exercise. Healthy adults can tolerate occasional exposure to air pollution levels that are somewhat above ambient air quality standards without observing adverse health effects.

The current attainment status for the air basin, with respect to federal standards, is summarized in Table 4.2-2. In general, the air basin experiences low concentrations of most pollutants compared to federal standards, except for particulate matter (PM_{10} and $PM_{2.5}$), for which standards are exceeded periodically (see Table 4.2-1).

Emission Standards for New Off-Road Equipment

Before 1994, there were no standards to limit the amount of emissions from off-road equipment, which includes construction equipment. In 1994, the U.S. EPA established emission standards for hydrocarbons, NO_X, CO, and particulate matter to regulate new pieces of off-road equipment. These emission standards came to be known as Tier 1. Since that time, increasingly more stringent Tier 2, Tier 3, and Tier 4 (interim and final) standards were adopted by the U.S. EPA as well as the air board. Each adopted emission standard was phased in over time. New engines built in or after 2015 across all horsepower sizes must meet Tier 4 final emission standards. In other words, new engines cannot exceed the emissions established for Tier 4 final emissions standards.

State Regulations

California Clean Air Act

Although the federal Clean Air Act established national ambient air quality standards, individual states retained the option to adopt more stringent standards and include other pollution sources. California established its own air quality standards when the federal standards were established. Because of the unique meteorological problems in California, there is considerable diversity between the state and national ambient air quality standards, as shown in Table 4.2-2. California ambient standards are as protective as national ambient standards and often more stringent. In 1988, California passed the California Clean Air Act (California Health and Safety Code section 39600 et seq.), which, like its federal counterpart, required the designation of areas as attainment or non-attainment areas, but based these designations on state ambient air quality standards rather than the federal standards. As indicated in Table 4.2-2, the air basin is designated "non-attainment" for state ozone, PM_{10}, and $PM_{2.5}$ standards and "attainment" or "unclassified" for other pollutants.

Toxic Air Contaminants

In 2005, the air board approved a regulatory measure to reduce emissions of toxic and criteria pollutants by limiting the idling of new heavy-duty diesel vehicles. The regulations limit the idling of commercial motor vehicles (including buses and trucks) within 100 feet of a school or residential area to five consecutive minutes or aggregate periods of five minutes in any one hour. Buses or vehicles also must turn off their engines upon stopping at a school and must not turn their engines on more than 30

seconds before beginning to depart from a school. Also, in accordance with Senate Bill 352, adopted in 2003, public schools cannot be located within 500 feet of a freeway or busy traffic corridor (Education Code section 17213; Public Resources Code section 21151.8).

Tanner Air Toxics Act and Air Toxics Hot Spots Information and Assessment Act

TACs in California are regulated primarily through the Tanner Air Toxics Act (Assembly Bill 1807) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (Assembly Bill 2588), also known as the Hot Spots Act. To date, the air board has identified more than 21 TACs and adopted the U.S. EPA's list of hazardous air pollutants as TACs.

California Air Resources Board's In-Use Off-Road Diesel-Fueled Fleets Regulation

In 2007, the air board adopted a regulation to reduce DPM and NO_X emissions from in-use off-road heavy-duty diesel vehicles in California.[60] The regulation imposes limits on vehicle idling and requires fleets to reduce emissions by retiring, replacing, repowering, or installing exhaust retrofits on older engines. In December 2010, major amendments were made to the regulation, including a delay of the compliance date for the first performance standards to no earlier than January 1, 2014.

Regional Regulations and Plans

Bay Area Air Quality Management District

The air district is the regional agency with jurisdiction over the nine-county region located in the air basin. The Association of Bay Area Governments, Metropolitan Transportation Commission, county transportation agencies, cities and counties, and various non-governmental organizations also participate in efforts to improve air quality through a variety of programs. These programs include the adoption of regulations and policies as well as implementation of extensive education and public outreach programs. The air district is responsible for maintaining air quality in the region. Specifically, the air district is responsible for monitoring ambient air pollutant levels and developing and implementing strategies to attain the applicable federal and state standards. However, the air district does not have authority to regulate emissions from motor vehicles. Specific rules and regulations adopted by the air district limit emissions generated by various stationary sources and identify specific pollution reduction measures that must be implemented in association with various activities. These rules regulate not only emissions of the six criteria air pollutants but also TACs through the air district's permitting process and standards of operation. Through this permitting process, including an annual permit review, the air district monitors the generation of stationary emissions and uses this information to develop its air quality plans. Any sources of stationary emissions constructed as part of the proposed project, such as the diesel emergency back-up generator, would be subject to air district rules and regulations. Both federal and state ozone plans rely heavily on stationary-source control measures set forth in the air district's rules and regulations.

[60] California Code of Regulations, Title 13, sections 2449, 2449.1, 2449.2, and 2449.3.

2017 Bay Area Clean Air Plan

The air district adopted the 2017 Bay Area Clean Air Plan, Spare the Air, Cool the Climate, on April 19, 2017, to provide a regional strategy to improve Bay Area air quality and meet public health goals.[61] The control strategy described in the 2017 Bay Area Clean Air Plan includes a wide range of control measures to reduce emissions and lower ambient concentrations of harmful pollutants, safeguard public health by reducing exposure to air pollutants that pose the greatest health risk, and reducing GHG emissions to protect the climate. The 2017 Bay Area Clean Air Plan addresses four categories of pollutants: ground-level ozone and its key precursors, ROG and NO_X; particulate matter, primarily $PM_{2.5}$ and precursors to secondary $PM_{2.5}$; air toxics; and GHGs. The control measures are categorized according to an economic sector framework that includes stationary sources, transportation, energy, buildings, agriculture, natural and working lands, waste management, and water measures.

Particulate Matter Plan

To fulfill federal air quality planning requirements, the air district adopted a $PM_{2.5}$ emissions inventory for 2010, which was presented at a public hearing on November 7, 2012. The 2017 Bay Area Clean Air Plan also included several measures for reducing particulate matter emissions from stationary sources and wood burning. On January 9, 2013, the U.S. EPA issued a final rule, determining that the Bay Area had attained the 24-hour $PM_{2.5}$ national ambient air quality standard and thereby suspended federal State Implementation Plan requirements for the air basin.[62] Despite this U.S. EPA action, the air basin will continue to be designated as a non-attainment area for the national 24-hour $PM_{2.5}$ standard until the air district submits a redesignation request and a maintenance plan to the U.S. EPA and the U.S. EPA approves the proposed redesignation.

2001 Ozone Attainment Plan

The air district adopted the Bay Area Ozone Attainment Plan in 2001 in response to the U.S. EPA's finding that the Bay Area had failed to attain the national ambient air quality standard for ozone. The plan includes a control strategy for ozone and its precursors to ensure a reduction in emissions from stationary sources, mobile sources, and the transportation sector.[63]

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[61] Air District, 2017 Bay Area Clean Air Plan: Spare the Air, Cool the Climate. A Blueprint for Clean Air and Climate Protection in the Bay Area, April 19, 2017, http://www.baaqmd.gov/~/media/files/planningand-research/plans/2017-clean-air-plan/attachment-a_-proposed-final-cap-vol-1-pdf.pdf?la=en, accessed October 16, 2019.

[62] U.S. EPA, Determination of Attainment for the San Francisco Bay Area Nonattainment Area for the 2006 Fine Particle Standard, California, Determination Regarding Applicability of Clean Air Act Requirements, January 9, 2013, https://www.federalregister.gov/documents/2013/01/09/2013-00170/determination-of-attainment-forthe-san-francisco-bay-area-nonattainment-area-for-the-2006-fine, accessed October 16, 2019.

[63] Air District, Revised San Francisco Bay Area Ozone Attainment Plan for the 1-Hour National Ozone Standard, adopted October 24, 2001, http://www.baaqmd.gov/~/media/files/planning-and-research/plans/2001- ozone-attainment-plan/oap_2001.pdf, accessed October 16, 2019.

Regulation 2, Rule 5

The air district regulates back-up emergency generators, fire pumps, and other sources of TACs through its New Source Review (Regulation 2, Rule 2)[64] and New Source Review for Air Toxics (Regulation 2, Rule 54)[65] permitting process. Although emergency generators are intended to be used only during periods of power outages, monthly testing of each generator is required; however, the air district limits testing to no more than 50 hours per year. Each emergency generator is assumed to meet a minimum of Tier 2 emission standards (before control measures). As part of the permitting process, the air district requires implementation of best available control technology for toxics and denies permission to construct or operate any new or modified source of TACs that exceeds a cancer risk of 10 in 1 million or a chronic or acute hazard index of 1.0.

Metropolitan Transportation Commission and Association of Bay Area Governments-Plan Bay Area

On July 18, 2013, the Metropolitan Transportation Commission and the Association of Bay Area Governments approved Plan Bay Area, which includes integrated land use and transportation strategies for the region. Plan Bay Area was developed through OneBayArea, a joint initiative between the Association of Bay Area Governments, the air district, the Metropolitan Transportation Commission, and the San Francisco Bay Conservation and Development Commission. The plan's transportation policies focus on maintaining the extensive transportation network and using the system more efficiently to handle the density in Bay Area transportation cores.[66] Assumptions for land use development are from local and regional planning documents. Emission forecasts in the 2017 Bay Area Clean Air Plan rely on projections regarding vehicle miles traveled, population, employment, and land use made by local jurisdictions during development of Plan Bay Area. In July 2017, the Metropolitan Transportation Commission and the Association of Bay Area Governments adopted an update to the 2013 plan: Plan Bay Area 2040. The updated plan addresses housing and economic issues and provides strategies concerning the area's transportation and land use goals. The plan's land use and transportation strategies achieve two mandated requirements for reductions in per-capita CO_2 emissions from passenger vehicles and adequate housing for the Bay Area's expected population growth through 2040.[67]

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[64] Air District, Regulation 2, Permits, Rule 2, New Source Review, adopted December 6, 2017, http://www.baaqmd.gov/~/media/dotgov/files/rules/reg-2-rule-2-new-source-review/documents/rg0202.pdf ?la=en, accessed October 16, 2019.

[65] Air District, Regulation 2, Permits, Rule 5, New Source Review of Toxic Air Contaminants, adopted December 2016, http://www.baaqmd.gov/~/media/dotgov/files/rules/reg-2-rule-5-new-source-review-oftoxic-air-contaminants/documents/rg0205_120716-pdf.pdf?la=en, accessed October 16, 2019.

[66] Association of Bay Area Governments and Metropolitan Transportation Commission, Plan Bay Area: Regional Transportation Plan and Sustainable Communities Strategy for the San Francisco Bay Area, 2013–2040, adopted July 18, 2013, https://mtc.ca.gov/our-work/plans-projects/plan-bay-area-2040/plan-bay-area, accessed October 16, 2019.

[67] Association of Bay Area Governments and Metropolitan Transportation Commission, Plan Bay Area 2040: Regional Transportation Plan and Sustainable Communities Strategy for the San Francisco Bay Area, 2017–2040, adopted July 26, 2017, http://2040.planbayarea.org/reports and http://2040.planbayarea.org/cdn/farfuture/u_7TKELkH2s3AAiOhCyh9Q9QlWEZIdYcJzi2QDCZuIs/1510696833/sites/default/files/2017-11/Fi nal_Plan_Bay_Area_2040.pdf, accessed October 17, 2019.

Local Regulations and Plans

San Francisco General Plan Air Quality Element

The San Francisco General Plan includes the 1997 air quality element.[68] The objectives specified by the city include the following:

- Objective 1: Adhere to state and federal air quality standards and regional programs.
- Objective 2: Reduce mobile sources of air pollution through implementation of the transportation element of the general plan.
- Objective 3: Decrease the air quality impacts of development by coordination of land use and transportation decisions.
- Objective 4: Improve air quality by increasing public awareness regarding the negative health effects of pollutants generated by stationary and mobile sources.
- Objective 5: Minimize particulate matter emissions from road and construction sites.
- Objective 6: Link the positive effects of energy conservation and waste management to emission reductions.

San Francisco Construction Dust Control Ordinance

In 2008, the city adopted San Francisco Health Code article 22B and San Francisco Building Code section 106.A.3.2.6, which collectively constitute the Construction Dust Control Ordinance.[69] The ordinance requires all site preparation work, demolition, or other construction activities within San Francisco that have the potential to create dust or expose or disturb more than 10 cubic yards or 500 square feet of soil to comply with specified dust control measures whether or not the activity requires a permit from the Department of Building Inspection. For projects affecting more than 0.5 acre, the Construction Dust Control Ordinance requires that the project sponsor submit a dust control plan for approval by the San Francisco Department of Public Health prior to issuance of a building permit by the Department of Building Inspection.

Building permits will not be issued without written notification from the Director of Public Health stating that the applicant has a site-specific dust control plan, unless the director waives the requirement. The Construction Dust Control Ordinance requires project sponsors and contractors responsible for construction activities to control construction dust on the site or implement other practices that result in equivalent dust control that are acceptable to the Director of Public Health.

Dust suppression activities may include watering all active construction areas to prevent dust from becoming airborne; increased watering may be necessary whenever wind speeds exceed 15 miles per hour. Reclaimed water must be used if required by article 21, section 1100 et seq., of the San Francisco Public Works Code.

[68] San Francisco Planning Department, San Francisco General Plan, air quality element, July 1997, updated in 2000

[69] Ordinance 176-08, effective July 30, 2008, https://www.sfdph.org/dph/EH/Air/Dust.asp, accessed October 16, 2019.

The project site is approximately 0.66 acres; therefore, the project sponsor would be required to prepare a dust control plan for approval by the San Francisco Department of Public Health.

San Francisco Health Code Provisions for Urban Infill Development (Article 38)

San Francisco adopted article 38 of the Health Code in 2008, with revisions that took effect in December 2014. The revised code requires sensitive land use developments within mapped APEZs to incorporate Minimum Efficiency Reporting Value 13 (MERV-13) or equivalent ventilation systems to remove particulates from outdoor air.[70] This regulation also applies to the conversion of uses to a sensitive use (such as a residential use, a senior care facility, or a daycare center). Article 38 is applicable to the proposed project because the project site is located within a mapped APEZ, according to the San Francisco Department of Public Health.[71]

4.2.4 Impacts and Mitigation Measures

This section describes the impact analysis related to air quality for the proposed project. It describes the methods used to determine the impacts of the proposed project and lists the thresholds used to conclude whether an impact would be significant. Measures to mitigate (i.e., avoid, minimize, rectify, reduce, eliminate, or compensate for) significant impacts accompany the discussion of each identified significant impact. The potential for the proposed project to result in significant odor and greenhouse gas emissions is addressed in the initial study in Section E.7 Air Quality (pages 153-154) and Section E.8 Greenhouse Gas Emissions (pages 155-158). The initial study found impacts to these resource topics to be less than significant and therefore these topics are not addressed further in this EIR.

Significance Criteria

The criteria for determining the significance of impacts in this analysis are consistent with the environmental checklist in Appendix G of the State CEQA Guidelines, which has been modified by the planning department. For the purpose of this analysis, the following criteria were used to determine whether implementing the proposed project would result in a significant air quality impact:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Result in a cumulatively considerable net increase in any criteria pollutant for which the project region is in non-attainment status under an applicable federal, state, or regional ambient air quality standard; or
- Expose sensitive receptors to substantial pollutant concentrations.

[70] The MERV rating is a measurement scale designed by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers to rate the effectiveness of air filters. The scale is designed to represent the worst-case performance of a filter when dealing with particles in the range of 0.3 to 10 micrometers. The MERV rating system ranges from 1 to 16, with higher MERV ratings correspond to a greater percentage of particles captured on each pass.

[71] San Francisco Department of Public Health, Air Pollution Exposure Zone Maps, https://www.sfdph.org/dph/files/EHSdocs/AirQuality/AirPollutantExposureZoneMap_2020.pdf, accessed February 21, 2020.

Approach to Analysis

In general, a project could result in two types of potential air quality impacts: impacts from construction activities and impacts from project operations due to increased vehicle travel and new sources of emissions (e.g., natural gas combustion, one or more emergency diesel generators).

Direct impacts are separated into impacts from criteria air pollutant emissions, which are generally regional in nature, and impacts associated with exposure to $PM_{2.5}$ and TACs, which result in localized health impacts and expressed in terms of exposure to $PM_{2.5}$ concentrations and the probability of contracting cancer per 1 million persons exposed to TAC concentrations. The assessment of criteria air pollutant impacts addresses the second bulleted significance threshold identified above. The assessment of exposure to $PM_{2.5}$ concentrations and excess cancer risk address the third bulleted significance threshold identified above.

The air quality analysis conducted for this project uses emission factors, models, and tools distributed by a variety of agencies, including the air board, the California Air Pollution Officers Association, the California Office of Environmental Health Hazard Assessment (OEHHA),[72] and the U.S. EPA. In addition, the analysis includes methodologies identified in the air district's *CEQA Air Quality Guidelines*.[73]

Project Features

The project site is located within an APEZ, which is an area designated by the San Francisco Department of Public Health as having poor air quality.[74] The proposed project's HVAC equipment is required to be designed to include a MERV-13 filtration system in accordance with Health Code article 38.

Air Quality Plan

The applicable air quality plan is the air district's 2017 Bay Area Clean Air Plan. Consistency with the 2017 Bay Area Clean Air Plan can be determined if the project would support the goals of the plan, would include applicable control measures from the plan, and would not disrupt or hinder implementation of any control measures from the plan. Consistency with the 2017 Bay Area Clean Air Plan is the basis for determining whether the proposed project would conflict with or obstruct implementation of an applicable air quality plan.

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[72] CalEPA. 2015. Air Toxics Hot Spots Program, Risk Assessment Guidelines, Guidance Manual for Preparation of Health Risk Assessments, Office of Environmental Health Hazard Assessment, February, http://oehha.ca.gov/air/hot_spots/hotspots2015.html.

[73] Air District, CEQA Air Quality Guidelines, May 2017, http://www.baaqmd.gov/~/media/files/ planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en, accessed October 16, 2019.

[74] San Francisco Department of Public Health and San Francisco Planning Department, Air Pollutant Exposure Zone Map – Citywide, April 10, 2014, https://www.sfdph.org/dph/files/EHSdocs/AirQuality/AirPollutantExposureZoneMap.pdf, Accessed October 28, 2019.

Criteria Air Pollutants

As described above under Regulatory Framework, the air basin experiences low concentrations of most pollutants with respect to federal and state standards and is designated as either in attainment or unclassified for most criteria pollutants, with the exception of ozone, $PM_{2.5}$, and PM_{10}, which are designated as non-attainment for the state and federal air quality standards.

By definition, regional air pollution is largely a cumulative impact in that no single project is large enough by itself to result in non-attainment of air quality standards. Instead, a project's individual emissions are considered to contribute to existing cumulative air quality conditions. If a project's contribution to cumulative air quality conditions is considerable, then the project's impact on air quality would be considered significant.[75]

Table 4.2-5, Criteria Air Pollutant Thresholds, identifies quantitative criteria air pollutant significance thresholds. The table is followed by a discussion of each threshold. Projects that would result in criteria pollutant emissions that would be below these significance thresholds would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is designated as non-attainment under state or federal air quality standards. Both the average daily and maximum annual significance thresholds apply to operational emissions from a given project. Construction emissions are assessed solely with respect to the average daily thresholds, pursuant to the air district's guidance, because of the generally temporary nature of construction-related emissions.[76]

Table 4.2-5: Criteria Air Pollutant Thresholds

Pollutant	Average Daily Emissions (pounds per day)	Maximum Annual Emissions (tons per year)
ROG	54	10
NO_x	54	10
PM_{10}	82	15
$PM_{2.5}$	84	10
Fugitive Dust	Construction dust ordinance or other best management practices to control fugitive dust emissions	

Source: Air District, CEQA Air Quality Guidelines, May 2017.

The thresholds of significance for criteria air pollutants are based on substantial evidence, as presented in Appendix D of the air district's 2017 *CEQA Air Quality Guidelines* and 2009 *Revised Draft Options and Justification Report, CEQA Thresholds of Significance*.[77]

[75] Air District, CEQA Air Quality Guidelines, May 2017, http://www.baaqmd.gov/~/media/files/ planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en, accessed October 16, 2019.

[76] Ibid.

[77] Ibid., p. 2-1 to 2-3 and Appendix D; Air District, Revised Draft Options and Justification Report, California Environmental Quality Act Thresholds of Significance, October 2009, p. 16-17.

The potential for a project to result in a cumulatively considerable net increase in criteria air pollutants that may contribute to an existing or projected air quality violation is based on the emissions limits for stationary sources set by the federal and California Clean Air Acts. To ensure that new stationary sources do not cause or contribute to a violation of an air quality standard, the air district's Regulation 2, Rule 2, requires any new source that emits criteria air pollutants above a specified emissions limit to offset those emissions. For ozone precursors ROG and NO_X, the offset emissions level is an annual average of 10 tons per year (or 54 pounds per day).[78] These levels represent emissions below which new sources are not anticipated to contribute to an air quality violation or result in a considerable net increase in criteria air pollutants that could result in increased health effects.

The federal New Source Review program was created under the federal Clean Air Act to ensure that stationary sources of air pollution are constructed in a manner that is consistent with attainment of federal health-based ambient air quality standards. For PM_{10} and $PM_{2.5}$, the emissions limit under the New Source Review program is 15 tons per year (82 pounds per day) and 10 tons per year (54 pounds per day), respectively. These emissions limits represent levels below which a source alone is not expected to have a significant impact on air quality.[79]

Although the regulations specified above apply to new or modified stationary sources, land use development projects generate ROG, NO_X, PM_{10}, and $PM_{2.5}$ emissions as a result of increases in vehicle trips, energy use, the application of architectural coatings, and construction activities. Therefore, the identified thresholds can be applied to the construction and operational phases of land use projects. Projects that would result in emissions below the thresholds would not be considered projects that would contribute considerably to non-attainment criteria air pollutants.

Fugitive dust emissions are typically generated during construction phases. Studies have shown that the application of best management practices at construction sites significantly controls fugitive dust,[80] and individual measures have been shown to reduce fugitive dust by anywhere from 30 to 90 percent.[81] The air district has identified eight best management practices to control fugitive dust emissions from construction activities.[82] San Francisco's Construction Dust Control Ordinance requires a number of fugitive dust control measures to ensure that construction projects do not result in visible dust. The project would be subject to the requirements of the Construction Dust Control Ordinance, which is the basis for determining the significance of air quality impacts from fugitive dust emissions.

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[78] Air District, Revised Draft Options and Justification Report, California Environmental Quality Act Thresholds of Significance, December 2009, p. 67, http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ proposed-thresholds-of-significance-dec-7-09.pdf?la=en, accessed October 16, 2019.

[79] Ibid, p. 16.

[80] Western Regional Air Partnership, WRAP Fugitive Dust Handbook, September 7, 2006, wrapair.org/forums/dejf/fdh/content/FDHandbook_Rev_06.pdf, accessed October 17, 2019.

[81] Air District, Revised Draft Options and Justification Report, California Environmental Quality Act Thresholds of Significance, December 2009, p. 27, http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ proposed-thresholds-of-significance-dec-7-09.pdf?la=en, accessed October 16, 2019.

[82] Such as a tunnel, underpass, or urban canyon between buildings where a free flow of air currents can be impeded.

Other Criteria Pollutants

Regional concentrations of CO and SO_2 in the Bay Area have not exceeded the state standards for more than two decades. The primary source of CO emissions from development projects is vehicle traffic. Construction-related SO_2 emissions represent a negligible portion of total basin-wide emissions, and construction-related CO emissions represent less than 5 percent of the Bay Area's total basin-wide CO emissions. As discussed previously, the Bay Area is in attainment for both CO and SO_2. Furthermore, the air district has demonstrated, based on modeling, that to exceed the California ambient air quality standard of 9.0 ppm (8-hour average) or 20.0 ppm (1-hour average) for CO, project traffic in addition to existing traffic would need to exceed 44,000 vehicles per hour at affected intersections (or 24,000 vehicles per hour where vertical and/or horizontal mixing is limited). The transportation analysis included as Appendix B in the initial study indicates that the intersection in the project area with the greatest vehicle volume would be the 5th and Mission, with peak-hour traffic volumes of 4,440 vehicles per hour in 2040 with the project and future traffic growth. This is less than 44,000 vehicles per hour. Given the Bay Area's attainment status and the limited CO and SO_2 emissions that could result from project implementation, the proposed project would not result in a cumulatively considerable net increase in CO or SO_2, and a quantitative analysis is not required.

Local Health Risks and Hazards

As discussed previously, the proposed project's onsite receptors and the nearest offsite receptors are located within an area that currently meets the APEZ criteria. Therefore, existing health risk impacts to sensitive receptors are significant. A health risk assessment was conducted to determine whether the proposed project's contribution to existing health risk impacts would be considerable. For project's located within the APEZ, a considerable contribution is defined as an increased cancer risk of 7.0 per million persons exposed or $PM_{2.5}$ concentrations of 0.2 $\mu g/m^3$. These thresholds are more stringent than the air district's thresholds for determining a cumulatively considerable contribution to health risks, but appropriate for locations that experience higher levels of air pollution and associated health risk.[83,84]

As part of the environmental review for the proposed project, a health risk assessment was conducted to provide quantitative estimates of health risks from exposure to TACs as a result of the proposed project. The health risk assessment examines all sensitive receptors within 1,000 meters of the project boundary. Figure 19 shows the extent of the area studied for localized air quality impacts.

In order to evaluate health impacts to onsite and offsite sensitive receptors, receptors were placed at locations collocated with the receptors used in the citywide health risk modeling and within 1,000 meters of the proposed project site. This approach of collocating sensitive receptor locations with those

[83] Air District, CEQA Air Quality Guidelines, May 2017, http://www.baaqmd.gov/~/media/files/ planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en, accessed October 29, 2019.

[84] The air district's thresholds for determining a considerable health risk contribution from $PM_{2.5}$ emissions are 0.3 $\mu g/m^3$ and an excess cancer risk of 10 per million persons exposed. The city's $PM_{2.5}$ significance threshold of 0.2 $\mu g/m^3$ is based on a 0.28 percent increase in non-injury mortality or an increase of about twenty-one excess deaths per 1,000,000 population per year from non-injury causes in San Francisco. This information is based on Jerrett M et al., Spatial Analysis of Air Pollution and Mortality in Los Angeles, Epidemiology 16 (2005): 727–736. The cancer risk has been proportionally reduced to result in a significance criteria of 7 per million persons exposed.

in the citywide health risk modeling facilitates the assessment of cumulative health risks and $PM_{2.5}$ concentrations.

Exposure assessment guidance established the assumption that people in residences would be exposed to air pollution 24 hours per day, 350 days per year for 30 years as the basis for calculating cancer risk in any health risk assessment. Therefore, the assessment of residents' air pollutant exposure typically results in the greatest adverse health outcomes of all population groups. In accordance with OEHHA guidance, the estimated excess lifetime cancer risk for a resident was adjusted using the age sensitivity factors recommended in OEHHA's Technical Support Document for Cancer Potency Factors. This approach accounts for an "anticipated special sensitivity to carcinogens" of infants and children. Cancer risk estimates were weighted by a factor of 10 for exposures that occur from the third trimester of pregnancy to 2 years of age (labeled by OEHHA as "3rd trimester" and "0 < 2") and by a factor of three for exposures that occur from 2 through 15 years of age ("2 < 16"). No weighting factor (i.e., an age sensitivity factor of one, which is equivalent to no adjustment) was applied to ages 16 and older.

Cumulative Impacts

As discussed above, the contribution of a project's individual air emissions to regional air quality impacts is, by its nature, a cumulative effect. Emissions from reasonably foreseeable future projects in the vicinity would contribute to adverse regional air quality impacts on a cumulative basis. No single project by itself would be large enough to result in non-attainment of ambient air quality standards. Instead, a project's individual emissions contribute to existing cumulative air quality conditions.[85] As described above, the project-level thresholds for criteria air pollutants are based on levels below which a project would not be anticipated to result in a considerable contribution to non-attainment criteria air pollutants. Therefore, if a project's emissions are below the project-level thresholds, the project would not result in a considerable contribution to cumulative regional air quality impacts. As a result, no separate cumulative impact statement is included for the project's impact with respect to regional air quality.

[85] Air District, CEQA Air Quality Guidelines, May 2017, http://www.baaqmd.gov/~/media/files/ planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en, accessed October 29, 2019

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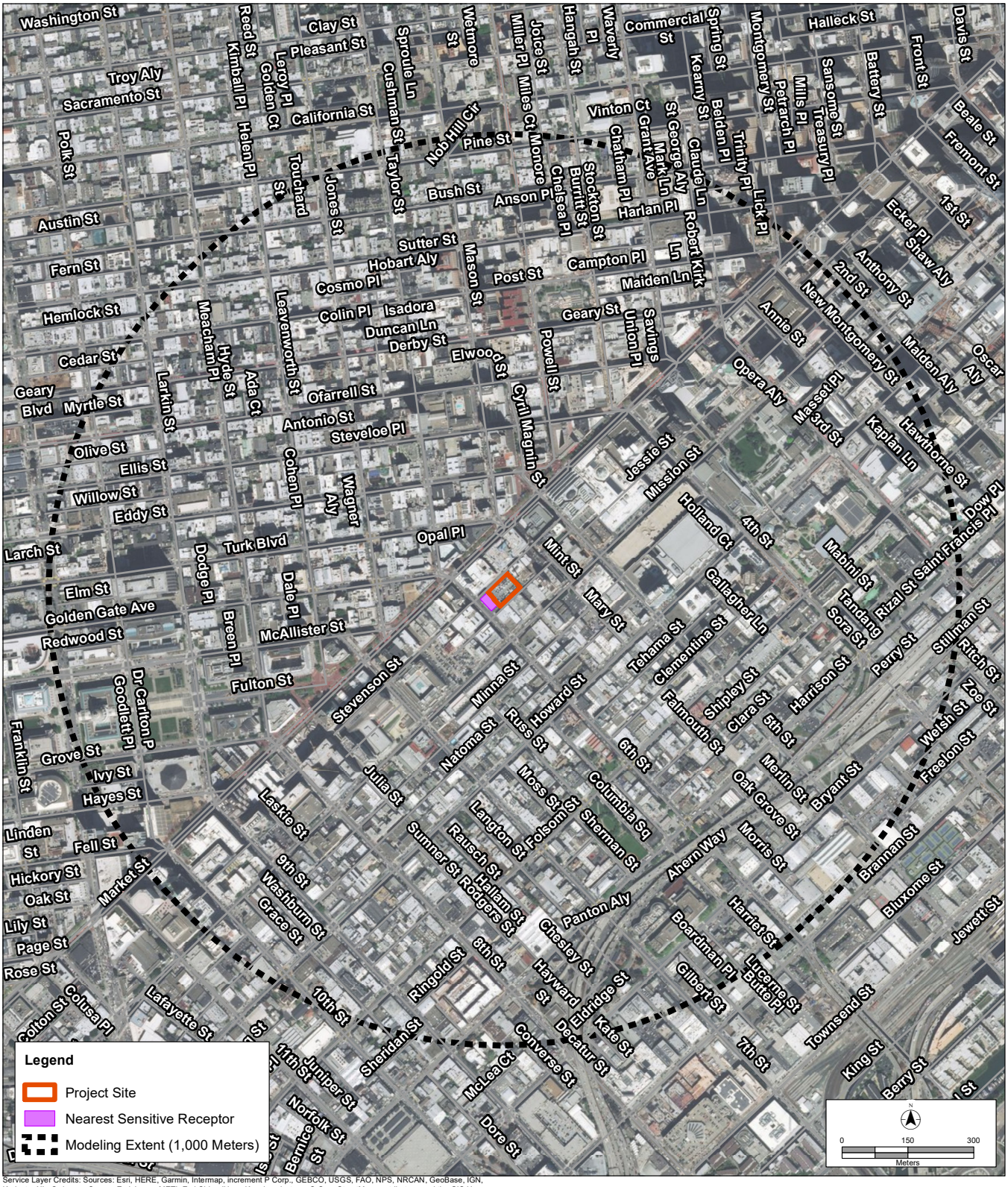

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Case No. 2017-014833ENV

Figure 19: Air Quality Modeling Extent and Nearest Sensitive Receptor

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Similarly, the health risk assessment takes into account the cumulative contribution of localized health risks to sensitive receptors from sources included in the citywide health risk modeling plus the proposed project's sources. The cumulative health risk analysis provides a qualitative and semi-quantitative discussion of additional health risks that may occur as a result of reasonably foreseeable cumulative projects. However, because the project site is already located within an air pollutant exposure zone, cumulative health risks are significant and an exceedance of the project-level thresholds discussed above (an increased cancer risk of 7.0 per million persons exposed or $PM_{2.5}$ concentrations of 0.2 $\mu g/m^3$) would constitute a considerable contribution to cumulative health risks.

Impact Evaluation

The following analysis evaluates potential air quality impacts, including those related to criteria air pollutants and toxic air contaminants, that could result from construction and operation of the proposed project.

Impact AQ-1: During construction, the proposed project would not result in a cumulatively considerable net increase in non-attainment criteria air pollutants. (*Less than Significant*)

Construction activities required for the proposed project would include site preparation/demolition, excavation/shoring, foundation/below grade construction, building construction, exterior finishing, and site work/paving. These construction activities would require the use of heavy trucks, excavating and grading equipment, material loaders, dozers, and other mobile and stationary construction equipment. Fugitive dust emissions during construction would be generated during ground-disturbing activities, materials handling, and mobile equipment use on unimproved surfaces. Fugitive ROG emissions would be generated during application of architectural coatings. Equipment exhaust would be generated from construction worker vehicle trips, material truck trips, and the operation of construction equipment onsite.

Demolition and construction of the proposed project are estimated to take approximately 36 months from groundbreaking, which is anticipated to occur in 2021. The proposed project would be constructed in one continuous phase and all construction materials would be accommodated onsite.

Fugitive Dust

Project-related demolition, excavation, grading, and other construction activities may cause wind-blown dust that could contribute particulate matter to the local atmosphere. Despite the established federal standards for air pollutants and ongoing implementation of state and regional air quality control plans, air pollutants continue to have impacts on human health throughout the country.

Dust can be an irritant, causing watery eyes or irritating the lungs, nose, and throat. Depending on exposure, particulate matter in general can cause adverse health effects, as can specific contaminants such as lead or asbestos, which may be constituents of dust.

The project site is approximately 0.66 acre and is therefore subject to a dust control plan as required by the Construction Dust Control Ordinance. The project sponsor must submit a site-specific dust control plan to the San Francisco Department of Public Health and the building department will not issue a building permit without written notification from the Director of Public Health stating that the applicant has an approved site-specific dust control plan.

Because the project site would be within 1,000 feet of sensitive receptors, the site-specific dust control plan submitted to the Director of Public Health would be required to include a map showing the locations of sensitive receptors. This plan also must contain the following measures, as specified in section 106.3.2.6.3 of the building code: designate an individual who will be responsible for monitoring compliance with dust control requirements, water all active construction areas to prevent dust from becoming airborne, use reclaimed water whenever possible, wet sweep or vacuum streets and sidewalks during excavation and dirt-moving activities, cover any inactive stockpiles, and use dust enclosures, curtains, and dust collectors as necessary. In addition, the site-specific dust control plan may require the project sponsor to wet down areas with soil at least three times per day; provide an analysis of wind direction and install upwind and downwind particulate dust monitors; record particulate monitoring results; hire an independent third party to conduct inspections and keep a record of those inspections; establish shut-down conditions, based on wind, soil migration, etc.; establish a hotline for surrounding community members who may be affected by project-related dust; limit the area subject to construction activities at any one time; install dust curtains and windbreaks at the property lines, as necessary; limit the amount of soil in hauling trucks to the size of the truck bed and secure with a tarpaulin; enforce a 15-mile-per-hour speed limit for vehicles entering and exiting construction areas; sweep affected streets with water sweepers at the end of the day; install and use wheel washers to clean truck tires; terminate construction activities when winds exceed 25 miles per hour; and sweep off adjacent streets to reduce particulate emissions. Inactive stockpiles (where no disturbance occurs for more than seven days) with more than 10 cubic yards or 500 square feet of excavated material, backfill material, import material, gravel, sand, road base, or soil must be covered with a 10-millimeter (0.01-inch) polyethylene plastic (or equivalent) tarpaulin that has been secured (equivalent soil stabilization techniques may also be used). Reclaimed water must be used for dust suppression watering, when required by article 21, section 1100 et seq., of the San Francisco Public Works Code. Contractors must provide as much water as necessary to control dust (without creating runoff in any area of land clearing and/or earth movement). The San Francisco Public Utilities Commission operates a recycled water fill station at the Southeast Water Pollution Control Plant, which provides recycled water at no charge.

Implementation of dust control measures, in compliance with the regulations and procedures set forth by the Construction Dust Control Ordinance, would ensure that the potential dust-related construction air quality impacts of the proposed project would be less than significant, and no mitigation measures are necessary.

Criteria Air Pollutants

Construction emissions would be generated by many different sources, including off-road construction equipment, such as excavators, loaders, backhoes, lifts, paving equipment, and cranes, and on-road trucks. The predominant source of emissions of NO_X, PM_{10}, and $PM_{2.5}$ would be combustion emission from off-road equipment. The predominant source of ROG emissions would be off-gassing emissions from the application of architectural coatings.

Project-specific construction equipment inventories that include details on the type, quantity, construction schedule and hours of operation anticipated for each piece of equipment for each construction phase were used to estimate construction emissions. Because there is typically a delay between new emission factors being developed and incorporated into air quality models, the air district-approved California Emissions Estimator Model (CalEEMod®) has not been updated to

incorporate the latest air board OFFROAD2017 and the air board's Emission Factor (EMFAC) 2017 emission factors. As such, the air quality analysis used methodologies consistent with CalEEMod® to estimate equipment emissions and created spreadsheets incorporating the air board's emission factors and load factors from OFFROAD2017 to estimate construction emissions and EMFAC2017 to estimate on-road mobile source emissions for diesel fueled equipment. The analysis is based on the anticipated project-specific off-road equipment types and hours provided by the project sponsor (included in EIR Appendix B). CalEEMod off-road default horsepower and load factors were used to calculate emissions from each piece of equipment.

On-road haul truck traffic would consist primarily of material deliveries to the site and the removal of demolition and excavation materials. Approximately 55,850 cubic yards of soil would be hauled away from the entire site primarily during the first two phases of the construction program, resulting in approximately 2,075 round trips (4,150 one-way trips). These haul trips, which would include excavated soil, demolition spoils, and material removed during site work, were allocated to the demolition, excavation, and site work components of each phase of the construction program. Additional trucks would be required for concrete deliveries during foundation/below-grade construction and building construction. Up to 8 material/vendor trips per day for the duration of each phase of the construction program were assumed. Truck routes may vary, but the differences in potential routes are not expected to result in a material difference in air quality impacts because total criteria air pollutant emissions would be virtually equivalent, regardless of which route is selected. The CalEEMod default trip lengths were revised from 20 miles to 40 miles because final locations for material and soil import/export have not been determined and a 40-mile trip length would provide a conservative estimate of emissions associated with disposal locations within the region.

Emission factors for on-road truck traffic were developed using EMFAC2017, the air board's on-road mobile emissions program, with the same methodology used to develop CalEEMod trucking emission factors.

More information on emissions calculations can be found in Appendix B. Construction of the proposed project would occur over a period of approximately 36 months. The construction schedule is discussed in Section 2.0, Project Description.

Total construction emissions by phase and year were calculated and divided by 763 construction days to derive average daily emissions for comparison against applicable significance thresholds.

Table 4.2-6, Criteria Air Pollutant Emissions from the Proposed Project during Construction, presents the construction-period emissions that would result from the proposed project. The maximum average daily emission rate during construction of the proposed project is compared to significance thresholds to establish a significance determination. Specifically, Table 4.2-6 indicates that maximum average daily emissions (in pounds per day), would amount to an increase of 12.25 lbs/day for ROG, 18.69 lbs/day for NO_X, 1.46 lbs/day for PM_{10} (exhaust), and 0.98 lbs/day for $PM_{2.5}$ (exhaust), each of which is below the respective thresholds of 54 lbs/day for ROG, NO_X, and $PM_{2.5}$ and 82 lbs/day for PM_{10}. Therefore, as shown in Table 4.2-6, construction-related criteria air pollutant emissions for the duration of the construction program, would be less than significant, and no mitigation measures are necessary.

Table 4.2-6: Criteria Air Pollutant Emissions from the Proposed Project During Construction

Year	Annual Emissions (lbs/year)				
	Source	**ROG**	**NO_X**	**PM_{10} Exhaust**	**$PM_{2.5}$ Exhaust**
2021	Off-road vehicle emissions	34.34	337.01	13.75	12.65
	On-road vehicle emissions	55.44	1,583.43	60.62	35.54
2021 Subtotal		**89.78**	**1,920.44**	**74.37**	**48.18**
2022	Off-road vehicle emissions	314.60	2,688.62	170.43	156.80
	On-road vehicle emissions	40.23	749.10	111.91	0.00
2022 Subtotal		**354.83**	**3,437.72**	**282.35**	**156.80**
2023	Off-road vehicle emissions	461.27	3,789.04	236.08	217.19
	On-road vehicle emissions	68.43	1,190.18	204.63	91.14
	Architectural Coating	1,430.60	0.00	0.00	0.00
2023 Subtotal		**1,960.31**	**4,979.22**	**440.70**	**308.33**
2024	Off-road vehicle emissions	404.86	3,320.94	202.74	186.52
	On-road vehicle emissions	36.69	599.19	116.34	51.28
	Architectural Coating	6,499.20	0.00	0.00	0.00
2024 Subtotal		**6,940.76**	**3,920.13**	**319.08**	**237.80**
Grand Total		**9,345.68**	**14,257.52**	**1,116.50**	**751.11**
Average Daily Emissions (lbs/day)		12.25	18.69	1.46	0.98
Significance Threshold (lbs/day)		54	54	82	54
Above Threshold?		**No**	**No**	**No**	**No**

Source: Stantec, March 2020, Table 4, Appendix B
Notes:
1. Average daily emissions based on 763 total working days.
2. Totals may not add due to rounding.

Impact AQ-2: At project buildout, operation of the proposed project would not result in a cumulatively considerable net increase in non-attainment criteria air pollutants. (*Less than Significant*)

Operation of the proposed project would have the potential to create air quality impacts, which would be associated primarily with mobile, area, and energy sources. Mobile source emissions would occur from increases in vehicle traffic, including daily resident-access, visitor, delivery truck, and employee vehicle trips. Area source emissions include landscaping equipment, architectural coatings and the associated off-gassing during reapplication, and consumer products (e.g., solvents, cleaning supplies, cosmetics, toiletries). Energy source emissions include natural gas combustion for space and water heating. The proposed project would also include a diesel emergency generator, which would be permitted through the air district. Each of these sources was taken into account in calculating the proposed project's long-term operational emissions.

Area-source and energy emissions were calculated using CalEEMod, based on the type and size of land uses associated with the proposed project. Area sources include hearths, consumer products,

architectural coatings, and landscaping equipment. San Francisco County–specific consumer product emission rate data were used in the CalEEMod model to estimate daily ROG (or VOC) emissions.

Mobile-source emissions would result from vehicle trips (auto and truck) associated with the proposed project. EMFAC2017 emission factors were used to estimate mobile-source emissions consistent with CalEEMod methodologies. Trip lengths for the proposed project are 2.3 miles for residential vehicle and 0.995 miles for retail (employee and customer) vehicle trips, consistent with the data regarding daily vehicle miles traveled per capita for residential and commercial land uses for the Traffic Analysis Zone (TAZ) the project site is located in.

The methodology for quantifying operational emissions is further described in Appendix B. The average daily and maximum annual emissions associated with operation of the proposed project is shown in Table 4.2-7, Criterial Air Pollutant Emissions from the Proposed Project During Operations, with results showing the contribution of emissions by each source. As shown in Table 4.2-7, the proposed project would result in criteria air pollutant emissions well below the significance thresholds with maximum ROG emissions of 13.62 lbs/day, NOx emission of 4.46 lbs/day, and PM_{10} and $PM_{2.5}$ emissions of 0.39 lbs/day. Therefore, the proposed project would not result in a cumulatively considerable net increase in non-attainment criteria air pollutants and this impact would be less than significant.

Table 4.2-7: Criteria Air Pollutant Emissions from the Proposed Project During Operations

Source	Maximum Annual Emissions (tons/year)			
	ROG	**NO_X**	**PM_{10}**	**$PM_{2.5}$**
Area	2.40	0.04	0.02	0.02
Energy	0.02	0.20	0.02	0.02
Generators	0.11	0.49	0.02	0.02
Traffic	0.01	0.05	0.00	0.00
Total Emissions (tons/year)	**2.55**	**0.77**	**0.06**	**0.06**
Significance Threshold (tons/year)	10	10	15	10
Above Threshold?	**No**	**No**	**No**	**No**
	Average Daily Emissions (lbs/day)			
Area	12.82	0.44	0.21	0.21
Energy	0.12	1.03	0.08	0.08
Generators	0.60	2.70	0.09	0.09
Traffic	0.08	0.28	0.00	0.00
Total Emissions (lbs/day)	**13.62**	**4.46**	**0.39**	**0.39**
Significance Threshold (lbs/day)	54	54	82	54
Above Threshold?	**No**	**No**	**No**	**No**

Source: Stantec, March 2020, Table 4, Appendix B

Note: Totals may not add due to rounding.

Impact AQ-3: Construction and operation of the proposed project would generate toxic air contaminants, including DPM, at levels that would expose sensitive receptors to substantial pollutant concentrations. (*Less than Significant with Mitigation*)

Demolition, excavation, grading, foundation construction, building construction, and interior and exterior work would affect localized air quality during the construction phases of the proposed project. Short-term emissions from construction equipment during these site preparation activities would include directly emitted particulate matter ($PM_{2.5}$ and PM_{10}) and TACs such as DPM. In addition, the long-term emissions from the proposed project's mobile and stationary sources during operations, as described under Impact AQ-2, would include particulate matter ($PM_{2.5}$) and TACs such as DPM and some compounds or variations of ROGs. A health risk assessment was conducted for the proposed project to evaluate the potential health risks to nearby residents resulting from project implementation.

Methodology

In general, a health risk assessment is used to determine if a particular chemical poses a significant risk to human health and, if so, under what circumstances. For the proposed project, a health risk assessment was conducted to identify health risks to offsite and onsite sensitive receptors due to inhalation of $PM_{2.5}$ and TACs. The health risk assessment prepared for the proposed project focused on $PM_{2.5}$ and TACs (primarily DPM) because these types of air pollutants, more so than others, pose substantial health impacts at the local level. A detailed discussion of the methods used for the health risk assessment is provided in the air quality analysis included in Appendix B.

The health risk analysis estimated DPM (a TAC) and $PM_{2.5}$ emissions from project construction and operational emissions using emission factors from OFFROAD 2017 and EMFAC 2017 in accordance with methodologies provided in CalEEMod. Near-field air dispersion modeling of DPM and $PM_{2.5}$ emissions from project sources was conducted using the U.S. EPA's AERMOD model (version 19191). The DPM and $PM_{2.5}$ emissions rates were used as AERMOD inputs to predict worst-case DPM and $PM_{2.5}$ concentrations at sensitive receptor locations, respectively. AERMOD is also the model that was used by the air district and the city in the citywide health risk assessment modeling discussed above under Environmental Setting. DPM concentrations were then used to determine the lifetime cancer risk resulting from the proposed project at sensitive receptor locations, based on the health risk assessment methodology published by the Office of Environmental Health Hazard Assessment in 2015. Construction activities were modeled as area sources; haul trips were modeled as adjacent volume sources.

AERMOD requires inputs such as source parameters, meteorological parameters, topography information, and receptor parameters. The exposure parameters were obtained using risk assessment guidelines from the California Environmental Protection Agency (CalEPA) and the air district. Exposure parameters include daily breathing rate, exposure time, exposure frequency, exposure duration, averaging time, and inhalation intake factors (refer to Appendix B for details regarding the AERMOD modeling inputs, toxics analysis, and exposure parameters).

Offsite residents were assumed to be present at one location for the entire construction period and exposure was assumed to begin for a child in the third trimester in utero at the start of construction in year 2021. Offsite residents were assumed to be exposed to construction emissions for the entire duration of construction activity and then operational emissions until the resident reached 30 years of age. Onsite residents were assumed to be present after completion of construction in 2024 and therefore

not exposed to the project's construction emissions but were assumed to be exposed to 30 years of operational emissions from the project. Offsite and onsite residents were assumed to be present at one location for 30 years, consistent with OEHHA guidance. $PM_{2.5}$ concentrations are evaluated on an annual average basis.

The DPM and $PM_{2.5}$ concentrations were modeled separately by year of construction to account for emissions specific to construction activities occurring in specific time periods. The excess lifetime cancer risk and $PM_{2.5}$ concentrations from project construction and operational emissions were added to the existing health risks from the draft 2020 citywide health risk assessment database at each receptor point to determine the existing plus project cancer risk and $PM_{2.5}$ concentration at the project's maximally exposed sensitive receptor.

Results for Offsite Sensitive Receptors

The locations of modeled offsite sensitive receptors are presented in Figure 19, Project Boundary and Modeling Extent. The maximum estimated excess lifetime cancer risk from the project (assuming a receptor was born at the beginning of construction at offsite locations) is presented in Table 4.2-8, Lifetime Cancer Risk and $PM_{2.5}$ Concentrations at Maximally Exposed Offsite Receptors.

Existing cancer risk and $PM_{2.5}$ concentrations are available from San Francisco's draft 2020 citywide health risk assessment database, the most recent comprehensive citywide health risk assessment available to date. As shown in Table 4.2-8, the combination of unmitigated construction-related and operational emissions at the maximum impacted offsite sensitive receptor would result in an increased cancer risk of 65 in 1 million, which is above the 7 in 1 million significance threshold for projects in the APEZ. Therefore, the proposed project would result in a significant cancer risk impact at offsite sensitive receptors. Also, as shown in Table 4.2-8, the proposed project would contribute $PM_{2.5}$ concentrations of 0.3 $\mu g/m^3$, which is above the 0.2 $\mu g/m^3$ significance threshold. Therefore, $PM_{2.5}$ concentrations at offsite sensitive receptors would also be significant.

Table 4.2-8: Existing Plus Project Lifetime Cancer Risk and $PM_{2.5}$ Concentration at Maximally Exposed Offsite Receptors

Source	Unmitigated		Mitigated	
	Cancer Risk[a] (in 1 million)	$PM_{2.5}$ concentration (μg/m³)	Cancer Risk[a] (in 1 million)	$PM_{2.5}$ concentration (μg/m³)
Existing Background[b]	348	12.35	348	12.35
Project Construction	65.2	0.3	6.43	0.031
Project Operation (diesel generator and traffic)	0.08	0.0004	0.08	0.0004
Project Contribution Subtotal	**65.28**	**0.3004**	**6.51**	**0.0314**
Total with Background	413	12.65	355	12.38
Project Contribution Significance Threshold	7	0.2	7	0.2
Above Threshold?	**Yes**	**Yes**	**No**	**No**

Source: Stantec, March 2020, Table 10, Appendix B
Notes:
a. The cancer risks were estimated using the information specified in Appendix B.
b. Background cancer risk and $PM_{2.5}$ concentrations were estimated from the draft 2020 citywide health risk assessment database.
c. The sources at Station T are included in the draft 2020 citywide health risk assessment database and part of existing background health risk.

To address the excess cancer risk and PM2.5 concentrations during construction and operations of the proposed project, Mitigation Measure M-AQ-3a, Off-Road Construction Equipment Emissions Minimization and Mitigation Measure M-AQ-3b, Diesel Backup Generator Specifications shown below, have been identified and would apply to the proposed project. Table 4.2-8 also shows the lifetime cancer risk and PM2.5 concentrations under the mitigated scenario.

Mitigation Measures

M-AQ-3a: Off-road Construction Equipment Emissions Minimization.

The project sponsor shall comply with all of the following:

A. *Engine Requirements.*

1. All off-road equipment greater than 25 horsepower (hp) and operating for more than 20 total hours over the entire duration of construction activities shall have engines that meet or exceed U.S. Environmental Protection Agency (U.S. EPA) Tier 4 Interim or Tier 4 Final off-road emission standards.

2. Where access to alternative sources of power are available, portable diesel engines shall be prohibited.

3. Diesel engines, whether for off-road or on-road equipment, shall not be left idling for more than two minutes, at any location, except as provided in exceptions to the applicable state regulations regarding idling for off-road and on-road equipment (e.g., traffic conditions, safe operating conditions). The project sponsor shall post legible and visible signs in English, Spanish, and Chinese, in designated queuing areas and at the construction site to remind operators of the two-minute idling limit.

4. The project sponsor shall instruct construction workers and equipment operators on the maintenance and tuning of construction equipment and require that such workers and operators properly maintain and tune equipment in accordance with manufacturer specifications.

B. *Waivers.*

1. The Planning Department's Environmental Review Officer or designee (ERO) may waive the alternative source of power requirement of Subsection (A)(2) if an alternative source of power is limited or infeasible at the project site. If the ERO grants the waiver, the project sponsor must submit documentation that the equipment used for onsite power generation meets the requirements of Subsection (A)(1).
2. The ERO may waive the equipment requirements of Subsection (A)(1) if: a particular piece of Tier 4 compliant off-road equipment is technically not feasible; the equipment would not produce desired emissions reduction due to expected operating modes; installation of the equipment would create a safety hazard or impaired visibility for the operator; or, there is a compelling emergency need to use off-road equipment that is not Tier 4 compliant. If the ERO grants the waiver, the project sponsor must use the next cleanest piece of off-road equipment, according to Table AQ-1 below. Additionally, the project sponsor must demonstrate that use of the alternative equipment would not result in a cancer risk from project construction and operation that exceeds 7 per one million exposed and annual average $PM_{2.5}$ concentrations that exceed 0.2 $\mu g/m^3$.

Table AQ-1– Off-Road Equipment Compliance Step-down Schedule

Compliance Alternative	Engine Emission Standard	Verified Diesel Emissions Control Strategy (VDECS)
1	Tier 2	ARB Level 3 VDECS
2	Tier 2	ARB Level 2 VDECS
3	Tier 2	ARB Level 1 VDECS

How to use the table: If the ERO determines that the equipment requirements cannot be met, then the project sponsor would need to meet Compliance Alternative 1. If the ERO determines that the project sponsor cannot supply off-road equipment meeting Compliance Alternative 1, then the project sponsor must meet Compliance Alternative 2. If the ERO determines that the project sponsor cannot supply off-road equipment meeting Compliance Alternative 2, then the project sponsor must meet Compliance Alternative 3.

C. *Construction Emissions Minimization Plan.* Before starting on-site construction activities, the project sponsor shall submit a Construction Emissions Minimization Plan (Plan) to the ERO for review and approval. The Plan shall state, in reasonable detail, how the project sponsor will meet the requirements of Section A.

1. The Plan shall include estimates of the construction timeline by phase, with a description of each piece of off-road equipment required for every construction phase. The description may include, but is not limited to: equipment type, equipment manufacturer, equipment identification number, engine model year, engine certification (Tier rating), horsepower, engine serial number, and expected fuel use and hours of operation. For VDECS installed, the description may include: technology type, serial number, make, model, manufacturer, air board verification number level, and installation date and hour meter reading on installation date.
2. The project sponsor shall ensure that all applicable requirements of the Plan have been incorporated into the contract specifications. The Plan shall include a certification statement that the project sponsor agrees to comply fully with the Plan.
3. The project sponsor shall make the Plan available to the public for review on-site during working hours. The project sponsor shall post at the construction site a legible and visible sign summarizing the Plan. The sign shall also state that the public may ask to inspect the Plan for the project at any time during working hours and shall explain how to request to inspect the Plan. The project sponsor shall post at least one copy of the sign in a visible location on each side of the construction site facing a public right-of-way.

D. *Monitoring.* After start of construction activities, the project sponsor shall submit quarterly reports to the ERO documenting compliance with the Plan. After completion of construction activities and prior to receiving a final certificate of occupancy, the project sponsor shall submit to the ERO a final report summarizing construction activities, including the start and end dates and duration of each construction phase, and the specific information required in the Plan.

Mitigation Measure M-AQ-3b: Diesel Backup Generator Specifications.

The project sponsor shall ensure that the proposed diesel backup generator meets or exceeds California Air Resources Board Tier 4 off-road emission standards. Additionally, once operational, the diesel backup generator shall be maintained in good working order for the life of the equipment and any future replacement of the diesel backup generator shall be required to be consistent with these emissions specifications. The operator of the facility at which the generator is located shall maintain records of the testing schedule for the diesel backup generator for the life of that diesel backup generator and to provide this information for review to the planning department within three months of requesting such information.

Significance after Mitigation: The health risk analysis quantitatively evaluated the effectiveness of Mitigation Measures M-AQ-3a and M-AQ-3b. Revised emission estimates for the mitigated equipment were quantified and the $PM_{2.5}$ and cancer risks were estimated using dispersion modeling and risk characterization methods consistent with air district and OEHHA risk assessment guidance and the citywide health risk assessment. The results of that analysis are presented in Table 4.2-8, above. As shown there, with implementation of M-AQ-3a and M-AQ-3b, the proposed project would result in an excess cancer risk of 6.51 in 1 million and $PM_{2.5}$ concentrations of 0.03 $\mu g/m^3$, which is below the 7 in 1 million cancer risk and 0.2 $\mu g/m^3$ $PM_{2.5}$ significance thresholds. Therefore, particulate emission reductions from Mitigation Measures M-AQ-3a and M-AQ-3b would reduce potential health risk impacts to sensitive receptors to less than significant levels. With implementation of these mitigation

measures, the proposed project would not result in significant adverse environmental effects to offsite sensitive receptors.

Results for Onsite Receptors

The proposed project would include development of residential units, which is considered a sensitive land use for purposes of air quality evaluation. Onsite receptors would not be exposed to increased cancer risks from construction emissions because they would not occupy the buildings until after construction is complete. The estimated excess cancer risk at the onsite maximally exposed individual sensitive receptor is presented in Table 4.2-9, Lifetime Cancer Risk and $PM_{2.5}$ Concentrations at the Maximally Exposed Onsite Receptors. Existing background cancer risk information is available from the draft 2020 citywide health risk assessment database. The proposed project's emissions would result in health impacts that would combine with existing background health impacts resulting in a cancer risk at the maximally exposed onsite receptor of 327 in 1 million. The incremental increase in cancer risk from the proposed project to onsite receptors would be 4.14 in 1 million, which is below the 7 in 1 million significance threshold. Similarly, the proposed project would result in $PM_{2.5}$ concentrations well below the significance threshold of 0.2 $\mu g/m^3$. Therefore, the proposed project would result in a less-than-significant health risk impact on onsite receptors.

Table 4.2-9: Existing Plus Project Lifetime Cancer Risk and $PM_{2.5}$ Concentrations At Maximally Exposed Onsite Receptors

Source	Excess Lifetime Cancer Risk[a] (in 1 million)	$PM_{2.5}$ concentration ($\mu g/m^3$)
Existing Background[b]	323	11.86
Project Operation (diesel generator and traffic)	4.14	0.0009
Project Contribution Subtotal	**4.14**	**0.0009**
Total with Background	327	11.86
Project Contribution Significance Threshold	7	0.2
Above Threshold?	**No**	**No**

Source: Stantec, March 2020, Table 11, Appendix B
Notes:
a. The cancer risks were estimated using the information specified in Appendix B.
b. Background cancer risk and $PM_{2.5}$ concentrations were estimated from the draft 2020 citywide health risk assessment database.
c. The sources at Station T are included in the draft 2020 citywide health risk assessment database and part of existing background health risk.

Impact AQ-4: The proposed project would not conflict with implementation of the 2017 Bay Area Clean Air Plan. (*Less than Significant*)

The most recently adopted air quality plan for the air basin is the 2017 Bay Area Clean Air Plan. The 2017 Bay Area Clean Air Plan is a road map that demonstrates how the Bay Area will, in accordance with the requirements of the California Clean Air Act, implement all feasible measures to reduce ozone precursors (ROG and NO_x) and reduce the transport of ozone and its precursors to neighboring air basins. It also provides a climate and air pollution control strategy to reduce ozone, particulate matter,

TACs, and GHGs that builds upon existing regional, state, and national programs. In determining consistency with the 2017 Bay Area Clean Air Plan, this analysis considers whether the proposed project would (1) support the primary goals of the 2017 Bay Area Clean Air Plan, (2) include applicable control measures from the 2017 Bay Area Clean Air Plan, and (3) avoid disrupting or hindering implementation of control measures identified in the 2017 Bay Area Clean Air Plan.

The goals of the 2017 Bay Area Clean Air Plan are to protect air quality and health at the regional and local scale and protect the climate. Air quality protection and the safeguarding of public health from harmful air pollutants is accomplished through meeting state and national ambient air quality standards. Climate protection is focused on reducing GHG emissions to 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050. To meet these goals, the 2017 Bay Area Clean Air Plan recommends specific control measures and actions to reduce emissions and decrease concentrations of harmful air pollutants. To this end, the 2017 Bay Area Clean Air Plan includes 85 control measures that are aimed at reducing air pollutants in the air basin. These control measures are grouped into various categories: the stationary-source sector, transportation sector, buildings sector, energy sector, agriculture sector, natural- and working-lands sector, waste sector, water sector, and super-GHG pollutants sector. The 2017 Bay Area Clean Air Plan recognizes that, to a great extent, community design dictates individual travel modes and that a key long-term control strategy to reduce emissions of criteria pollutants, TACs, and GHGs from motor vehicles is to channel future Bay Area growth into mixed-use, pedestrian-friendly communities that are served by a range of viable transportation options and where goods and services meet the day-to-day needs of residents and workers. The proposed project would be an urban infill development with neighborhood-serving uses in the immediate vicinity that would allow for many of the day-to-day needs of its residents to be met by walking, bicycling, or taking transit to or from the project site instead of taking trips by private automobile.

The control measures identified in the 2017 Bay Area Clean Air Plan that are most applicable to the proposed project are related to the transportation sector, building sector, energy sector, waste sector, and water sector, some of which would be implemented as part of, but not limited to, the proposed project's compliance with the general plan, planning code, green building code, and local GHG-reducing regulations detailed in the GHG checklist provided in the initial study, Appendix A of this EIR. For example, as described in Chapter 2, Project Description, the proposed project is required to implement a transportation demand management (TDM) plan that would encourage a reduction in the number of automobile trips by improving sidewalks to promote walking; encouraging biking by installing secured bike parking for residents and patrons of on-site retail spaces; providing bike-share memberships, bicycle repair station and maintenance services; and offering contributions or incentives for sustainable transportation, among other TDM measures. Many of the TDM measures and other features of the proposed project would align with the transportation control measures identified in Table 5-13 of the 2017 Bay Area Clean Air Plan (e.g., TR2, Trip Reduction Programs; TR3, Local and Regional Bus Service; TR9, Bicycle and Pedestrian Access and Facilities; TR14, Cars and Light Trucks; and TR15, Public Outreach and Education).

Furthermore, the project site is within one of the city's transit priority areas, indicating that the proposed project would be developed at a site in a walkable urban area and near a concentration of regional and local transit service. The proposed project is located within one-half mile of several rail and bus transit routes, including the BART and Muni Powell Street Station.

The proposed project's impact with respect to GHGs is discussed in the initial study (Appendix A, Section E.8, Greenhouse Gas Emissions). As stated there, the proposed project would be compliant with the City's GHG reduction strategy and thus would not result in any significant impacts associated with an increase in GHGs or conflict with measures adopted for the purpose of reducing such emissions. The City's GHG compliance checklist for private projects lists regulatory requirements, many of which are related to transportation, energy conservation, waste reduction, and water conservation and align with those specific sectors of the 2017 Bay Area Clean Air Plan's control measures. Compliance with these requirements would ensure that the proposed project would include the relevant transportation sector, building sector, energy sector, waste sector, and water sector control measures specified in the 2017 Bay Area Clean Air Plan. Therefore, the proposed project would include applicable control measures identified in the 2017 Bay Area Clean Air Plan and support the primary goals of the 2017 Bay Area Clean Air Plan.

Examples of projects that could disrupt or delay the 2017 Bay Area Clean Air Plan control measures are projects that would preclude the extension of a transit line or bike path or projects that propose excessive vehicular parking, beyond city parking requirements. There are no minimum vehicular parking requirements for the proposed project. The proposed project would provide 178 residential parking spaces at a ratio of approximately 0.36 parking spaces per dwelling unit. Therefore, the project does not propose an excessive amount of parking beyond planning code maximums. The proposed project would not preclude the extension of a transit line or a bike path, or any other transit improvement, and, thus, would not disrupt or hinder implementation of control measures identified in the 2017 Bay Area Clean Air Plan.

For the reasons described above, the proposed project would not interfere with implementation of the 2017 Bay Area Clean Air Plan. Because the proposed project would be consistent with the applicable air quality plan that demonstrates how the region would improve ambient air quality and achieve the state and federal ambient air quality standards, this impact would be less than significant, and no mitigation measures are necessary.

Cumulative Impacts

This section discusses cumulative air quality impacts that could result from the proposed project in combination with reasonably foreseeable future projects. The contribution of a project's individual air emissions to regional air quality impacts is, by nature, a cumulative effect. Emissions from reasonably foreseeable future projects in the region would contribute to adverse regional air quality impacts on a cumulative basis. No single project by itself would be large enough to result in non-attainment of ambient air quality standards. Instead, a project's individual emissions would contribute to existing cumulative air quality conditions.[86] Refer to Impacts AQ-1 and AQ-2, which provide a cumulative criteria air pollutant analysis.

[86] Air District, CEQA Air Quality Guidelines, May 2011, p. 2-1.

Impact C-AQ-1: The proposed project during construction and operations, in combination with reasonably foreseeable projects, would result in significant health risk impacts to sensitive receptors. (*Less than Significant with Mitigation*)

The geographic scope of analysis for cumulative health risks is a distance of 1,000 feet around the maximally exposed offsite and onsite sensitive receptors. The air district specifies that cumulative sources represent the combined total risk values of each individual source within the 1,000-foot evaluation zone. The contribution of TACs from the proposed project to health risks beyond the 1,000-foot evaluation zone as well as the contribution from projects beyond that zone to health risks at or near the project site would be greatly attenuated through both distance and intervening structures. Therefore, their contribution would be expected to be minimal. The cumulative health risk assessment takes into account the contribution of existing localized health risks to sensitive receptors from sources included in the draft 2020 citywide health risk assessment database plus the proposed project's sources and also considers the effects of cumulative projects within 1,000 feet of the maximally exposed individual sensitive receptor. Each of these sources is described below.

Background Health Risks and $PM_{2.5}$ Concentrations

The planning department has conducted a citywide health risk assessment for year 2040. This citywide 2040 health risk assessment accounts for expected growth in vehicle trips and associated emissions, and accounts for projected lower emissions from vehicles as new regulations are phased in over time. Therefore, vehicle-generated emissions from the cumulative projects would be accounted for in the 2040 citywide health risk assessment database and are therefore accounted for in this cumulative analysis.

The citywide health risk assessment database for existing conditions (draft 2020 citywide health risk assessment) and 2040 projected conditions were compared at the project's maximally exposed offsite sensitive receptor to determine which database (existing or projected 2040 conditions) had higher background cancer risk and $PM_{2.5}$ levels. The results of this comparison revealed that background $PM_{2.5}$ emissions at the project's maximally exposed sensitive receptor was higher under existing conditions at 12.35 $\mu g/m^3$ compared to 9.6 $\mu g/m^3$ under 2040 conditions. The background modeled cancer risk is expected to decrease from a risk of 348 in 1 million under existing conditions to 80 in 1 million under 2040 conditions. Therefore, in order to present a worst-case cumulative analysis, the background $PM_{2.5}$ and cancer risk from the existing conditions, which report higher concentrations and risks, are included in the quantitative cumulative analysis below in Table 4.2-10.

Project Contributions

The methodology for analyzing the proposed project's health risk impact and $PM_{2.5}$ contributions at sensitive receptor locations is presented under Impact AQ-3, above.

Other Cumulative Projects

This cumulative analysis evaluates known cumulative projects within 1,000 feet of the project site that could affect local air quality and health risks. Projects within an approximately 1,000-foot radius of the project site are included in Table 4.1-1, Cumulative Projects within 0.25-Mile Radius of the Proposed Project. There are 17 projects within the 1,000 feet that are included in the cumulative air quality analysis. There is one additional project, 5M, that is not included in Table 4.1-1, but is within the 1,000-

foot radius.[87] The 5M Project is located on 4 acres between Fifth, Mission, and Howard streets. The 5M Project entails the development of office, retail, residential, cultural, educational, and open space uses in the southwest quadrant of Fifth and Mission streets and its construction would potentially overlap with the proposed project, resulting in cumulative air quality impacts. Two development options are proposed for the 5M Project that would result in approximately the same net increase of 1.5 million square feet of development.

Two of the cumulative projects within 1,000 feet of the project site required a quantitative health risk assessment: 5M and Better Market Street. The quantitative construction and operational health risk impacts from those projects have been included in the quantitative cumulative analysis below.

Cumulative Results

Cumulative health risks are determined by summing baseline risks, project risks, and risks from cumulative projects that were not already included in the baseline risk assessment. Similarly, cumulative $PM_{2.5}$ concentrations are determined by summing baseline $PM_{2.5}$ concentrations, project $PM_{2.5}$ concentrations, and $PM_{2.5}$ concentrations from cumulative projects that were not already included in the baseline $PM_{2.5}$ assessment. Results of this analysis at the maximum offsite receptor are presented in Table 4.2-10. The cumulative excess lifetime cancer risk at the maximally exposed offsite residential receptor would be 422 in 1 million, and the $PM_{2.5}$ concentration would be 12.95 $\mu g/m^3$. The analysis accounts for the health risk and $PM_{2.5}$ contributions from the 5M and Better Market Street projects. The analysis does not account for the construction and operational effects of the other cumulative projects because the health risks and $PM_{2.5}$ concentration from those projects cannot be known without detailed modeling. However, as discussed above the traffic-related operational emissions from cumulative projects are reasonably accounted for the in the quantitative analysis below. Nevertheless, the cumulative health risks at the maximally exposed offsite sensitive receptor is likely to be higher than that reported below in Table 4.2-10. Regardless, the proposed project's contribution to cumulative health risks would remain the same as that presented under the existing plus project scenario (see Impact AQ-3).

Results for Offsite Sensitive Receptors

As shown in Table 4.2-10, the proposed project's contribution to cumulatively significant health risks at offsite sensitive receptors would be an increased cancer risk of 65 in 1 million, which exceeds the project contribution significance threshold of 7 in 1 million, resulting in a significant contribution to cumulative health risks at offsite sensitive receptors.

As shown in Table 4.2-10, $PM_{2.5}$ concentrations at offsite sensitive receptors would be 0.3 $\mu g/m^3$, which exceeds the project contribution significance threshold of 0.2 $\mu g/m^3$. Therefore, the proposed project would result in a considerable contribution to cumulatively significant $PM_{2.5}$ concentrations at offsite sensitive receptors and this impact would be significant.

[87] The 5M project is approved and under construction and therefore is considered part of baseline conditions for the analysis of the proposed project's operational impacts. However, as construction of the 5M project is expected to overlap with construction of the proposed project, it is considered in the cumulative construction analysis.

Table 4.2-10: Cumulative Lifetime Cancer Risk and $PM_{2.5}$ Concentrations At Maximally Exposed Offsite Receptors

Source	Unmitigated		Mitigated	
	Cancer Risk[a] (in 1 million)	$PM_{2.5}$ concentration ($\mu g/m^3$)	Cancer Risk[a] (in 1 million)	$PM_{2.5}$ concentration ($\mu g/m^3$)
Cumulative Baseline[b,c]	348	12.35	348	12.35
5M Project[d]	6.4	0.2	6.4	0.2
Better Market Street[e]	2.4	0.1	2.4	0.1
Project Construction	65.2	0.3	6.43	0.031
Project Operation (diesel generator and traffic)	0.08	0.0004	0.08	0.0004
Project Contribution Subtotal	**65.28**	**0.3004**	**6.51**	**0.0314**
Total with Background	422	12.95	364	12.68
Project Contribution Significance Threshold	7	0.2	7	0.2
Above Threshold?	**Yes**	**Yes**	**No**	**No**

Source: Stantec, March 2020, Table 13, Appendix B
Notes:
a. The cancer risks were estimated using the information specified in Appendix B.
b. Background cancer risk and $PM_{2.5}$ concentrations were estimated from the draft 2020 citywide health risk assessment database.
c. The sources at Station T are included in the draft 2020 citywide health risk assessment database and part of existing background health risk.
d. From the 2016 Draft EIR, CASE NO. 2014-000362ENV, mitigated results.
e. From the 2019 Draft EIR, Case NO. 2014.0012E, mitigated results.

Mitigation Measures

Implement ***Mitigation Measures M-AQ-3a and M-AQ-3b***

Significance after Mitigation: Mitigation Measures M-AQ-3a and M-AQ-3b, discussed above, would be required, and would reduce the proposed project's increased cancer risk contribution to 6.51 in 1 million and would also reduce the proposed project's $PM_{2.5}$ contribution to 0.0314 $\mu g/m^3$. Therefore, with implementation of M-AQ-3a and M-AQ-3b, the project's contribution to cumulatively significant health risks impacts would be reduced to less than significant.

Results for Onsite Sensitive Receptors

As shown in Table 4.2-11, the proposed project's contribution to cumulatively significant health risks at onsite sensitive receptors would be an increased cancer risk of 4.14 in 1 million and a $PM_{2.5}$ concentration of 0.0009 $\mu g/m^3$, which are both well below the project contribution significance thresholds of an increased cancer risk of 7 in 1 million and $PM_{2.5}$ concentrations of 0.2 $\mu g/m^3$. Therefore, the proposed project would not make a considerable contribution to health risk impacts at onsite sensitive receptors and this impact would be less than significant.

Table 4.2-11: Cumulative Lifetime Cancer Risk and $PM_{2.5}$ Concentrations At Maximally Exposed Onsite Receptors

Source	Unmitigated	
	Cancer Risk[a] (in 1 million)	**$PM_{2.5}$ concentration ($\mu g/m^3$)**
Cumulative Baseline[b,c]	323	11.86
5M Project[d]	6.4	0.2
Better Market Street[e]	2.4	0.1
Project Operation (diesel generator and traffic)	4.14	0.0009
Project Contribution Subtotal	**4.14**	**0.0009**
Total with Background	336	12.16
Project Contribution Significance Threshold	7	0.2
Above Threshold?	**No**	**No**

Source: Stantec, March 2020, Table 14, Appendix B

Notes:

a. The cancer risks were estimated using the information specified in Appendix B.

b. Background cancer risk and $PM_{2.5}$ concentrations were estimated from the draft 2020 citywide health risk assessment database.

c. The sources at Station T are included in the draft 2020 citywide health risk assessment database and part of existing background health risk.

d. From the 2016 Draft EIR, CASE NO. 2014-000362ENV, mitigated results.

e. From the 2019 Draft EIR, Case NO. 2014.0012E, mitigated results.

Overall, based on the analysis above, the proposed project in combination with cumulative projects would result in a less-than-significant cumulative health risk impact with mitigation.

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4.3 WIND

4.3.1 Introduction

This section describes the project's impacts on ground-level wind speeds at various locations on and near the project site. This section is based on a wind study prepared for the proposed project by ARUP, included in this EIR as Appendix C.[88] The wind study assesses the probability that the proposed project would create areas of windiness at publicly accessible points in the project vicinity. The "Environmental Setting" discussion that follows includes a general description of the wind environment in San Francisco and existing wind conditions on the project site. The "Regulatory Framework" section discusses regulations related to wind applicable to proposed development projects. The "Impacts and Mitigation Measures" discussion describes the criteria for determining whether wind impacts are significant under CEQA, the wind impacts of the proposed project and cumulative development projects, and applicable mitigation measures, if required.

4.3.2 Environmental Setting

San Francisco's Existing Wind Environment

In San Francisco, average wind speeds are the highest in the summer and lowest in the winter. In the summer months landscaping tends to be at its fullest and helps to absorb and control windiness at street level. This is an advantage that the city of San Francisco has over many of its northern city neighbors where the stronger winds occur in the winter months when trees and landscaping are less beneficial in improving the local wind environment.

However, the strongest peak wind speeds occur in the winter and are generally associated with storm conditions. The highest average wind speeds occur in mid-afternoon and the lowest occur in the early morning. Based on over 40 years of recordkeeping, the highest mean hourly wind speeds (approximately 20 mph) occur mid-afternoon in July, while the lowest mean hourly wind speeds (in the range of 6 to 9 mph) occur throughout the day in November.

Meteorological data collected at the old San Francisco Federal Building at 50 UN Plaza and available for public access show that westerly through northwesterly winds are the most frequent and strongest winds during all seasons. Of the 16 primary wind directions, four primary wind directions comprise the majority of the strong wind occurrences. These four wind directions are northwesterly (10 to 13 percent of all winds), west northwesterly (14 to 26 percent of all winds), westerly (35 to 45 percent of all winds), and southwesterly (2 percent of all winds); they make up more than 60 percent of the general winds and more than 85 percent of the strongest winds in San Francisco.

Wind Effects on People

The acceptability of windiness is subjective and depends on several important factors, none more so than the type of activity being performed.

[88] ARUP. January 2020. Wind Study for 469 Stevenson Street.

The criteria defined in section 148 of the San Francisco Planning Code are used to describe frequent wind conditions and specify acceptable limits for various activities. With regards to comfort, the planning code differentiates between areas of substantial pedestrian use (hereafter "pedestrian areas") and public seating areas (hereafter "seating areas"). The pedestrian areas are primarily suitable for walking. The seating areas are considered acceptable for reading a book or dining. These are comfort criteria.

There is also a hazard criterion used to describe a less frequent level of windiness and is to be exceeded less than one hour yearly. When the wind speed is above the hazard limit, aerodynamic forces approach the body weight and it rapidly becomes difficult to remain standing.

Wind Effects from Buildings

The local wind conditions onsite are strongly influenced by the surrounding buildings. Windiness depends both on the arrangement of buildings and structures within their surroundings and their orientation compared to the prevailing winds.

When strong winds approach a bluff façade, the façade will act to split the flow. The winds encountering the top one-third of the building will tend to accelerate up and over the top of the building as the winds seek the fastest path from the high-pressure region created on the windward façade to the low-pressure region created on the leeward façade of the building. Winds encountering the lower two-thirds of the building tend to be pushed, or *downdrafted*, to ground level. Downdrafts carry the same energy as the winds at the upper level. As a result, increased levels of windiness are experienced at ground level, especially around building corners where winds accelerate.

Local acceleration of winds occurs when two buildings are positioned side by side (*funneling*). Acceleration from funneling is greatest when the spacing between buildings ranges between 25 to 100 percent of the building's width.

Project Setting and Surrounding Vicinity

The project site is currently used as a surface parking lot. The 28,790 square-foot site is bounded to the north by Stevenson Street, to the south by Jessie Street and to the east by Clearway Energy's thermal power station. The site shares the property line to the west with the neighboring properties on Sixth Street. The project site measures 200 feet along Stevenson Street and Jessie Street, and 145 feet along its eastern and western property lines.

The immediate surroundings of the project site consist mostly of mid-rise buildings that are typically less than 100 feet tall, except for 995 Market Street (190 feet tall) to the west of the project site. Beyond the immediate project vicinity, the surrounding area consists of similar low- and mid-rise buildings to the south and taller buildings to the west and north. A large concentration of high-rise buildings is built in the Financial District, to the northeast of the project site.

4.3.3 Regulatory Framework

While there are no specific federal or state regulations which deal with wind effects on publicly accessible areas, San Francisco has established several provisions, policies, and procedures that provide the framework to evaluate potential wind impacts from new development and to determine whether wind conditions are suitable for pedestrian activities.

Local Regulations

Downtown Area Plan

Policy 14.2 in the Downtown Area Plan states that new development should promote building forms that will minimize the creation of surface winds near the base of buildings. The Downtown Area Plan further states "variation in ground level wind impacts is related to several factors:

- Exposure of the building to the prevailing wind direction, the more exposed a building is, the greater the volume and momentum of the wind intercepted, and the greater the potential for wind accelerations at street level.
- The shape, area, and uniformity of the upwind facade. Relatively large, uniform facades typically result in greater wind accelerations than do narrow or complex facades with numerous setbacks.

These factors should be considered in the massing and detailing of new buildings. Exposed facades should use setbacks at various levels, and other configured shapes and design features, to reduce [the] wind impact. In buildings of a size likely to cause problems, wind tunnel tests of alternative building masses should be undertaken and the results employed in selecting the shape of the building. As a general rule, a building form should not be used which causes wind speeds to exceed 11 mph in areas where people are walking and 7 miles per hour where people are sitting.[89]"

Planning Code

Planning code section 148 outlines pedestrian comfort and hazardous wind speed criteria for the Downtown (C-3) Use Districts where the project site is located. Section 148 defines "equivalent wind speed" as "an hourly mean wind speed adjusted to incorporate the effect of gustiness or turbulence on pedestrians" and is used to determine comfort wind speeds. The pedestrian comfort wind speed criteria are 7 mph for no more than 10 percent of the time year-round, between 7 a.m. and 6 p.m., in public seating areas and 11 mph for no more than 10 percent of the time year-round, between 7 a.m. and 6 p.m., in areas of substantial pedestrian use. A hazardous wind condition is when the wind speed exceeds 26 mph for a single hour of the year.

Following the adoption of planning code section 148, the planning department developed procedures for implementation of the requirements, including a wind tunnel testing protocol that remains in use

[89] City and County of San Francisco. 1989. Downtown Area Plan. Available at: https://generalplan.sfplanning.org/Downtown.htm. Accessed October 23, 2019.

today. As such, the criteria defined in section 148 of the planning code are used to evaluate wind comfort and hazard, and to determine whether wind conditions are suitable for pedestrian activities.

4.3.4 Impacts and Mitigation Measures

Significance Criteria

The following significance criterion is used by the planning department to determine whether the proposed project would result in a significant wind impact. Implementation of the proposed project would have a significant effect related to wind if the project would:

- Create wind hazards in publicly accessible areas of substantial pedestrian use.

Approach to Analysis

The methodology and the criteria for analyzing potential project wind impacts in this EIR are derived from planning code section 148. As noted, section 148 establishes a wind hazard criterion, whereby project buildings may not cause wind speeds that meet or exceed 26 mph, averaged for a full hour for any hour of the year. The 26 mph, one-hour wind hazard criterion is converted to a one-minute average wind speed of 36 mph, and 36 mph is accordingly used as the hazard threshold in the reporting of test results. Projects that exceed the wind hazard criteria would result in a significant wind impact. As also described above, section 148 establishes wind comfort criteria, whereby a project shall not cause ground-level wind currents to exceed, more than 10 percent of the time, 11 mph in areas of substantial pedestrian use, and 7 mph in public seating areas. Project effects on wind comfort are presented in this EIR for informational purposes.

Methodology

ARUP conducted a wind tunnel test to characterize the existing wind environment and to determine future wind conditions on sidewalks and open spaces around the project site should the proposed project be constructed. A 1-inch-to-25-foot scale (1:300) model of the proposed project and surrounding buildings within a 1,200-foot radius of the project site was constructed to simulate existing, existing-plus-project, cumulative, and cumulative-plus-project conditions. Such distance from the project site is considered appropriate to reproduce the local wind effects of the surrounding buildings (existing and planned) on site and is commonly used in the industry. The scale model, which was equipped with permanently mounted wind speed sensors, was placed inside an atmospheric boundary layer wind tunnel. The wind testing included multiple iterations of design scenarios to develop a design that would comply with the wind hazard criterion of section 148 of the planning code. The resulting project design is presented as the proposed project as described in Chapter 2, Project Description.

The wind tunnel test measured wind speeds for the existing setting and the existing-plus-project scenarios, as well as a cumulative and the cumulative-plus-project scenarios. Pedestrian-level wind speeds were measured at 63 locations for each of the four scenarios at an effective-full-scale height of

approximately 6 feet above ground, which is the standard height used for assessing wind effects on pedestrians.[90]

Locations for wind speed sensors, or study test points, were selected to indicate how the general flow of winds would be directed around the project buildings. Consistent with section 148, the locations of test points are placed adjacent to the project site, in frequently used areas (e.g., public seating areas, entrances, retail frontages, walking zones), and in areas expected to experience higher wind speeds. The measurement locations are shown in Figure 20.

Existing Scenario

The existing scenario considers all existing buildings and projects within 1,200 feet of the project site, including the following:

- **5M Project (925-967 Mission Street)**, to the east of the proposed project on the southern corner of Fifth Street and Mission Street. The development consists of a 200-foot-tall tower along Mission Street, a 470-foot-tall tower on Fifth Street, a 350-foot-tall tower at the crossing of Fifth Street and Howard Street and a 395-foot-tall tower on Howard Street. The development is under construction.
- **945 Market Street**, to the north of the proposed project between Market Street and Stevenson Street. The scheme consists of an existing 5-story, 90-foot-tall retail building.
- **950-974 Market Street**, to the northwest of the proposed project at the southwest crossing of Market Street and Turk Street. The scheme consists of a 12-story, 120-foot-tall mixed-used building and is currently under construction.
- **1066 Market Street**, to the west of the proposed project at the southeast crossing of Jones Street and Golden Gate Avenue and north of Market Street. The scheme consists of a 12-story, 120-foot-tall residential building and is currently under construction.

Cumulative Scenario

The cumulative scenario includes the following projects that are within 1,200 feet of the proposed project and listed in Table 4.1-1:

- **996 Mission Street**, to the south of the proposed project at the northwest crossing of Mission Street and Sixth Street. The scheme has been modeled as an 8-story building.
- **1055 Market Street**, to the southwest of the proposed project on the southern side of Market Street between Sixth Street and Seventh Street. The scheme consists of a 10-story, 90-foot-tall hotel building with ground floor retail space.
- **921 Howard Street**, to the southeast of the proposed project on the south side of Howard Street between Fifth Street and Sixth Street. The scheme has been modeled as an 18-story building.
- **1025 Howard Street**, to the southeast of the proposed project at the southwest crossing of Howard Street and Harriet Street. The scheme consists of an 8-story, 90-foot-tall hotel building.

[90] ARUP. January 2020. Wind Study for the 469 Stevenson Street Project.

- **481-483 Tehama Street**, to the southeast of the proposed project on the south side of Tehama Street between Fifth Street and Sixth Street. The scheme consists of a 4-story, 50-foot-tall residential building.
- **457-475 Minna Street**, to the southeast of the proposed project on the south side of Minna Street between Fifth Street and Sixth Street. The scheme consists of a 16-story, 160-foot-tall residential building.
- **527 Stevenson Street**, to the southwest of the proposed project on the south side of Stevenson between Sixth Street and Seventh Street. The scheme consists of a 7-story, 74-foot-tall commercial building.
- **57 Taylor Street (111 Turk Street)**, to the northwest of the proposed project at the south-west crossing of Turk Street and Taylor Street. The scheme consists of a 11-story, 120-foot-tall residential building.

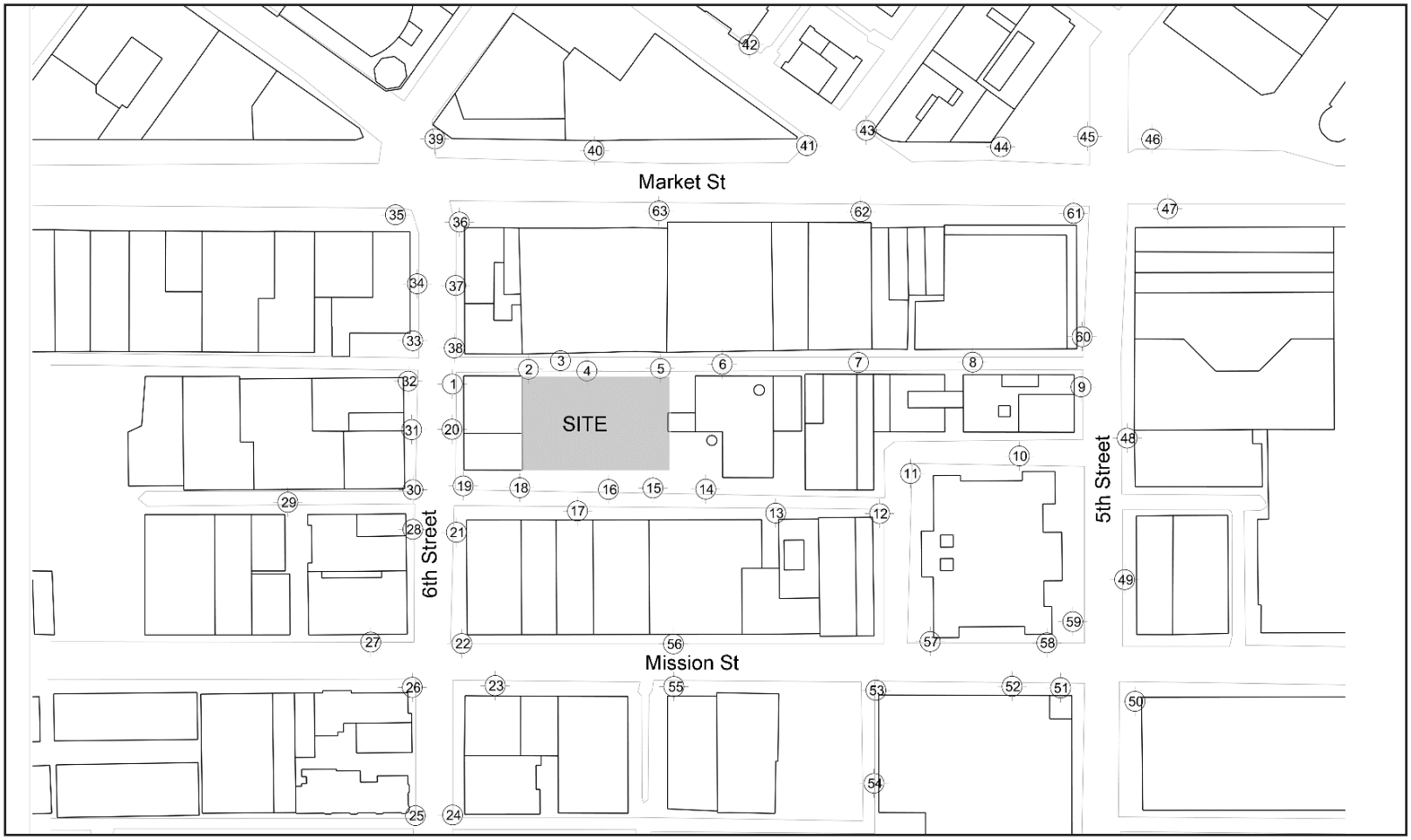
Additionally, for the cumulative analysis only, existing landscaping (including street trees and other green canopy) located at and near Mint Plaza were included in the model.[91]

Project Design Features to Reduce Wind Impacts

The proposed project as tested in the wind tunnel includes the following features specifically designed to minimize potential pedestrian-level winds:

- The position of the tower is about 26 feet away from the northeast side of the podium;
- The height of the volumetric elements toward Stevenson Street is reduced from 45 feet to 35 feet;
- A 20-foot-tall solid screen along the podium edge on Stevenson Street; and
- A 12-foot-tall solid screen on the volumetric elements.

[91] ARUP and planning staff reviewed cumulative projects in the area to ensure that there were no reasonably foreseeable cumulative projects that could potentially result in the removal of the landscaping near Mint Plaza that was included in the wind tunnel model. Because there are no cumulative projects or proposals that would result in landscape removal near Mint Plaza, it is appropriate to consider this existing landscaping as part of the existing environmental conditions for the cumulative analysis.



469 Stevenson Street Project

Case No. 2017-014833ENV

Figure 20: Wind Measurement Locations

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Impact Evaluation

The following analysis evaluates potential wind impacts that could result from construction and operation of the proposed project.

Impact WD-1: The proposed project would not create wind hazards in publicly accessible areas of substantial pedestrian use. (*Less than Significant*)

Wind Hazard Analysis

The proposed project would replace the existing 176 space surface parking lot with a 27-story, 274-foot-tall (with an additional 10 feet for rooftop mechanical equipment) mixed-use residential building of approximately 535,000 gsf. Wind speeds were measured at 63 ground-level test locations for the existing conditions and the existing-plus-project conditions. Under existing conditions, the wind tunnel test determined that none of the 63 locations tested exceed the wind hazard criterion of 36 mph (refer to Table 4.3-1).

Pursuant section 148 of the planning code, the proposed project may not cause wind speeds that meet or exceed 36 mph; therefore, the proposed project has incorporated design features to ensure that wind speeds would not exceed the 36 mph wind hazard criteria. Physical design features incorporated into the project are discussed above. These design features would be maintained over the life of the proposed project. As such, under the existing-plus-project scenario, while the average wind speed would increase from approximately 22 mph to 24 mph, none of the 63 locations tested would exceed the wind hazard criterion of 36 mph (refer to Table 4.3-1).[92] Therefore, the proposed project would not create wind hazards that affect publicly accessible areas of substantial pedestrian use and this impact would be less than significant.

[92] ARUP. January 2020. Wind Study for the 469 Stevenson Street Project.

Table 4.3-1: Wind Hazard Results

References		Existing Conditions (No Project)		Existing-Plus-Project	
Measurement Location	Hazard Criterion (mph)	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criterion	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criterion
1	36	25	0	24	0
2	36	23	0	25	0
3	36	20	0	29	0
4	36	17	0	33	0
5	36	19	0	31	0
6	36	19	0	22	0
7	36	22	0	25	0
8	36	19	0	18	0
9	36	19	0	19	0
10	36	19	0	19	0
11	36	21	0	20	0
12	36	25	0	35	0
13	36	24	0	29	0
14	36	17	0	28	0
15	36	20	0	34	0
16	36	20	0	25	0
17	36	16	0	29	0
18	36	21	0	23	0
19	36	23	0	26	0
20	36	22	0	26	0
21	36	20	0	23	0
22	36	18	0	25	0
23	36	19	0	20	0
24	36	20	0	17	0
25	36	20	0	17	0
26	36	27	0	19	0
27	36	19	0	17	0

References		Existing Conditions (No Project)		Existing-Plus-Project	
Measurement Location	Hazard Criterion (mph)	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criterion	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criterion
28	36	16	0	19	0
29	36	21	0	20	0
30	36	18	0	25	0
31	36	17	0	22	0
32	36	19	0	20	0
33	36	21	0	21	0
34	36	25	0	27	0
35	36	22	0	31	0
36	36	24	0	29	0
37	36	19	0	22	0
38	36	27	0	23	0
39	36	20	0	22	0
40	36	28	0	26	0
41	36	20	0	23	0
42	36	24	0	24	0
43	36	27	0	26	0
44	36	33	0	30	0
45	36	27	0	27	0
46	36	23	0	25	0
47	36	26	0	24	0
48	36	22	0	23	0
49	36	20	0	19	0
50	36	26	0	26	0
51	36	23	0	19	0
52	36	26	0	20	0
53	36	31	0	31	0
54	36	34	0	30	0
55	36	26	0	27	0

References		Existing Conditions (No Project)		Existing-Plus-Project	
Measurement Location	**Hazard Criterion (mph)**	**Wind Speed Exceeded 1 Hour per Year (mph)**	**Hours per Year Wind Speed Exceeds Hazard Criterion**	**Wind Speed Exceeded 1 Hour per Year (mph)**	**Hours per Year Wind Speed Exceeds Hazard Criterion**
56	36	23	0	26	0
57	36	21	0	23	0
58	36	27	0	27	0
59	36	22	0	23	0
60	36	24	0	23	0
61	36	26	0	27	0
62	36	21	0	22	0
63	36	23	0	23	0
Average Wind Speed		**22.3**	--	**24.3**	--
No. of Exceedances		--	**0**	--	**0**
Total Hours Exceeded		--	**0**	--	**0**

Source: ARUP January 2020

Cumulative Impacts

This section discusses cumulative wind impacts that could result from the proposed project in combination with reasonably foreseeable future projects.

Impact C-WD-1: The proposed project in combination with reasonably foreseeable projects, would not create wind hazards in publicly accessible areas of substantial pedestrian use. (*Less than Significant*)

Wind Hazard Analysis

As described above, the wind analysis constructed a model of the proposed project and the following planned future buildings within a 1,200-foot radius of the project site to simulate the cumulative conditions:

- 996 Mission Street
- 1055 Market Street
- 921 Howard Street
- 1025 Howard Street
- 481-483 Tehama Street
- 457-475 Minna Street
- 527 Stevenson Street
- 57 Taylor Street (111 Turk Street)

These cumulative projects have either been approved or a project application is on file with the planning department. The current project plans were used to develop models of these projects for use in wind-tunnel testing with input as necessary from the planning department. Additionally, as noted above, existing landscaping (including street trees and other green canopy) located at and near Mint Plaza were included in the model for the cumulative analysis only.

With the introduction of these cumulative development projects the average wind speed would increase approximately 1 to 2 mph from existing conditions (22.3 mph under existing conditions and 23.8 mph under cumulative plus project conditions). However, none of the 63 measurement locations would exceed the wind hazard criterion of 36 mph (refer to Table 4.3-2). As discussed under Impact WD-1, the proposed project would incorporate several design features so that pedestrian-level wind speeds do not exceed the 36-mph wind hazard criterion. Therefore, the proposed project in combination with the cumulative development projects would not create wind hazards in publicly accessible areas of substantial pedestrian use (refer to Table 4.3-2). The proposed project in combination with cumulative projects would have a less-than-significant cumulative wind hazard impact.

Table 4.3-2: Wind Hazard Results for Cumulative Conditions

References		Existing Conditions (No Project)		Cumulative Conditions (No Project)		Cumulative-Plus-Project	
Measurement Location	Hazard Criterion (mph)	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criterion	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criterion	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criterion
1	36	25	0	23	0	23	0
2	36	23	0	18	0	22	0
3	36	20	0	17	0	27	0
4	36	17	0	17	0	32	0
5	36	19	0	19	0	23	0
6	36	19	0	20	0	18	0
7	36	22	0	23	0	23	0
8	36	19	0	19	0	18	0
9	36	19	0	19	0	20	0
10	36	19	0	18	0	18	0
11	36	21	0	21	0	20	0
12	36	25	0	25	0	36	0
13	36	24	0	24	0	26	0
14	36	17	0	17	0	29	0
15	36	20	0	20	0	29	0
16	36	20	0	19	0	27	0
17	36	16	0	16	0	33	0
18	36	21	0	19	0	24	0
19	36	23	0	21	0	25	0
20	36	22	0	16	0	21	0
21	36	20	0	22	0	19	0
22	36	18	0	19	0	24	0
23	36	19	0	20	0	22	0
24	36	20	0	20	0	19	0
25	36	20	0	20	0	20	0
26	36	27	0	28	0	28	0

References		Existing Conditions (No Project)		Cumulative Conditions (No Project)		Cumulative-Plus-Project	
Measurement Location	Hazard Criterion (mph)	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criterion	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criterion	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criterion
27	36	19	0	18	0	18	0
28	36	16	0	18	0	23	0
29	36	21	0	19	0	18	0
30	36	18	0	19	0	28	0
31	36	17	0	16	0	20	0
32	36	19	0	17	0	19	0
33	36	21	0	20	0	20	0
34	36	25	0	24	0	25	0
35	36	22	0	19	0	21	0
36	36	24	0	23	0	24	0
37	36	19	0	21	0	20	0
38	36	27	0	21	0	20	0
39	36	20	0	20	0	21	0
40	36	28	0	24	0	24	0
41	36	20	0	20	0	22	0
42	36	24	0	23	0	34	0
43	36	27	0	27	0	26	0
44	36	33	0	33	0	33	0
45	36	27	0	27	0	27	0
46	36	23	0	24	0	24	0
47	36	26	0	26	0	27	0
48	36	22	0	22	0	22	0
49	36	20	0	21	0	19	0
50	36	26	0	26	0	25	0
51	36	23	0	23	0	19	0
52	36	26	0	26	0	19	0
53	36	31	0	31	0	28	0

References		Existing Conditions (No Project)		Cumulative Conditions (No Project)		Cumulative-Plus-Project	
Measurement Location	**Hazard Criterion (mph)**	**Wind Speed Exceeded 1 Hour per Year (mph)**	**Hours per Year Wind Speed Exceeds Hazard Criterion**	**Wind Speed Exceeded 1 Hour per Year (mph)**	**Hours per Year Wind Speed Exceeds Hazard Criterion**	**Wind Speed Exceeded 1 Hour per Year (mph)**	**Hours per Year Wind Speed Exceeds Hazard Criterion**
54	36	34	0	33	0	30	0
55	36	26	0	26	0	29	0
56	36	23	0	23	0	23	0
57	36	21	0	20	0	24	0
58	36	27	0	27	0	28	0
59	36	22	0	21	0	24	0
60	36	24	0	25	0	24	0
61	36	26	0	26	0	27	0
62	36	21	0	21	0	21	0
63	36	23	0	22	0	20	0
Average Wind Speed		**22.3**	--	**21.8**	--	**23.8**	--
No. of Exceedances		--	**0**	--	**0**	--	**0**
Total Hours Exceeded		--	**0**	--	**0**	--	**0**

Source: ARUP January 2020

Supplemental Information

Wind Comfort Analysis

As noted above, the project site is located within a C-3 District and is subject to planning code section 148. The wind comfort criteria is presented here for information purposes only as the 11-mph pedestrian comfort criterion and the 7-mph seating comfort criterion are not the planning department's CEQA significance criteria for wind impacts. However, the wind comfort criteria are useful in describing the overall wind environment because the comfort criteria wind speeds (those exceeded 10 percent of the time) are more representative of "typical" windy conditions than the hazard criterion wind speed, which are those exceeded only one hour per year, or approximately one one-hundredth of a percent of the time.

Under existing conditions, wind speeds in the vicinity of the project site average 11.6 mph for all measurement locations. Winds at 61 of the 63 locations currently exceed the 11-mph pedestrian comfort criterion established by planning code section 148 (see Table 4.3-3). In the immediate vicinity of the project site (locations #1 to #21), the highest wind speeds are 15 mph at location #12 and 14 mph at locations #1 and #13, where the seating comfort criterion (7 mph) is exceeded 40 to 50 percent of the time and the pedestrian comfort (11 mph) criterion is exceeded 20 to 24 percent of the time.[93]

Under the existing-plus-project conditions, average wind speeds for all measurement locations would increase by 0.8 mph, to 12.4 mph, and the seating and pedestrian comfort criteria would be exceeded at all 63 locations. The highest wind speeds in the immediate vicinity of the site are 19 mph at location #12 and 17 mph at location #13. Under the existing-plus-project condition at locations #12 and #13, the wind exceeds the seating comfort criterion approximately 55 to 57 percent of the time and the pedestrian comfort criterion about 32 to 35 percent of the time.

Under cumulative conditions without the proposed project, wind speeds in the vicinity of the project site average 11 mph for all measurement locations (Table 4.3-4). In the immediate vicinity of the project site (locations #1 to #21), the highest wind speed (13 mph) occurs at locations #12 and #13. At locations #12 and #13 under cumulative conditions, the winds exceed the seating comfort criterion approximately 43 to 47 percent of the time and the pedestrian comfort criterion approximately 16 to 19 percent of the time.

For the cumulative conditions with the proposed project, the average wind speed for all test locations would increase by 1.3 mph, to 12.3 mph. The highest wind speed in the immediate vicinity of the site is 19 mph at location #12 and #17 along Jessie Street (Table 4.3-4). At locations #12 and #17 the wind exceeds the seating comfort criterion approximately 56 to 62 percent of the time and the pedestrian comfort criterion about 35 to 40 percent of the time.

Overall, the proposed project would increase the windiness in the area by about 1 mph and exceed the comfort criteria at two new locations (locations #5 and #10) under existing plus project and cumulative plus project conditions.

[93] ARUP. January 2020. Wind Study for 469 Stevenson Street Project.

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Table 4.3-3: Wind Comfort Results for Existing and Existing Plus Project Conditions

References			Existing Conditions (No Project)			Existing-Plus-Project			
Measurement Location	Comfort criterion for seating areas (mph)	Comfort criterion for pedestrian areas (mph)	Wind Speed exceeded 10% of time (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas	Percentage of time wind speed exceeds comfort criterion for pedestrian areas	Wind Speed exceeded 10% of time (mph)	Speed Change Relative to Existing (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas	Percentage of time wind speed exceeds comfort criterion for pedestrian areas
1	7	11	14	41*	20*	14	0	51*	24*
2	7	11	13	36*	14*	13	0	48*	19*
3	7	11	11	28*	9	15	4	51*	24*
4	7	11	9	17*	2	16	7	52*	26*
5	7	11	7	9	1	15	8	53*	25*
6	7	11	8	16*	2	12	4	41*	13*
7	7	11	10	30*	5	11	1	33*	9
8	7	11	10	25*	4	10	0	28*	5
9	7	11	10	31*	6	11	1	35*	10
10	7	11	7	7	1	8	1	16*	1
11	7	11	11	36*	9	10	-1	31*	6
12	7	11	15	50*	24*	19	4	55*	35*
13	7	11	14	49*	21*	17	3	57*	32*
14	7	11	10	28*	4	15	5	56*	27*
15	7	11	12	40*	14*	14	2	56*	24*
16	7	11	12	41*	14*	14	2	52*	22*
17	7	11	9	25*	3	16	7	58*	30*
18	7	11	12	42*	13*	12	0	41*	11*
19	7	11	13	44*	18*	15	2	52*	26*
20	7	11	12	36*	13*	14	2	49*	22*
21	7	11	11	34*	9	14	3	47*	20*
22	7	11	9	25*	3	14	5	43*	20*
23	7	11	9	23*	3	10	1	31*	6
24	7	11	11	36*	9	10	-1	29*	5
25	7	11	10	29*	5	9	-1	19*	2
26	7	11	13	36*	14*	9	-4	20*	2
27	7	11	9	17*	3	8	-1	14*	1
28	7	11	8	15*	1	9	1	21*	3

References			Existing Conditions (No Project)			Existing-Plus-Project			
Measurement Location	Comfort criterion for seating areas (mph)	Comfort criterion for pedestrian areas (mph)	Wind Speed exceeded 10% of time (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas	Percentage of time wind speed exceeds comfort criterion for pedestrian areas	Wind Speed exceeded 10% of time (mph)	Speed Change Relative to Existing (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas	Percentage of time wind speed exceeds comfort criterion for pedestrian areas
29	7	11	11	30*	7	11	0	31*	7
30	7	11	10	25*	4	13	3	48*	19*
31	7	11	10	25*	4	12	2	43*	14*
32	7	11	11	33*	9	11	0	39*	10
33	7	11	12	37*	12*	13	1	42*	15*
34	7	11	10	27*	4	8	-2	13*	2
35	7	11	11	33*	10	15	4	45*	24*
36	7	11	13	45*	15*	15	2	53*	25*
37	7	11	11	32*	7	12	1	41*	14*
38	7	11	15	44*	23*	13	-2	40*	16*
39	7	11	12	36*	11*	11	-1	36*	8
40	7	11	17	55*	31*	15	-2	47*	24*
41	7	11	8	15*	2	8	0	16*	2
42	7	11	12	38*	13*	13	1	41*	14*
43	7	11	15	49*	23*	14	-1	49*	22*
44	7	11	14	45*	18*	14	0	45*	18*
45	7	11	13	47*	18*	15	2	49*	22*
46	7	11	13	47*	18*	14	1	48*	20*
47	7	11	12	40*	12*	12	0	38*	11*
48	7	11	13	42*	15*	13	0	43*	18*
49	7	11	11	36*	10	11	0	32*	7
50	7	11	13	48*	17*	13	0	49*	18*
51	7	11	14	42*	20*	10	-4	27*	6
52	7	11	16	45*	25*	11	-5	31*	7
53	7	11	14	50*	21*	12	-2	33*	11*
54	7	11	15	52*	24*	11	-4	31*	7
55	7	11	12	42*	12*	14	2	50*	22*
56	7	11	12	42*	12*	11	-1	38*	9

References			Existing Conditions (No Project)			Existing-Plus-Project			
Measurement Location	**Comfort criterion for seating areas (mph)**	**Comfort criterion for pedestrian areas (mph)**	**Wind Speed exceeded 10% of time (mph)**	**Percentage of time wind speed exceeds comfort criterion for seating areas**	**Percentage of time wind speed exceeds comfort criterion for pedestrian areas**	**Wind Speed exceeded 10% of time (mph)**	**Speed Change Relative to Existing (mph)**	**Percentage of time wind speed exceeds comfort criterion for seating areas**	**Percentage of time wind speed exceeds comfort criterion for pedestrian areas**
57	7	11	12	41*	14*	13	1	44*	17*
58	7	11	12	40*	13*	10	-2	28*	5
59	7	11	8	14*	2	10	2	28*	4
60	7	11	13	44*	15*	12	-1	40*	12*
61	7	11	12	32*	11*	12	0	29*	11*
62	7	11	11	36*	8	10	-1	27*	4
63	7	11	13	47*	18*	13	0	45*	19*
Average	--	--	**11.6**	**35**	**11.5**	**12.4**	**0.8**	**39.3**	**14.5**
No. of Exceedances	--	--	--	**61**	**34**	--	--	**63**	**39**

* = exceeds

Source: ARUP January 2020

Table 4.3-4: Wind Comfort Results for Cumulative and Cumulative Plus Project Conditions

References			Existing Conditions (No Project)			Cumulative Conditions (No Project)			Cumulative-Plus-Project			
Measurement Location	Comfort criterion for seating areas (mph)	Comfort criterion for pedestrian areas (mph)	Wind Speed exceeded 10% of time (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas	Percentage of time wind speed exceeds comfort criterion for pedestrian areas	Wind Speed exceeded 10% of time (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas	Percentage of time wind speed exceeds comfort criterion for pedestrian areas	Wind Speed exceeded 10% of time (mph)	Speed Change Relative to Existing (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas	Percentage of time wind speed exceeds comfort criterion for pedestrian areas
1	7	11	14	41*	20*	12	38*	13*	14	2	47*	21*
2	7	11	13	36*	14*	10	25*	5	12	2	39*	12*
3	7	11	11	28*	9	9	17*	2	14	5	42*	17*
4	7	11	9	17*	2	7	7	1	15	8	45*	21*
5	7	11	7	9	1	7	8	1	13	6	49*	19*
6	7	11	8	16*	2	8	14*	2	11	3	32*	6
7	7	11	10	30*	5	10	28*	4	11	1	35*	9
8	7	11	10	25*	4	10	24*	4	10	0	30*	5
9	7	11	10	31*	6	10	31*	6	12	2	37*	11*
10	7	11	7	7	1	7	6	1	7	0	8	1
11	7	11	11	36*	9	11	34*	8	9	-2	21*	2
12	7	11	15	50*	24*	13	43*	16*	19	6	56*	35*
13	7	11	14	49*	21*	13	47*	19*	15	2	54*	27*
14	7	11	10	28*	4	10	27*	4	14	4	55*	24*
15	7	11	12	40*	14*	12	38*	12*	14	2	55*	23*
16	7	11	12	41*	14*	11	37*	10	16	5	57*	30*
17	7	11	9	25*	3	9	21*	2	19	10	62*	40*
18	7	11	12	42*	13*	11	38*	10	11	0	38*	9
19	7	11	13	44*	18*	12	37*	11*	14	2	50*	20*
20	7	11	12	36*	13*	10	25*	4	11	1	35*	9
21	7	11	11	34*	9	10	29*	5	11	1	39*	10

References			Existing Conditions (No Project)			Cumulative Conditions (No Project)			Cumulative-Plus-Project			
Measurement Location	Comfort criterion for seating areas (mph)	Comfort criterion for pedestrian areas (mph)	Wind Speed exceeded 10% of time (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas	Percentage of time wind speed exceeds comfort criterion for pedestrian areas	Wind Speed exceeded 10% of time (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas	Percentage of time wind speed exceeds comfort criterion for pedestrian areas	Wind Speed exceeded 10% of time (mph)	Speed Change Relative to Existing (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas	Percentage of time wind speed exceeds comfort criterion for pedestrian areas
22	7	11	9	25*	3	11	32*	7	14	3	45*	20*
23	7	11	9	23*	3	10	31*	5	13	3	44*	18*
24	7	11	11	36*	9	11	36*	9	11	0	36*	8
25	7	11	10	29*	5	9	24*	3	10	1	29*	5
26	7	11	13	36*	14*	13	38*	15*	14	1	44*	21*
27	7	11	9	17*	3	9	17*	2	9	0	17*	3
28	7	11	8	15*	1	8	14*	1	11	3	34*	8
29	7	11	11	30*	7	11	31*	7	10	-1	28*	5
30	7	11	10	25*	4	10	23*	4	14	4	46*	19*
31	7	11	10	25*	4	8	15*	1	11	3	34*	8
32	7	11	11	33*	9	10	26*	4	10	0	32*	6
33	7	11	12	37*	12*	10	30*	6	12	2	37*	10*
34	7	11	10	27*	4	9	20*	2	9	0	24*	3
35	7	11	11	33*	10	10	26*	6	10	0	21*	5
36	7	11	13	45*	15*	11	38*	9	12	1	41*	11*
37	7	11	11	32*	7	10	29*	7	11	1	31*	7
38	7	11	15	44*	23*	12	38*	12*	11	-1	32*	9
39	7	11	12	36*	11*	11	36*	10	12	1	39*	11*
40	7	11	17	55*	31*	14	49*	22*	15	1	51*	24*
41	7	11	8	15*	2	8	12*	2	8	0	13*	2
42	7	11	12	38*	13*	12	38*	12*	19	7	69*	44*
43	7	11	15	49*	23*	15	49*	23*	14	-1	49*	22*
44	7	11	14	45*	18*	14	45*	19*	14	0	48*	21*
45	7	11	13	47*	18*	14	47*	19*	14	0	49*	21*

References			Existing Conditions (No Project)			Cumulative Conditions (No Project)			Cumulative-Plus-Project			
Measurement Location	Comfort criterion for seating areas (mph)	Comfort criterion for pedestrian areas (mph)	Wind Speed exceeded 10% of time (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas	Percentage of time wind speed exceeds comfort criterion for pedestrian areas	Wind Speed exceeded 10% of time (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas	Percentage of time wind speed exceeds comfort criterion for pedestrian areas	Wind Speed exceeded 10% of time (mph)	Speed Change Relative to Existing (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas	Percentage of time wind speed exceeds comfort criterion for pedestrian areas
46	7	11	13	47*	18*	14	48*	20*	13	-1	48*	19*
47	7	11	12	40*	12*	12	41*	13*	12	0	40*	13*
48	7	11	13	42*	15*	13	42*	16*	13	0	44*	18*
49	7	11	11	36*	10	12	35*	10*	11	-1	31*	7
50	7	11	13	48*	17*	13	47*	16*	13	0	46*	15*
51	7	11	14	42*	20*	14	41*	19*	10	-4	25*	5
52	7	11	16	45*	25*	15	45*	24*	9	-6	23*	3
53	7	11	14	50*	21*	14	50*	20*	11	-3	31*	8
54	7	11	15	52*	24*	14	49*	21*	13	-1	48*	18*
55	7	11	12	42*	12*	12	42*	12*	16	4	51*	25*
56	7	11	12	42*	12*	12	40*	11*	11	-1	36*	8
57	7	11	12	41*	14*	12	40*	12*	13	1	43*	16*
58	7	11	12	40*	13*	12	41*	14*	10	-2	32*	6
59	7	11	8	14*	2	8	16*	2	10	2	33*	6
60	7	11	13	44*	15*	13	44*	15*	13	0	43*	15*
61	7	11	12	32	11*	12	34*	12*	12	0	31*	12*
62	7	11	11	36	8	11	32*	7	10	-1	30*	5
63	7	11	13	47	18*	11	38*	10	12	1	40*	11*
Average	--	--	**11.6**	**35**	**11.5**	**11.0**	**32.4**	**9.5**	**12.3**	**1.2**	**39.0**	**13.8**
No. of Exceedances	--	--	--	**61**	**34**	--	**60**	**27**	--	--	**62**	**35**

* = exceeds

Source: ARUP January 2020

4.4 SHADOW

4.4.1 Introduction

This section discusses the shadow impacts of the proposed project on public open spaces and recreation facilities near the project site. This section is based on the results of the shadow analysis report prepared for the proposed project by Prevision Design, included in this EIR as Appendix D.[94] The "Environmental Setting" discussion that follows describes the existing publicly accessible open spaces and recreation facilities near the project site that could potentially be affected by the proposed project. The "Regulatory Framework" section discusses regulations related to shadow that are applicable to proposed development projects. The "Impacts and Mitigation Measures" discussion describes the criteria for determining whether the proposed project would cast shadow on public open spaces near the project site; the shadow impacts of the proposed project; the cumulative shadow effects of the proposed project, combined with past, present, and reasonably foreseeable future projects; and applicable mitigation measures.

4.4.2 Environmental Setting

Existing Open Space Near the Project Site

There are no existing public or private open space facilities located on the project site. The nearest parks or public open spaces include the following:

- Mint Plaza, about 0.1-mile to the northeast;
- Father Alfred E. Boeddeker Park, about 0.3-mile to the northwest;
- Gene Friend Recreation Center, about 0.3-mile to the southeast;
- Turk-Hyde Mini Park, about 0.4-mile to the north;
- Tenderloin Recreation Center, about 0.4-mile to the north;
- UN Plaza, about 0.4-mile to the northwest;
- Victoria Manalo Draves Park, about 0.5-mile to the south;
- Joseph L. Alioto Performing Arts Piazza, about 0.5-mile to the northwest;
- Union Square, about 0.7-mile to the north; and
- Yerba Buena Gardens, about 0.5-mile to the northeast.

As discussed in the shadow analysis report, the UN Plaza and Mint Plaza are the only public open space areas that could be affected by shadow casted by the proposed project (Figure 21). The characteristics of these two open space areas are described in the following paragraphs.

[94] Prevision Design. March 2020. Shadow Analysis Report for the Proposed 469 Stevenson Street Project

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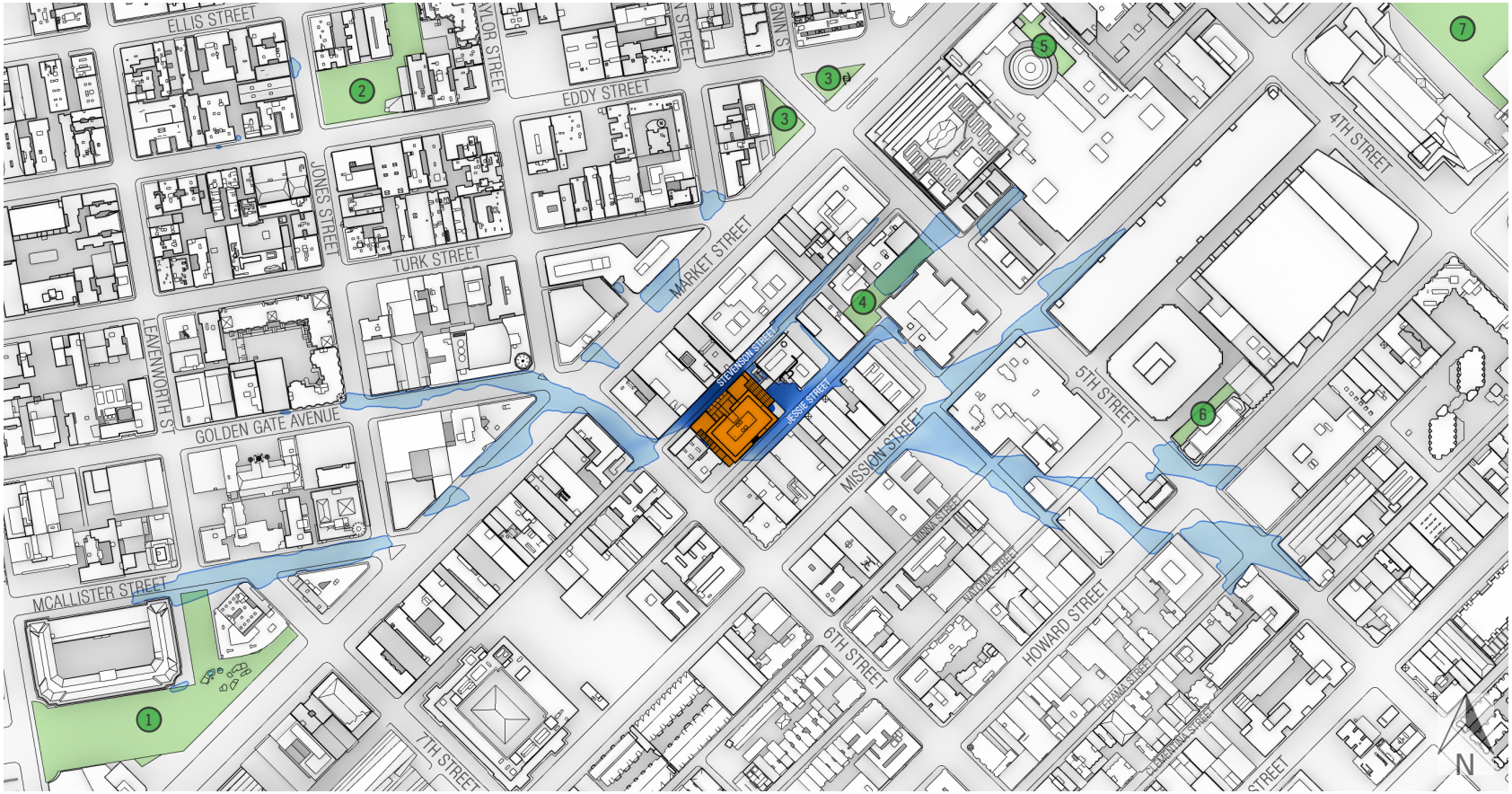

Proposed Project

Net New Shadow Fan of Proposed Project

occasional shadow — frequent shadow

SHADOW FAN DIAGRAM
AFFECTED AREAS DURING SECTION 295 TIMES

FULL YEAR

Parks and Open Spaces (Jurisdiction)

1. UN Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)
7. Yerba Buena Gardens (OCII)

Figure 21: Net New Shadow Fan and Affected Open Spaces

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UN Plaza

UN Plaza is a 2.35-acre (102,227 square feet) urban plaza about 0.4-mile northwest of the project site. The UN Plaza is under the jurisdiction of San Francisco Public Works and located in the Downtown/Civic Center neighborhood of San Francisco. The plaza is bounded by McAllister Street to the north, Market Street to the south, Charles J. Brenham Place to the east, and Hyde Street to the west. The plaza fills the space between three groups of buildings on the northwest, southwest and northeast corners of the block (Assessor's Block 0351 / Lots 022, 033, 035, 037, 041, 043, 046, 049, 050, 051, and 052-113).

UN Plaza is irregularly shaped but has two principal axes: the east-west axis visually connects San Francisco City Hall with Market Street, while a shorter north-south axis connects Leavenworth Street to Market Street. The plaza is not fenced and consists of a wide brick-paved area which is punctuated by raised planting areas with mature trees. On the western edge of the plaza near Hyde Street, there is a large bronze equestrian statue. Near the center of the plaza, there is a terraced area with a sculptural fountain. On the western corner of the plaza as well on the southern side are entrances to the underground Civic Center BART and Muni stations.

Prevision Design visited UN Plaza on September 29, 2019 and October 3 through October 5, 2019 and conducted 30-minute observations during the morning (7:30 a.m.-8:00 a.m.), midday (11:30 a.m.-12:00 p.m.), and afternoon (2:45 p.m.-3:15 p.m.). During these times, the number of users in the plaza ranged from approximately 900 to 1,400. The observed intensity of use varied at different times of the day and days of the week, but could be characterized as high, likely due to the location of the plaza between Market Street and Civic Center and because of the two entries/exits for the Civic Center BART and Muni Stations. It was observed that approximately 90 to 95 percent of the users were passing through the plaza.[95] There were several scheduled events occurring during the site visits, including an arts and crafts fair, farmer's market, and rally. During the events, it was observed that the number of total users passing through the plaza dropped, with about 75 percent of users engaging in the event (e.g., buying food at the farmer's market).[96]

Mint Plaza

Mint Plaza is a 0.36-acre (15,496 square feet) urban plaza about 0.1-mile northeast of the project site. Mint Plaza is owned by the City and County of San Francisco but maintained and programmed by the Friends of Mint Plaza, a non-profit organization. The plaza is in the SoMa neighborhood of San Francisco. The "L" shaped plaza is bounded by existing development (the former U.S. Mint, 2 Mint Plaza, 6 Mint Plaza, 10 Mint Plaza, and 14-54 Mint Plaza) to the north, south, and west, with public entries on Fifth Street, along the eastern edge of the plaza, and on Jessie Street at the southwest portion of the plaza.

Completed in 2009, the plaza is comprised primarily of stone paving hardscape, along with fixed bench seating areas and landscape plantings, a vine trellis canopy running along the northern edge, and several areas for movable café seating serving several cafés and restaurants as well as mobile food

[95] Prevision Design. March 2020. Shadow Analysis Report for the Proposed 469 Stevenson Street Project.

[96] Ibid.

vendors. The plaza also serves as a stormwater collection area, with a large sub-grade water infiltration zone in the center of the plaza.

Prevision Design visited Mint Plaza on September 29, 2019 and October 3 through October 5, 2019 and conducted 30-minute observations during the morning (9:00 a.m.-9:30 a.m.), midday (12:15 p.m.-12:45 p.m. and 12:30 p.m.-1:00 p.m.), and afternoon (2:45 p.m.-3:15 p.m. and 3:30 p.m.-4:00 p.m.). During these times, the number of users in the plaza ranged from approximately 200 to 575. It was observed that approximately 75 to 90 percent of users utilized the plaza to cut through to other destinations, or as a destination for a cup of coffee or food truck item that was taken to go.[97] Approximately 10 to 25 percent of users observed remained in the plaza for longer than a few minutes, with those users utilizing the fixed seating wall areas or the movable chairs. Overall, the observed intensity of use varied but could be characterized as moderate to high, but was largely observed to be used as a pass-though, or a destination to buy café goods then leave.[98]

4.4.3 Regulatory Framework

While there are no specific federal or state regulations which deal with solar access or shadow effects on publicly accessible open spaces, San Francisco has established several provisions, policies, and procedures that provide the framework by which shadow cast from projects is evaluated.

Local Regulations

San Francisco General Plan

Recreation and Open Space Element

Policy 1.9 in the Recreation and Open Space Element (2014) of the general plan states that sunlight should be preserved in public open spaces. The policy promotes protection of solar access and avoiding shade to maintain the usability of public open space. To determine whether a new shadow cast by a development is adverse to the use of a particular property, the City considers several quantitative and qualitative criteria, including the size of the park property, the amount of existing shadow, and the timing, size, location, and duration of the new shadow and the public good served by the building. The proposed project would be subject to this review under the general plan.

Urban Design Element

Policy 3.4 in the Urban Design Element of the general plan calls for the promotion of building forms that will respect and improve the integrity of open spaces and other public areas. Buildings to the south, east, and west of parks and plazas are to be limited in height or effectively oriented so as not to prevent the penetration of sunlight to such parks and plazas. Where feasible, large buildings and developments are to have ground-level open space, well situated for public access and sunlight penetration.

[97] Prevision Design. March 2020. Shadow Analysis Report for the Proposed 469 Stevenson Street Project.
[98] Ibid.

Downtown Area Plan

Policy 14.1 in the Downtown Plan states that new development should promote building forms that will maximize the sun access to open spaces and other public areas. As such, buildings to the south, east, and west of parks and plazas should be limited in height or effectively oriented so as not to prevent the penetration of sunlight to such parks and plazas. There are also certain locations in downtown where direct sunlight is very important. This includes shopping streets in the retail district, and alleys with a high concentration of eating and drinking establishments and a high volume of lunchtime pedestrian use. New buildings adjacent to these spaces should be shaped to minimize the shadow that is cast by the building on the public space.[99]

San Francisco Planning Code

Planning Code Section 101.1/Proposition M

Section 101.1 of the San Francisco Planning Code establishes eight priority policies. These priority policies are the basis upon which inconsistencies with the General Plan are resolved. Priority policy No. 8 calls for the protection of parks and open space and their access to sunlight and vistas.

Prior to issuing a permit for any project that requires an initial study under CEQA; prior to issuing a permit for any demolition, conversion, or change of use; and prior to taking any action that requires a finding of consistency with the General Plan, the City is required to find that the proposed project or legislation would be consistent with the priority policies.

Planning Code Section 295/Proposition K

Section 295 of the San Francisco Planning Code prohibits the issuance of building permits for structures over 40 feet in height that would cast net new shadow on properties under the jurisdiction of, or designated to be acquired by, the Recreation and Park Commission between one hour after sunrise to one hour before sunset at any time of year, unless the planning commission determines that the net new shadow (1) would not have an adverse impact on the use of the property or (2) the impact would not be significant.

The shadow analysis determined net new shadow cast by the proposed project would not affect any open space under the jurisdiction of, or designated for acquisition by, the Recreation and Park Commission, so these specific provisions do not apply to the proposed project.

Other Local Regulations

Planning code sections 146 and 147 establish additional design guidelines for buildings in C-3 Downtown Commercial, South of Market Mixed Use, and Eastern Neighborhoods Mixed Use Districts for the purpose of limiting shadow on public sidewalks, public plazas, and other publicly accessible spaces other than those protected under section 295.

[99] City and County of San Francisco. 1989. Downtown Area Plan. Available at: https://generalplan.sfplanning.org/Downtown.htm. Accessed October 23, 2019.

The proposed project is not located in an area subject to section 146 regulations. However, the project would be subject to the provisions of section 147. Accordingly, the proposed project is required to comply with section 147 through the section 309 process to establish that the project has been shaped, consistent with the dictates of good design and without unduly restricting the development potential of the site in question, to reduce substantial shadow impacts on public plazas and other publicly accessible spaces.

4.4.4 Impacts and Mitigation Measures

Significance Criteria

The following significance criterion is from the planning department's initial study checklist and is used to determine the level of impact related to shadow. Implementation of the proposed project would have a significant effect related to shadow if the project would:

- Create new shadow that substantially and adversely affects the use and enjoyment of publicly accessible open spaces

Approach to Analysis

As there are no broadly established or accepted methodologies for technical evaluation of shadow effects under the San Francisco General Plan or CEQA, for review of shadow impacts on open spaces not subject to section 295, the planning department typically adapts many of the section 295 technical standards. This analysis uses many of the standards for review of shadow under section 295.

Although the proposed project would not shade any section 295 open space, the shadow fan analysis[100] prepared by Prevision Design follows the criteria adopted by the Recreation and Parks Commission and the planning commission in 1987 and 1989, as stated below:

> *Shadow is quantitatively measured by multiplying the area of the shadow by the amount of time the shadow is present on the open space, in units called square foot-hours (sfh). Determining the annual net new shadow load generated by a project begins with a calculation of the number of square foot-hours that would theoretically fall on a qualifying publicly accessible open space each day from an hour after sunrise to an hour before sunset summed over the course of a year, ignoring all shadow from any source. This total is referred to as the Theoretical Annual Available Sunlight (TAAS) for that park. The second step is the calculation of the baseline (or current) shading conditions, which factors in the square foot-hours of shadow cast by existing buildings and other structures on the open space. Lastly, the shadow effects of the project are calculated, with the difference between the baseline shadow condition and project shadow condition considered being net new project shadow. The amount of shadow is defined as the shadow in square foot-hours cast by the project divided by the TAAS, expressed as a percentage.*
>
> *Further, in addition to quantitative criteria, the adopted criteria set forth qualitative criteria for evaluation of shadow. Those criteria for assessing net new shadow are based on existing shadow profiles*

[100] Prevision Design. March 2020. Shadow Analysis Report for the Proposed 469 Stevenson Street Project.

[graphics], important times of day, important seasons in the year, location of the net new shadow, size, and duration of net new shadows and the public good served by buildings casting net new shadow.

Methodology

To evaluate the shadow impacts of the proposed project, a 3D computer model of the project was prepared. The model includes the project site, potentially affected open spaces, the surrounding urban environment, and cumulative development projects that would have the potential to generate additional net new shadow on the same publicly accessible open spaces as the proposed project. The purpose of this analysis is to inform decision-makers of the potential effects of the proposed project's shadow on public and private open space areas, and to determine whether the project could create new shadow that would substantially affect the use and enjoyment of these facilities.

For the purposes of this analysis, Prevision Design has built a 3D computer model reflecting representation of the local San Francisco urban building context and landform surrounding the project generated by Light Intensity Distance and Ranging [or Laser Imaging Detection and Ranging]. This model is reflective of actual building massing and articulation circa 2010. For new buildings built[101] after that date, Prevision Design has generated individual building models using available architectural plans and records. Prevision Design also obtained or generated 3D models of reasonably foreseeable future projects[102] that would have the potential to generate additional net new shadow on the same publicly accessible open spaces that were shown to be affected by the project (cumulative scenario). Precise locations, boundaries, and sizes of the affected open spaces are input using geographic information systems data provided by the planning department. The shadow model considers the proposed project at full buildout.

To determine the area and features that would be affected by net new project shadow, Prevision Design used the 3D computer context model to generate a full-year shadow fan diagram, which depicts all areas that would receive net new shadow (factoring in the presence of current and intervening shadow from existing buildings) between one hour after sunrise through one hour before sunset ("the daily analysis period") throughout the year. The shadow fan analysis identified that UN Plaza and Mint Plaza would receive net new shadow from the project, as shown by Figure 21.

Quantitative Calculations

Using the 3D project and urban context model, Prevision Design performed snapshot shadow measurements at 15-minute intervals within the daily analysis period, repeating these daily measurements every seven days between the Summer Solstice (June 21) and Winter Solstice (December 20), with interim times and dates extrapolated to approximate shadow conditions on other days and times. This half-year period (between the Summer and Winter Solstices) is referred to by the planning department as a "solar year." As the path of the sun is roughly mirrored over the second half of the year (December 21 through June 20), analysis of this half-year period allows for a reasonable

[101] The final form of buildings currently under construction are included as if they are complete for the purposes of this study.
[102] Qualifying cumulative projects are those that are currently in some stage of the planning or permitting process but have not yet been approved or have been approved but are not yet under construction.

extrapolation to arrive at a full year estimated calculation of the areas and durations of existing (baseline) shadow that currently falls on the affected open spaces.

In addition to the quantitative analysis of existing shadow conditions, calculations were generated to reflect the addition of the project, with the difference between the baseline conditions and those with the project representing the net new shadow effect.

Lastly, 3D models of the cumulative development projects (listed in Table 4.4-1) were added to the model in order to generate the cumulative scenario, depicting the effect of reasonably foreseeable shadow from projects that are currently under review by the planning department or a building permit is on file or has been approved by the building department. Cumulative projects for this resource topic were identified by determining which projects in the planning department's development pipeline could shade the same open spaces (UN Plaza and Mint Plaza) as the proposed project. Therefore, the list of cumulative projects for this topic includes projects outside of a 0.25-mile radius of the project site (Table 4.4-1).

Table 4.4-1: Cumulative Development Projects for Shadow

Cumulative Project Address	Building Height
1125 Market Street (Case No. 2013.0511E)	119'-3"+22' parapet
1055 Market Street (Case No. 2014.0408E)	94'+12' parapet
457-475 Minna Street (Case No. 2018-016055ENV)	173'-6"+12' parapet
57 Taylor Street aka 111 Turk Street (Case No. 2015-007525ENV)	118'+10' parapet
921 Howard Street (Case No. 2017-000275ENV)	180'+10' parapet
996 Mission Street (Case No. 2015-015253ENV)	85'+10'-8.25' parapet
30 Van Ness Avenue (Case No. 2017-008051PRJ)	520'+20' parapet
10 South Van Ness Avenue (Case No. 2015-004568ENV)	400'+20' parapet
95 Hawthorne Street (Case No. 2016-001794PRJ)	320'+38' parapet
101 Hyde Street (Case No. 2012.0086PRJ)	80'

Source: Prevision Design 2020

Qualitative Analysis

To gain an understanding of how net new shadow may affect existing patterns of use, Prevision Design conducted six 30-minute site visits to each open space to observe the nature and intensity of uses. Two site visits were performed in the morning, two at midday, and two late in the day, with one visit from each pair on a weekday and one on a weekend.

The qualitative effects of net new shadow on the affected open spaces are discussed based on the size, timing, and duration of net new shadow and how such shadow might potentially affect observed patterns of use.

Shadow Diagrams

To provide a spatial and contextual understanding of the location, size, and features affected by net new shadow, Prevision Design prepared the following shadow profile graphics:

- **Sweep Shadow diagrams.** Graphics showing "snapshot" shadow profiles at hourly intervals over the entire area affected by the project. Graphics differentiate between existing shadow, net new project shadow, and cumulative condition shadow within the daily analysis period on the Summer Solstice (June 21), the approximate equinoxes (March 22/September 20), and the Winter Solstice (December 20). These graphics are provided in Exhibit E and F in the shadow analysis report, Appendix D of this EIR.
- **Detail Shadow diagrams.** Additional graphics are produced showing existing, project and cumulative shadow profiles at each affected open space at hourly intervals within the daily analysis period on the date with the greatest quantitative net new shadow. At times when the project is casting net new shadow on an open space, additional graphics are provided at 15-minute intervals. These graphics are provided in Exhibit E and F in the shadow analysis report, Appendix D of this EIR.

Impact Evaluation

The following analysis evaluates potential shadow impacts that could result from the proposed project.

Impact SD-1: The proposed project could create new shadow that could substantially and adversely affect the use and enjoyment of publicly accessible open spaces. (*Significant and Unavoidable*)

Introduction

The project would increase shadow cast near the project site. Existing open space within potential reach of project shadow include UN Plaza and Mint Plaza. As can be seen in Figure 21, the proposed project does not have the potential to affect any public open spaces that are under the jurisdiction of the Recreation and Park Commission, or any other public parks or privately-owned open spaces, including several in the vicinity of the project, such as Boedekker Park, Hallidie Plaza, the Westfield public roof terrace, the public Intercontinental roof terrace, or Yerba Buena Gardens. Net new project shadow would not affect these properties due to the distance and location of these spaces relative to the project site, the design of the proposed project, and/or due to shadow cast by existing intervening buildings.

UN Plaza

UN Plaza experiences 140,940,789 annual sfh of shadow under current conditions. Based on a TAAS of 380,427,255 sfh, the UN Plaza's annual shadow load is 37.048 percent. The highest amount of shadow cast under current conditions occurs in the early morning and late afternoon hours, with the midday hours being the least shaded. This pattern occurs year-round; however, overall shading is greater over the winter months as compared to the summer months.[103]

[103] Prevision Design. March 2020. Shadow Analysis Report for the Proposed 469 Stevenson Street Project.

The proposed project would result in net new shadow falling on UN Plaza, adding approximately 9,693 net new annual sfh of shadow and increasing sfh of shadow by 0.003 percent above current levels from 37.048 percent to 37.051 percent. Net new shadow on UN Plaza that would be cast by the proposed project would occur between approximately May 4th through August 8th and would be present for up to 22 minutes in the early morning (no net new shadow would be present later than 7:30 a.m. on any date). Specifically, the day of maximum net new shadow on UN Plaza would occur on June 21st starting at 6:46 a.m. and lasting for approximately 10 minutes. During this time, the area of net new shadow cast would be 1,649 square feet in size, representing 1.6 percent of the total plaza area. The size and duration of proposed project-generated net new shadow would vary on other dates within the affected period, with net new shadow lasting between 0 and 22 minutes. Net new shadow on UN Plaza generated by the proposed project would have an average duration of approximately 10 minutes. Figure 22 depicts the size and location of the largest shadow cast on UN Plaza by the project.

The areas affected by net new shadow include areas that were not observed to be the most used by visitors, such as small portions of the plaza hardscape area, the McAllister point of public entry, and portions of the water feature.

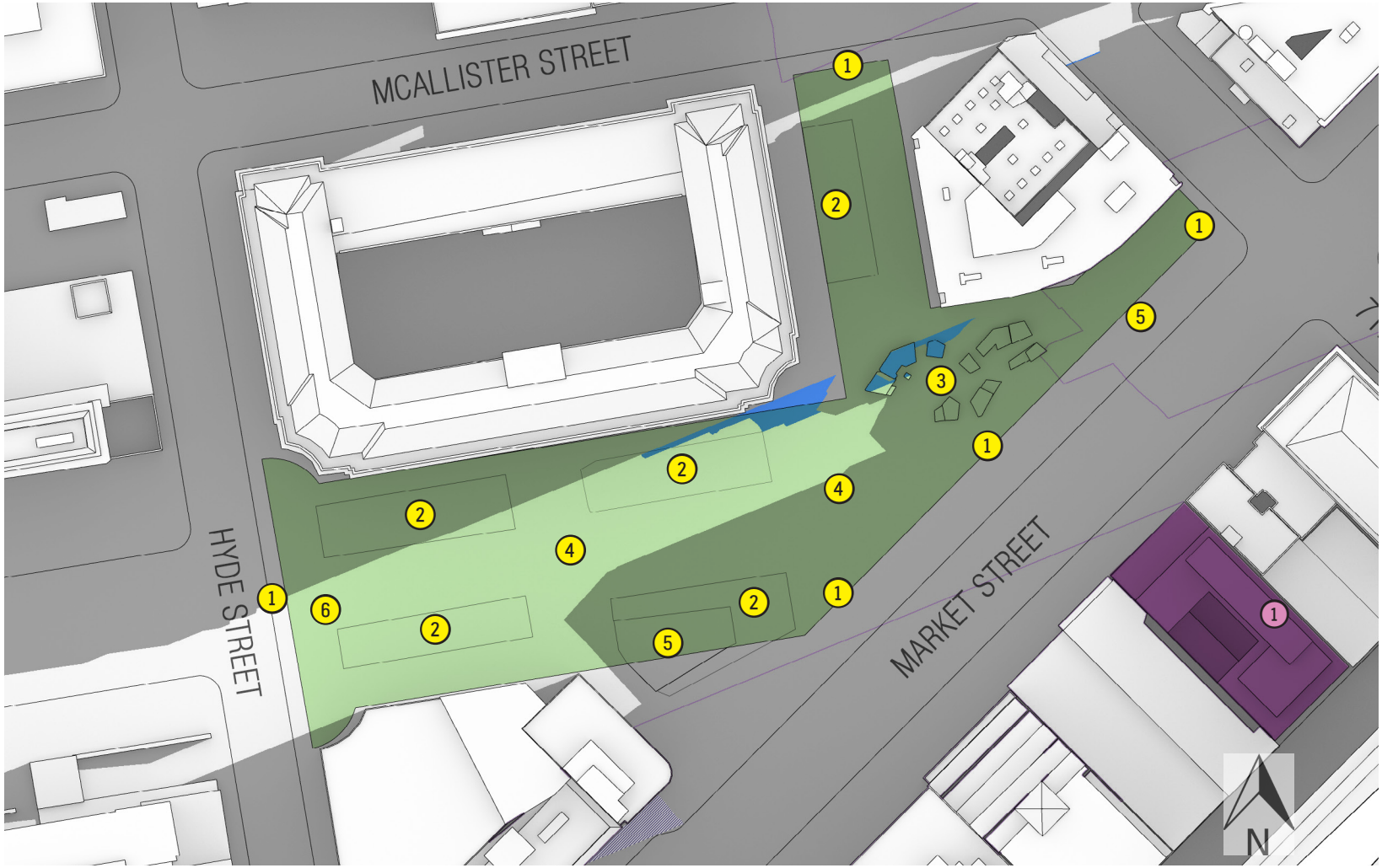
Furthermore, the date which has the maximum amount of net new shadow throughout the day would occur at a time early in the day when shadows are shortening and all net new shadow would leave the plaza prior to 7:30 a.m., and prior to the start of the types of events that were observed to increase user activity in UN Plaza, such as the farmer's market and arts and crafts fair.[104] Therefore, project shadow would not be expected to substantially and adversely affect the use and enjoyment of UN Plaza and shadow impacts on UN Plaza would be less than significant.

Mint Plaza

Mint Plaza experiences 38,441,767 annual sfh of shadow under current conditions. Based on a TAAS of 57,665,807 sfh, Mint Plaza's annual shadow load is 66.66 percent. Mint Plaza is surrounded on most sides by multi-story development which generates substantial shading on the plaza during the morning and mid- to late afternoon hours, and throughout the day over the winter months. Midday and early afternoon hours are the least shaded under current conditions, with the greatest sunlight availability occurring over the summer months.[105]

The proposed project would result in net new shadow falling on Mint Plaza, adding approximately 325,407 net new annual sfh of shadow and increasing sfh of shadow by 0.56 percent above current levels from 66.66 percent to 67.22 percent. Net new shadow on Mint Plaza that would be cast by the proposed project would occur between approximately September 21st through March 21st and would be present for up to 90 minutes in the mid- to late afternoon (no net new shadow would be present just before 2 p.m. or later than 4:30 p.m. on any date). The largest area of net new shadow cast would be 5,811 square feet and occur on November 1st and February 8th at 2:30 p.m. Figure 23 depicts the size and location of the largest shadow cast on Mint Plaza by the project.

[104] Ibid.
[105] Ibid.



Existing (current) Shadows
New Shading by Proposed Project
New Shading from Cumulative Projects
Cumulative Projects
1 1125 Market Street

1 Public Entries
2 Landscape/Planter Areas
3 Water Feature
4 Hardscape Plaza
5 BART/MUNI entry
6 Equestrian Sculpture

Max net new shadow on UN Plaza (6/21 at 6:46 AM)

Figure 22: Date with Most Net New Shadow from the Proposed Project on UN Plaza

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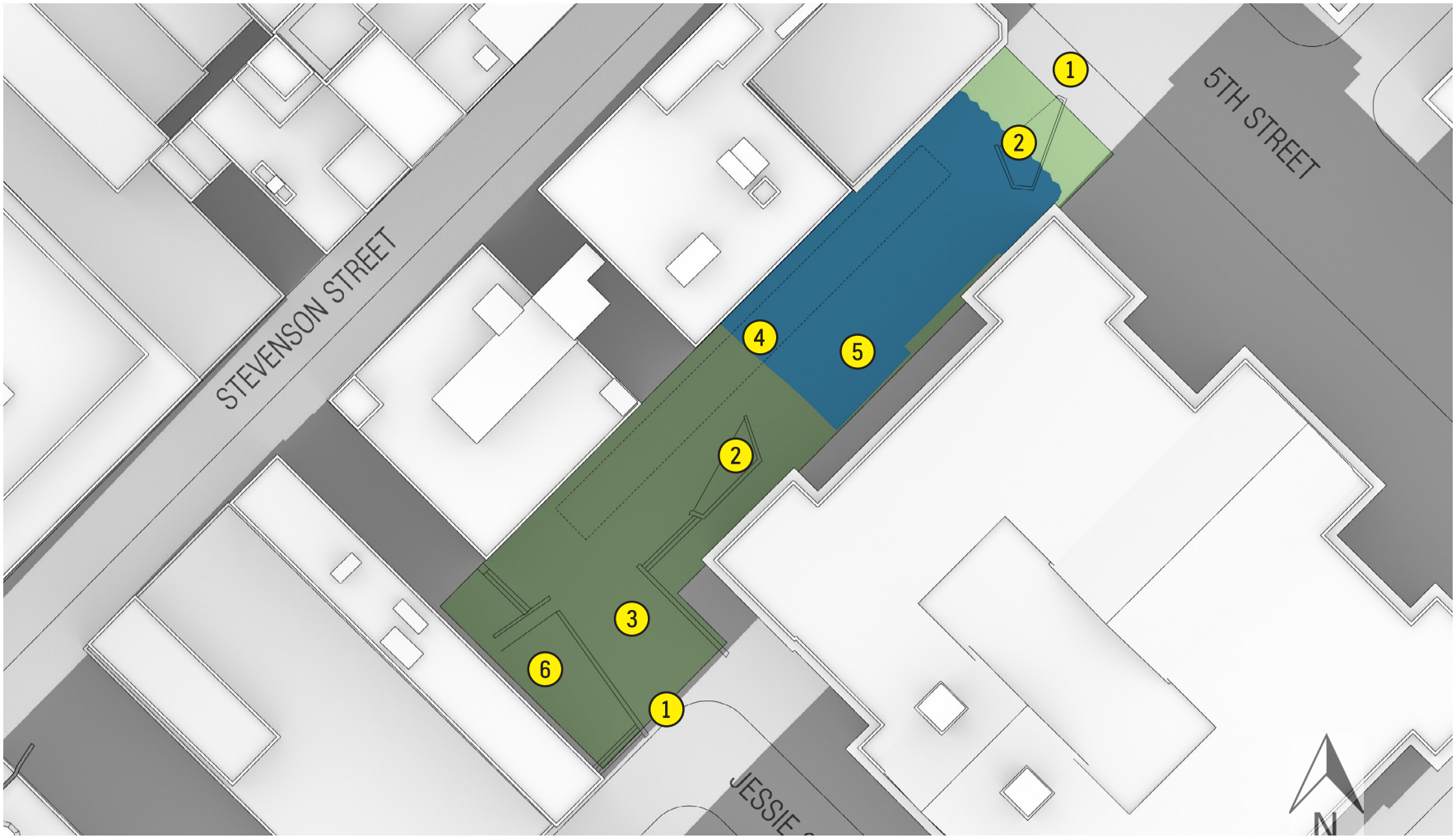

Max net new shadow on Mint Plaza (11/1 at 2:30 PM)

Existing (current) Shadows
New Shading by Proposed Project
New Shading from Cumulative Projects

1 Public Entries
2 Landscape Planters/Seating Wall
3 Tree Wells (6 trees)
4 Vine Trellis Structure
5 Hardscape / Non-fixed Seating Areas
6 Cafe Seating

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Figure 23: Date with Most Net New Shadow from the Proposed Project on Mint Plaza

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The longest duration of net new shadow on Mint Plaza due to the proposed project would occur on February 15th and October 25th when the proposed project would generate new shadow over the northwestern half of the plaza starting just prior to 2 p.m. and be present for approximately 90 minutes. The size and duration of proposed project-generated net new shadow would vary on other dates within the affected period, with net new shadow lasting between zero and 90 minutes. Net new shadow generated by the proposed project would have an average duration of approximately 60 minutes.

While the observed uses of Mint Plaza were largely transitory in nature, portions of Mint Plaza that would likely be more sensitive to the addition of net new shadow would be features that are fixed in location, conducive to more stationary activities (where users remain rather than pass through) or are observed to be currently well used by the public. The seating wall areas in Mint Plaza would likely qualify as the most sensitive areas as would the areas where movable seating is typically placed. The sensitivity of these areas would likely be increased if net new shadow were to occur at times of the day when the plaza is typically more unshaded and when such features would typically receive higher levels of use, such as around the midday hours.

Throughout the year, net new shadow due to the proposed project would occur in the mid- to late afternoon. The largest net new shadow profile would cover about one-third of the plaza area and would occur on the northeastern side fronting Fifth Street. Plaza users occupying the seating wall areas in the late afternoon would experience shadow falling on that area approximately one hour earlier in the afternoon than under current conditions. This may affect use of this feature which was observed to be occupied by 10 to 15 people over the course of both afternoon site observation visits. The net new shadow would additionally shade an area adjacent to the Mint building an hour earlier than under current conditions. This is an area where users were observed using movable chairs. Other areas of the plaza would either be unaffected due to the presence of existing shadow or observed to be areas of predominantly transitory uses. Due to the size, duration and location of shadow cast on Mint Plaza from the proposed project, the time of day the net new shadow would occur, and the number of users observed in the open space areas identified as most sensitive areas, the new shadow cast by the proposed project could substantially affect the use and enjoyment of Mint Plaza and result in a significant shadow impact.

Other than a reduction in building height or a change in building mass, no further modification of the proposed project would eliminate the net new shadow on Mint Plaza. Reducing the building height or changing the building mass would reduce the development program of the proposed project. Therefore, there is no feasible mitigation to reduce this impact to a less-than-significant level and this impact is significant and unavoidable.

Nearby Streets and Sidewalks

The proposed project could create new shadow on nearby streets and sidewalks at times of day and throughout the year when these areas would not already be shaded by existing buildings in the area. At certain times of day and year, the proposed project would cast net new shadow on nearby sidewalks, including those along Stevenson Street, Jessie Street, Fifth Street, and Sixth Street. Most of the sidewalks in this area are already shaded by existing buildings and, given that sidewalks are typically used by pedestrians traveling between destinations and not as a recreational resource, the additional project-related shadow would not substantially affect the use of the sidewalks.

Shadow from the proposed project on nearby sidewalks would be transitory in nature. Overall, the proposed project would not increase the amount of shadow on the sidewalks above levels that are common and generally expected in developed urban environments. Therefore, the proposed project would have a less than significant shadow impact on the use of streets and sidewalks.

Summary

As described above, the proposed project would cast new shadow on UN Plaza and Mint Plaza. Implementation of the proposed project would increase shadow on UN Plaza by approximately 0.003 percent and would therefore not adversely affect the use and enjoyment of this public open space area. However, due to the extent, duration, and location of the increased shadow coverage from the proposed project on Mint Plaza and the number of users that were observed in this open space area, the proposed project could adversely affect the use and enjoyment of this public open space area, resulting in a significant impact. No feasible mitigation measures to reduce shadow impacts on Mint Plaza have been identified. Therefore, the proposed project could result in a significant and unavoidable shadow impact on Mint Plaza.

Cumulative Impacts

This section discusses cumulative shadow impacts that could result from the proposed project in combination with reasonably foreseeable future projects. As described above under Approach to Analysis, the cumulative context includes the proposed project and the development projects listed in Table 4.4-1, which were determined to potentially shade UN Plaza and Mint Plaza.

Impact C-SD-1: The proposed project, in combination with reasonably foreseeable projects, could create new shadow in a manner that could substantially and adversely affect the use and enjoyment of publicly accessible open spaces. (*Significant and Unavoidable*)

The proposed project would not cast net new shadow on any public open spaces that are under the jurisdiction of the Recreation and Park Commission. For this reason, the proposed project would not have the potential to result in cumulative shadow impacts to public open spaces that are under the jurisdiction of the Recreation and Park Commission.

As discussed under Impact SD-1, UN Plaza and Mint Plaza are the only public open spaces that would be shadowed by the proposed project. Therefore, these are the only public open spaces that the project has the potential to contribute to cumulative shadow impacts.

UN Plaza

Shadow cast from cumulative development projects would affect UN Plaza year-round during both the early mornings as well as midday hours from fall through spring. The daily duration of net new shadow would be between approximately 46 and 156 minutes, with areas of shadow ranging from 0 to 15,080 square feet.

The days of maximum quantitative net new shadow on UN Plaza under the cumulative scenario would occur on April 26th and August 16th, when the proposed project and cumulative projects would shadow two of the southern planting/seat wall areas, the Civic Center BART/Muni entry, and portions of the

plaza hardscape areas starting at 7:25 a.m. and lasting for approximately 2.5 hours. The largest area of net new shadow cast under cumulative conditions would be 15,080 square feet, representing 14.75 percent of the total plaza area, particularly along the southern edge of the plaza which contains seating walls that were observed to be well used by visitors.

The cumulative net new shadow from the proposed project and the cumulative development projects would result in an increase of 838,530 sfh of net new shadow on UN Plaza, compared to an increase of 9,693 sfh in net new shadow from the proposed project alone. This increase in sfh would result in a cumulative condition shadow load increase of 0.220 percent.

Due to the location of net new shadow on seating walls that were observed to be well used by visitors, the size of maximum net new shadow at 14.75 percent of the plaza, and up to 2.5 hour duration of cumulative shadow on UN Plaza, the proposed project in combination with cumulative projects could result in a significant cumulative shadow impact. However, as the proposed project would only increase sfh of shadow by 0.003 percent above current levels in the early morning, and because the areas of net new shadow from the project were not observed to be areas well used or particularly sensitive to shadow, the project's incremental shadow contribution on UN Plaza would not be cumulatively considerable and cumulative shadow impacts of the proposed project would be less than significant.

Mint Plaza

As discussed under Impact SD-1, shadow cast from the proposed project would have a significant and unavoidable impact on Mint Plaza. Under the cumulative scenario, the only cumulative project that would shade Mint Plaza is the 921 Howard Street project. The 921 Howard Street project would generate a small amount of early morning shadow (prior to 8:30 a.m.) lasting less than 15 minutes over the western section of the plaza between November 16th and January 24th. While short in duration (less than 15 minutes), this cumulative shadow would cast shadow in a portion of the plaza that is currently unshaded (plaza is 75 to 85 percent shaded) and was observed to be occupied by 10 to 15 people during the morning.

The days of maximum net new shadow on Mint Plaza under cumulative conditions would occur on February 15th and October 25th, the same days as the maximum net new shadow on the plaza under existing plus project conditions. This is because the 921 Howard Street project would not shade the plaza on the same dates as the proposed project.

Although the proposed project and the 921 Howard Street project would not shade the plaza on the same dates, both projects would contribute new shadow on Mint Plaza. As such, the proposed project in combination with cumulative development projects could result in a significant cumulative impact on Mint Plaza. As cumulative shadow on Mint Plaza would be mostly from the proposed project, the proposed project's contribution to this significant cumulative shadow impact would be cumulatively considerable. Therefore, the proposed project in combination with reasonably foreseeable projects would result in a significant cumulative shadow impact on Mint Plaza.

There is no feasible mitigation for the proposed project's contribution to the significant cumulative shadow impact. Any theoretical mitigation would fundamentally alter the basic design and programming parameters of the proposed project. Other than a reduction in building height or a change in building mass, no other modification of the proposed project would eliminate the net new

shadow on Mint Plaza. Reducing the building height or changing the building mass would reduce the development program of the proposed project. Therefore, there is no feasible mitigation to reduce this cumulative impact to a less-than-significant level and this impact is significant and unavoidable.

Nearby Streets and Sidewalks

The proposed project in combination with reasonably foreseeable cumulative projects could create new shadow on nearby streets and sidewalks at times of day and throughout the year when these areas would not already be shaded by existing buildings in the area. At certain times of day and year, cumulative shadow would be cast by the proposed project and cumulative projects on nearby sidewalks, including those along Stevenson Street, Jessie Street, Fifth Street, and Sixth Street. Most of the sidewalks in this area are already shaded by existing buildings and, given that sidewalks are typically used by pedestrians traveling between destinations and not as a recreational resource, the additional cumulative shadow would not substantially affect the use of the sidewalks. Therefore, cumulative shadow on streets and sidewalks would be less than significant.

4.5 INITIAL STUDY TOPICS

4.5.1 Introduction

The planning department prepared an initial study to evaluate the physical environmental effects of the proposed project. The initial study assessed both project-specific and cumulative impacts for all topics required under CEQA and identified which environmental topic areas may be significantly impacted by the proposed project.

The initial study determined the proposed project's potential project-level and cumulative environmental effects would be less than significant, or reduced to less than significant with mitigation measures for the following topics: land use and planning, population and housing, cultural resources, tribal cultural resources, transportation and circulation, noise, odors, greenhouse gas emissions, recreation, utilities and service systems, public services, biological resources, geology and soils, hydrology and water quality, hazards and hazardous materials, mineral resources, energy resources, agriculture and forestry resources, and wildfire. Mitigation measures to reduce significant impacts to less than significant levels were identified for the following topics: cultural resources, tribal cultural resources, and noise.

As discussed in Chapter 2.7, the project sponsor has made changes to the project description since publication of the NOP and initial study. These changes include increasing the proposed number of dwelling units from 462 to 495, adjustments to the dwelling unit mix, increasing the number of vehicle parking spaces from 171 to 178, increasing the number of class 1 bicycle parking spaces from 192 to 200, and decreasing the overall building size from 542,000 square feet to 535,000 square feet. The proposed project would still be approximately 274 feet tall (with an additional 10 feet for rooftop mechanical equipment), provide affordable dwelling units onsite, and require approximately 36 months of construction. As demonstrated below, the changes made to the project description since publication of the initial study would not result in any new significant environmental impacts, substantial increases in the significance of previously identified effects, or necessitate implementation of additional or considerably different mitigation measures than those identified in the initial study. The effects of the proposed project would be substantially the same as those reported in the initial study.

4.5.2 Population and Housing

The population and housing analysis for the project is presented in Section E.2 of the initial study (Appendix A). The project sponsor has increased the number of residential units from 462 residential units to 495 residential units. Based on the average household size in the City and County of San Francisco of 2.35 people per household,[106] the initial study determined that 462 new residential units would generate approximately 1,086 residents.[107] With the addition of 33 dwelling units, the number of residents generated by the proposed project would increase from 1,086 to 1,163.[108]

[106] U.S. Census Bureau, San Francisco County, California, Families and Living Arrangements, Persons per households, 2013-2017. Available online at: https://www.census.gov/quickfacts/sanfranciscocountycalifornia. Accessed June 12, 2019.
[107] 462 residential units x 2.35 people per household = 1,086 new residents.
[108] 495 residential units x 2.35 people per household = 1,163 new residents.

According to the U.S. Census Bureau's most recent American Community Survey,[109] the City and County of San Francisco had an estimated population of about 883,305 residents and 397,550 housing units in 2018. The project site is within Census Tract 176.01, which has a population of 8,432 and a total of 5,931 housing units.[110] The growth projections prepared by ABAG for Plan Bay Area 2040 for San Francisco County anticipate 483,700 households in 2040 (an increase of 137,800 households between 2010 and 2040) and 872,500 jobs in 2040 (an increase of 295,700 jobs between 2010 and 2040).[111] Additionally, the housing element projects a population of 1,085,700 by 2040.[112]

The proposed project's construction of 495 dwelling units would represent a residential population increase of approximately 14 percent over the existing census tract population and approximately 0.13 percent citywide. In addition, the 495 residential units would represent a fraction of the expected increase in citywide households and population, as projected in Plan Bay Area 2040 and the housing element. As such, the development of 495 dwelling units would be consistent with the findings identified in the initial study and would not induce population growth but rather accommodate the need for housing within the city.

The proposed project would still include 4,000 square feet of commercial retail space and employ approximately 11 staff.[113] As discussed in the initial study, this amount of retail is not anticipated to attract new employees to San Francisco; therefore, the proposed project would not generate demand for new housing from the potential commercial employees. The number of residents and employees associated with the proposed project would have a less-than-significant impact related to population growth, both directly and indirectly, consistent with the determination in the initial study.

The proposed project would not result in any new or substantially more severe project-level effects than the previously proposed project. Therefore, the proposed project would also not result in any new or substantially more severe cumulative population and housing impacts than what was analyzed in the initial study.

4.5.3 Cultural and Tribal Cultural Resources

The cultural resources analysis is presented in Section E.3 of the initial study and the tribal cultural resources analysis is presented in Section E.4 of the initial study (Appendix A). There were no changes made to the overall building footprint, construction activities, depth of excavation, or construction schedule. The proposed project would still excavate the project site approximately 55 feet bgs and

[109] U.S. Census Bureau, San Francisco County, California, Families and Living Arrangements, Households, 2013-2017. Available online at: https://www.census.gov/quickfacts/sanfranciscocountycalifornia. Accessed May 20, 2019.

[110] Census Reporter, Census Tract 176.01, San Francisco, California, 2017. Available online at: https://censusreporter.org/profiles/14000US06075017601-census-tract-17601-san-francisco-ca/. Accessed June 14, 2019.

[111] Metropolitan Transportation Commission and Association of Bay Area Government, Plan Bay Area 2010 Final Supplemental Report: Land Use and Modeling Report. July 2017. This document is available online at: http://2040.planbayarea.org/reports. Accessed November 7, 2018.

[112] San Francisco Planning Department, 2014 Housing Element, San Francisco General Plan, adopted April 27, 2015, http://www.sfplanning.org/ftp/General_Plan/2014HousingElement-AllParts_ADOPTED_web.pdf, accessed February 5, 2019.

[113] San Francisco Planning Department, Transportation Impact Analysis Guidelines for Environmental Review (Guidelines), February 2019. The estimated number of employees is based on the Guidelines which assumes an average of 1 employee per 350 square feet of retail (4,000 square feet of retail ÷ 350 = 11 employees).

would remove approximately 55,800 cubic yards of soil for construction of the below grade garage and foundation work. The proposed project would still implement Mitigation Measure M-CR-3: Archeological Testing, and Mitigation Measure M-TCR-1: Tribal Cultural Resources Interpretive Program to reduce potential impacts on archeological and tribal cultural resources to a less-than-significant level. Implementation of M-CR-3 and M-TCR-1 would also ensure that the proposed project's contribution to any potential cumulative impacts related to archeological resources or human remains would not be cumulatively considerable. As such, revisions made to the project description would not change any of the cultural resources impacts or tribal cultural resources impacts that were identified in the initial study.

4.5.4 Transportation and Circulation

The transportation and circulation analysis is presented in Section E.5 of the initial study (Appendix A). The following summary is based on the information provided in Appendix E, which addresses any changes to the project's transportation and circulation impacts that would result from the revised project description.

As discussed in Section 2.7, Changes to the Proposed Project Since Publication, the project sponsor has increased the number of residential units from 462 dwelling units to 495 dwelling units, resulting in an additional 33 dwelling units. The project sponsor has also increased the number of parking spaces from 171 to 178 and the number of class 1 bicycle parking spaces from 192 to 200. The proposed project would still include 4,000 square feet of commercial retail space.

The addition of 33 dwelling units would not change the anticipated construction activities for the proposed project. Construction of the proposed project is still expected to last for 36 months and the same road and sidewalk closures discussed in the initial study (Appendix A) and in Section 2 of this EIR would occur. Additionally, the number of construction-related trucks and construction worker trips for the proposed project are expected to be similar to those anticipated for the previously proposed project. Therefore, the proposed project would not result in any new or more-severe construction-related transportation impacts than were identified in the initial study.

Table 4.5-1 summarizes the travel demand changes between the previously proposed project and the proposed project presented and evaluated in this EIR for both daily and PM peak hour trips.

Table 4.5-1: Project Travel Demand Comparison

Land Use		Person Trips by Mode					Vehicle Trips[2]			Transit Trips	
		Auto	Transit	Other[1]	Walk	Total	In	Out	Total	In	Out
Daily – Previously Proposed Project (initial study)											
Retail[3]	4,000 sf	95	152	22	329	600	28	31	59	82	71
Residential	462 DU	854	776	80	1,045	2,772	318	251	570	308	468
Total		**949**	**929**	**103**	**1,374**	**3,355**	**347**	**282**	**628**	**390**	**539**
Daily – Proposed Project (EIR)											
Retail[3]	4,000 sf	95	152	22	329	600	28	31	59	82	71
Residential	495 DU	980	891	92	1,199	3,162	365	288	653	353	537
Total		**1,075**	**1,043**	**114**	**1,528**	**3,760**	**393**	**319**	**712**	**435**	**608**
Net Change		***+126***	***+114***	***+11***	***+154***	***+405***	***+46***	***+37***	***+84***	***+45***	***+69***
PM Peak Hour – Previously Proposed Project (initial study)											
Retail	4,000 sf	8	14	2	30	54	2	3	5	6	8
Residential	462 DU	76	69	7	93	245	39	11	50	50	19
Total		**84**	**83**	**9**	**123**	**299**	**41**	**15**	**55**	**56**	**27**
PM Peak Hour – Proposed Project (EIR)											
Retail[3]	4,000 sf	8	14	2	30	54	2	3	5	6	8
Residential	495 DU	87	79	8	107	281	44	13	57	58	22
Total		**95**	**93**	**10**	**137**	**335**	**46**	**16**	**62**	**64**	**30**
Net Change		***+11***	***+10***	***+1***	***+14***	***+36***	***+5***	***+1***	***+7***	***+8***	***+3***

Notes:
Due to rounding, numbers may not add up to 100 percent

1. Other includes biking, skateboarding, etc.
2. Vehicle trips accounts for average vehicle occupancy of private auto trips and vehicles operating as Transportation Network Companies (TNCs) and taxis.
3. Includes internal/linked trip reductions as appropriate.

Source: SF Guidelines, Fehr & Peers, February 2020

As shown in Table 4.5-1, the proposed project would generate an additional 84 daily vehicle trips and 7 vehicle trips during the p.m. peak hour beyond those evaluated in the initial study. The additional 84 daily vehicle trips and 7 p.m. peak hour vehicle trips would be dispersed among multiple streets surrounding the project site and are minimal compared to existing vehicle volumes.

The increase in residential units and corresponding vehicle trips would result in an increase in total VMT; however, the VMT per capita analysis would remain unchanged as transportation analysis zone 667 (the zone in which the project site is located) is 15 percent below the existing regional average. Therefore, the proposed project would not have any new or substantially more severe effects than those identified in the initial study related to VMT.

Table 4.5-1 also shows that the proposed project would generate 114 additional daily transit trips and 10 additional peak hour transit trips[114] beyond those analyzed in the initial study. These additional transit trips would be distributed among the multiple transit lines serving the project vicinity. Like the previously proposed project, the proposed project is estimated to result in fewer than 300 inbound project vehicle trips during the peak hour which represents the planning department's screening criteria for a quantitative transit delay analysis. With the increase in project-generated vehicle trips, there would still be relatively few added trips to streets with transit (Market Street, Mission Street, and Fifth Street) and substantial queuing because the proposed project is not expected on those streets. Therefore, the proposed project would not have any new or substantially more severe effects than those identified in the initial study related to transit.

The project site plan is the same as that which was analyzed in the initial study. The proposed project does not include any new design features that would interfere with accessibility of people walking or bicycling to and from the project site and adjoining areas, or result in inadequate emergency access. The proposed project would also meet its freight loading demand and the proposed curb cut would be located on Stevenson Street which does not have bicycle or transit facilities. Thus, vehicles loading on-site would not create potentially hazardous conditions for people walking or bicycling to and from the site and would not result in substantial transit delay. Therefore, the proposed project would not have any new or substantially more severe effects than those identified in the initial study related to potentially hazardous conditions, accessibility, transit delay, loading, and emergency access.

Given that the proposed project would not result in any new or substantially more severe project-level effects than the previously proposed project, the proposed project would also not result in any new or substantially more severe cumulative transportation impacts than what was disclosed in the initial study.

4.5.5 Noise

The noise analysis is presented in Section E.6 of the initial study (Appendix A). The following summary is based on the information provided in Appendix F, which addresses any changes to the project's noise impacts that would result from the revised project description.

The project sponsor has increased the number of residential units from 462 dwelling units to 495 dwelling units, resulting in an additional 33 dwelling units. The proposed project would still include 4,000 square feet of commercial retail space. No changes were made to the overall building footprint or construction activities from what was analyzed in the final noise report. Therefore, impacts associated with daytime construction noise, nighttime construction noise, and construction vibration

[114] The proposed project would result in 10 total p.m. peak hour transit trips. However, due to rounding simplification the inbound and outbound p.m. peak hour transit splits are 8 and 3, respectively.

would still be less than significant or less than significant with implementation of Mitigation Measure M-NO-1: Construction Noise. Mitigation Measure M-NO-1 would reduce the daytime construction noise levels at nearby noise sensitive receptors. A reduction in construction noise levels would be achieved by locating stationary noise-producing equipment as far away from the noise-sensitive receptors on Sixth Street as possible. In addition, Mitigation Measure M-NO-1 would require the project sponsor and their construction contractors to use noise attenuation barriers and/or blankets and utilize blockades from construction trailers as much as possible, and equipment would be attenuated with mufflers as much as possible.

As discussed above in Section 4.5.3, Transportation and Circulation, the additional 33 dwelling units would result in an additional 7 vehicle trips during the p.m. peak hour for a total of 62 p.m. peak hour vehicle trips. With the addition of 7 vehicle trips, the proposed project is still expected to minimally increase overall traffic volumes along Sixth Street (a 1 percent increase), Market Street (a 1 percent increase), and Fifth Street (approximately a 2 percent increase). Project-generated traffic would increase noise on these streets by less than 1-A-weighted decibel (dB(A)). Peak traffic volumes are expected to increase approximately 47 percent along Stevenson Street between Fifth and Sixth streets with implementation of the proposed project. Traffic increases of 47 percent only raise noise levels approximately 1.9-dB(A), which is imperceptible. Traffic noise increases of less than 3 dB(A) are barely perceptible to people, while a 5-dB(A) increase is readily noticeable. In areas where the existing or existing plus project environmental noise is conditionally acceptable or normally unacceptable per the general plan land use compatibility chart, any noise increases greater than 3-dB(A) is considered a significant noise impact. As project-generated traffic would increase noise on adjacent roadways by a maximum of 1.9-dBA, permanent noise increases due to project-related traffic with development of 495 dwelling units would still be less than significant, consistent with the determination in the initial study.

The main pieces of mechanical equipment would not change from what was analyzed in the final noise report and would still also be located on the roof. The additional 33 dwelling units would add to the overall number of water-source heat pumps within the units and their associated condensing units on the roof. Therefore, the proposed project would still exceed the property plane noise requirements in section 2909(a) of the police code and would result in a substantial increase in ambient noise levels in excess of standards established in the noise ordinance. The initial study identified Mitigation Measure M-NO-2: HVAC and Mechanical Equipment Exterior Noise to reduce noise levels from the source equipment and achieve compliance with the police code. The proposed project would still implement M-NO-2 and have a qualified acoustical consultant conduct a property plane noise analysis to confirm the HVAC and mechanical equipment package selected for the proposed project complies with the operational noise limits in the police code. Thus, with implementation of M-NO-2, noise impacts from the exterior mechanical system would be less than significant, consistent with the determination in the initial study.

As stated above, the additional 33 dwelling units would add to the overall number of water-source heat pumps and their associated condensing units on the roof. A standard HVAC unit would produce sound pressure levels in the range of 70 to 75-dBA at 50 feet.[115] A typical residential condensing unit

[115] Hoover and Keith, Noise Control for Buildings, Manufacturing Plants, Equipment, and Products, 2000, Houston, TX.

produces noise levels between 50 to 58-dBA at 3 feet or about 29 to 37-dBA at 50 feet.[116] The logarithmic addition of noise generated from 33 additional condensing units to the noise generated from the standard HVAC unit would result in a total noise level in the range between 70.1 to 75-dBA, which is the same noise level as previously disclosed in the initial study. Therefore, interior noise impacts from exterior mechanical noise generated by the proposed project would still be less than significant. The proposed project would not change the location or use of the emergency generator and noise impacts from the generator would be less than significant.

The initial study found that construction of the previously proposed project would contribute to a cumulative impact and identified Mitigation Measure M-NO-1 to reduce cumulative construction noise impacts to a less than significant level. The proposed project would still implement M-NO-1 to reduce cumulative construction noise impacts to a less than significant level. As such, the proposed project would not result in any new or substantially more severe cumulative noise impacts than what was disclosed in the initial study.

Overall, noise generation associated with the proposed project would still primarily be attributed to the project construction activities, including site grading, construction of the building, and apparatuses, and the increase in traffic related to facility use. Operational noise generation would still be attributed to the slight increase in traffic volumes from residents as well as from typical commercial and residential fixed mechanical equipment. As such, revisions made to the project description would not change any of the noise impacts that were previously disclosed in the initial study.

4.5.6 Utilities and Service Systems

The utilities and service systems analysis is presented in Section E.12 of the initial study (Appendix A) As discussed above in Section 4.5.2, Population and Housing, the proposed project would develop 495 units and add 1,163 residents to the project site. BKF Engineers has revised their sewer calculations for the proposed project to account for changes to the project description, which would result in an additional 77 residents.[117]

The proposed project is estimated to produce approximately 44,972 gallons of wastewater per day (44,567 gallons per day [gpd] for residential use and 405 gpd for the commercial retail use). The sewer calculations were based on a 95 percent return on water use.[118] The estimated amount of wastewater generated by the proposed project would remain the same as what was determined in the initial study and represent less than 1 percent of the 60 million gallons per day of wastewater treated at the Southeast Water Pollution Control Plant. As discussed in the initial study, the proposed project would also incorporate water-efficient fixtures, as required by Title 24 of the California Code of Regulations and the city's Green Building Ordinance. Compliance with these regulations would reduce wastewater flows generated by the project. In addition, separate from the proposed project, the SFPUC is upgrading the existing infrastructure at the Southeast Water Pollution Control Plant as part of its Sewer System Improvement Program to ensure reliability and performance of the city's sewer system.[119]

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[116] Noise levels taken from published data from Daikin RX##RMVJU outdoor condensing units.

[117] BKF Engineers. 2019. Revised Water Supply Assessment Calculations.

[118] Personal Communication BKF Engineers on August 2, 2019.

[119] SFPUC. 2014. SFPUC Sewer System Improvement Program. Available online at: https://sfwater.org/modules/showdocument.aspx?documentid=5801. Accessed: February 10, 2019.

Therefore, the proposed project's wastewater would be accommodated by the existing wastewater system and this impact would remain less than significant.

The proposed project does not require a water supply assessment under the California Water Code. Under sections 10910 through 10915 of the California Water Code, urban water suppliers, such as the SFPUC, must prepare water supply assessments for certain "large water demand" projects, as defined in CEQA Guidelines section 15155.[120] The proposed project would result in 495 new dwelling units and approximately 4,000 square feet of commercial retail. As such, it does not qualify as a "large water demand" project, as defined by CEQA Guidelines section 15155(a)(1). Further, based on guidance from the California Department of Water Resources and a citywide demand analysis, the SFPUC established 50,000 gpd as the equivalent project demand for projects that do not meet the definitions provided in CEQA Guidelines section 15155(a)(1).[121] The proposed project would require 46,959 gpd of water and therefore does not exceed the 50,000 gpd equivalent water demand. As discussed in the initial study, no single development project alone in San Francisco would require the development of new or expanded water supply facilities or require the SFPUC to take other actions, such as imposing a higher level of rationing across the city in the event of a water supply shortage in dry years. Therefore, a separate project-only analysis is not provided for this topic.

The analysis provided in the initial study instead considers whether the proposed project, in combination with both existing development and projected growth through 2040, would require new or expanded water supply facilities, the construction or relocation of which could have significant cumulative impacts on the environment. It also considers whether a high level of rationing would be required that could have significant cumulative impacts. It is only under this cumulative context that development in San Francisco could have the potential to require new or expanded water supply facilities, or require the SFPUC to take other actions, which, in turn, could result in significant physical environmental impacts related to water supply. If significant cumulative impacts could result, then the analysis considers whether the project would make a considerable contribution to the cumulative impact.

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[120] Pursuant to CEQA Guidelines section 15155, The following definitions are applicable to this section.

1. A "water-demand project" means:

A. A residential development of more than 500 dwelling units.

B. A shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.

C. A commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor area.

D. A hotel or motel, or both, having more than 500 rooms.

E. An industrial, manufacturing, or processing plant or industrial park for more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.

F. A mixed-use project that includes one or more of the projects specified in subdivisions (a)(1)(A), (a)(1)(B), (a)(1)(C), (a)(1)(D), (a)(1)(E), and (a)(1)(G) of this section.

G. A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a project with 500 dwelling units.

[121] Memorandum from Steven R. Ritchie, assistant general manager, Water Enterprise, San Francisco Public Utilities Commission, to Lisa Gibson, Environmental Review Officer, San Francisco Planning Department- Environmental Planning, May 31, 2019.

The proposed project would incorporate water-efficient fixtures, as required by Title 24 of the California Code of Regulations and the city's Green Building Ordinance. As such, for the reasons described in the initial study, the project's water demand is not substantial enough to require or result in the relocation or construction of new or expanded water facilities, the construction or relocation of which could cause significant environmental effects. Furthermore, the proposed project would not make a considerable contribution to a cumulative environmental impact caused by implementation of the Bay-Delta Plan Amendment and no mitigation measures are required. In sum, revisions made to the project description would not change any of the utilities and service systems impacts or result and in any new or substantially more severe cumulative impacts on utilities than previously identified in the initial study.

4.5.7 Energy Resources

The energy analysis is presented in Section E.19 of the initial study (Appendix A). The following summary is based on the information provided in Appendix G, which addresses any changes to the project's energy impacts that would result from the revised project description. The project sponsor has increased the number of residential units from 462 dwelling units to 495 dwelling units, resulting in an additional 33 dwelling units. No changes were made to the overall building footprint, commercial retail square footage, construction activities, construction equipment, or number of construction workers from what was disclosed in the initial study. Therefore, there would be no changes to the project's construction energy use and this impact would remain less than significant as identified in the initial study.

As shown in Table 4.5-2, the addition of 33 dwelling units would result in a slight increase in the project's operational energy use from what was determined in the initial study.

Table 4.5-2: Energy Use During Project Operation

Phase	Scenario	Diesel (gallons)	Gasoline (gallons)	Electricity (kWhr/year)	Natural Gas (kBTU/year)
Operation	Previously Proposed Project (initial study)	17,317	22,920	2,068,157	4,096,431
	Proposed Project (EIR)	17,317	25,831	2,184,276	4,339,963
Change		No Change	+ 2,911	+ 116,119	+ 243,532
Percentage Increase		--	12.7	5.6	5.9

Notes:

kBTU = 1,000 British Thermal Units

kWh = kilowatt hour

These changes to the project's energy use would be minimal, ranging from a 5.6 percent to 12.7 percent increase. As discussed in the initial study, compliance with the Title 24 energy conservation standards of the California Code of Regulations would ensure that operation of the proposed project would not have a measurable effect on regional energy supplies or on peak energy demand resulting in a need for additional capacity. Natural gas and electric service would be provided to meet the needs of the project, as required by the California Public Utilities Commission, which obligates the Pacific Gas and Electric Company (PG&E) and the SFPUC to provide service to its existing and potential customers.

PG&E and the SFPUC update their service projections in order to meet regional energy demand. Energy conservation measures incorporated into the proposed project would decrease energy consumption, decrease reliance on non-renewable energy sources, and increase reliance on renewable energy sources. The proposed project would also be consistent with San Francisco's GHG reduction strategy (refer to Section E.8, Greenhouse Gas Emissions of the initial study [Appendix A]). Energy consumption associated with operation of the proposed project would not occur in an inefficient or wasteful manner, and this impact would remain less than significant as identified in the initial study.

Like the proposed project, all new development in the city would be required to comply with the standards of Title 24 and the San Francisco Green Building Code, thereby minimizing the amount of fuel, water, and energy used. Therefore, the proposed project would not result in any new or substantially more severe cumulative impacts on energy resources than previously identified in the initial study.

4.5.8 Other Initial Study Topics

In addition to the topics discussed above (population and housing, cultural resources, tribal cultural resources, transportation and circulation, noise, utilities and service systems, and energy), the initial study concluded that the proposed project would have no impacts or less than significant impacts for the following environmental topics: Land Use and Land Use Planning, Odors, Greenhouse Gas Emissions, Recreation, Public Services, Biological Resources, Geology and Soils, Hydrology and Water Quality, Hazards/Hazardous Materials, Mineral Resources, Agriculture and Forestry Resources, and Wildfire (Appendix A).

The revisions made to the project description include the addition of 33 dwelling units, increase in vehicle and bicycle parking spaces, and slight reduction in building square footage. The proposed project would still include 4,000 square feet of commercial retail space. There were no changes made to the overall building footprint, site plan, building height, or construction activities from what was disclosed in the initial study.

The proposed project would have less than significant land use and land use planning impacts because the site plan, building height and massing, and mix of uses would be the same as that analyzed in the initial study.

The proposed project would have less than significant odor impacts because it would still consist of a mixed-use residential project and would not include any land uses known to generate substantial odors. Diesel exhaust from construction equipment would generate odors; however, odors would be temporary and would not persist upon project completion. The proposed project would have less than significant GHG impacts because it would be consistent with the city's GHG Reduction Strategy and would comply with applicable regulations and programs to reduce GHG emissions related to transportation, energy efficiency, water conservation, and waste disposal. The proposed project's compliance with the city's Greenhouse Gas Checklist has been revised to reflect the revised project description and is provided in Appendix H.

As described in Section 4.5.2, Population and Housing, the addition of 33 dwelling units would increase the number of residents from 1,086 to 1,163[122], resulting in additional 77 residents. The proposed project would provide the same mix of uses and amount of common and private open space as analyzed in the initial study. The proposed project would increase use of park facilities and demand for public services. However, this increase would not be substantial given the overall demand for such services on a citywide basis and would not require the construction of new, or alteration of existing facilities.

The proposed project would have less than significant geology and soils impacts because the construction activities, excavation depth of 55 feet bgs, and removal of 55,850 cubic yards of soil from the project site would remain the same as that analyzed in the initial study. The proposed project would also be required to comply with the provisions of the San Francisco Building Code, California Building Code, and the recommendations of the design-level geotechnical study, which would reduce geology and soils impacts to a less than significant level.

The proposed project would have less than significant hydrology and water quality impacts because the construction and dewatering activities would be the same as that analyzed in the initial study and the project would be required to implement an erosion and sediment control plan and best management practices in accordance with the San Francisco Public Works Code. Operation of the proposed project would result in the same amount of impervious and pervious surfaces on the project site as that analyzed in the initial study and required to comply with the city's Stormwater Management Ordinance and Stormwater Management Requirements and Design Guidelines to reduce hydrology and water quality impacts to a less than significant level.

The proposed project would have less than significant hazards and hazardous materials impacts because the construction activities, site location, and mix of uses would be the same as that analyzed in the initial study and required to comply with the Maher Ordinance and applicable regulations related to the transport, use, or disposal of hazardous materials, as overseen by the Department of Public Health and Toxic and Substance Control.

The proposed project would either have a less than significant or no impact related to biological resources, mineral resources, agricultural and forestry resources, and wildfire because the location of the project site would be the same as what was analyzed in the initial study. Overall, impacts of the proposed project for these topics would remain the same as what was evaluated in the initial study and either result in a less than significant impact or no impact for the same reasons as disclosed in the initial study; therefore, the proposed project would not result in any new or substantially more severe cumulative impacts than what was disclosed in the initial study.

[122] 495 residential units x 2.35 people per household = 1,163 new residents.

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5.0 OTHER CEQA ISSUES

This chapter discusses the following topics in relation to the proposed project: growth inducement potential, significant environmental effects that cannot be avoided if the project is implemented, significant irreversible environmental changes that would result if the proposed project is implemented, and areas of known controversy and issues to be resolved.

5.1 GROWTH INDUCEMENT

This section analyzes the growth-inducement potential of the proposed project, as required by CEQA Guidelines section 15126.2(d). A project is considered growth inducing if it would directly or indirectly foster substantial employment or population growth, or the construction of a substantial number of additional housing units. Examples of projects that would be likely to result in significant adverse growth inducement include extensions or expansions of infrastructure systems beyond what is needed to serve planned growth, and development of new residential subdivisions in areas that are sparsely developed or undeveloped.

The proposed project would construct a mixed-use infill development consisting of approximately 4,000 square feet of commercial space on the ground floor with 495 residential dwelling units above. The project would be located on an infill site in an urbanized area and would not be expected to substantially alter existing development patterns in the SoMa neighborhood in which it is located, or in San Francisco as a whole. Furthermore, the project site is in an established urban neighborhood and would not require, or create new demand for, the extension of municipal infrastructure.

According to the U.S. Census Bureau's most recent American Community Survey,[123] the City and County of San Francisco had an estimated population of about 883,305 residents, and 397,550 housing units in 2018. The project site is within Census Tract 176.01, which has a population of 8,432 and a total of 5,931 housing units.[124]

ABAG prepares projections of employment and housing growth for the Bay Area. The latest projections were prepared as part of Plan Bay Area 2040, which is the current long-range Regional Transportation Plan and Sustainable Communities Strategy adopted by the Metropolitan Transportation Commission and ABAG in March 2018. Plan Bay Area 2040 identifies an increasing percentage of Bay Area growth that is expected to occur as infill development in areas with access to transit. To facilitate that, Plan Bay Area 2040 focuses growth and development in nearly 200 priority development areas, or PDAs. These existing neighborhoods are served by public transit and have been identified as appropriate for additional development. The project site is located within the Downtown/Van Ness/Geary PDA. The growth projections prepared by ABAG for Plan Bay Area 2040 for San Francisco County anticipate 483,700 households in 2040 (an increase of 137,800 households between 2010 and 2040) and 872,500 jobs

[123] U.S. Census Bureau, San Francisco County, California, Families and Living Arrangements, Households, 2013-2017. Available online at: https://www.census.gov/quickfacts/sanfranciscocountycalifornia. Accessed May 20, 2019.

[124] Census Reporter, Census Tract 176.01, San Francisco, California, 2017. Available online at: https://censusreporter.org/profiles/14000US06075017601-census-tract-17601-san-francisco-ca/. Accessed June 14, 2019.

in 2040 (an increase of 295,700 jobs between 2010 and 2040).[125] Additionally, the housing element projects a population of 1,085,700 by 2040.[126]

Based on the average household size in the City and County of San Francisco of 2.35 people per household,[127] the addition of 495 new residential units, as the project proposes, would house approximately 1,163 residents.[128] This would represent a residential population increase of approximately 14 percent over the existing census tract population, and approximately 0.13 percent citywide. Additionally, the proposed project's 1,163 residents would represent 0.2 percent of the expected increase in citywide households and 0.1 percent of the citywide population, as projected by Plan Bay Area 2040. Based on the size of the proposed commercial space (approximately 4,000 square feet), the new businesses would employ a total of approximately 11 staff.[129] This amount of retail is not anticipated to attract new employees to San Francisco. Therefore, it can be anticipated that most of the employees would live in San Francisco (or nearby communities), and that the proposed project would not generate demand for new housing for the potential commercial employees.

The proposed project would provide housing that accommodates expected growth and would not induce substantial population growth beyond that projected by ABAG. Furthermore, the proposed project would contribute to ABAG's regional housing objectives, help meet regional goals that call for growth and development within walking distance of retail/shopping areas and transit and increase the local and regional housing supply. Therefore, implementation of the proposed project would increase population growth only to the extent already anticipated in existing regional, local, and area plans and would not have a direct or indirect growth-inducing impact.

5.2 SIGNIFICANT AND UNAVOIDABLE IMPACTS

In accordance with CEQA section 21067 and CEQA Guidelines sections 15126(b) and 15126.2(b), this section identifies significant environmental impacts that could not be eliminated or reduced to less-than-significant levels by implementation of all identified mitigation measures. As described in Chapter 4, the impacts listed below would be considered significant and unavoidable, even with implementation of feasible mitigation measures. With the exception of the impacts listed below, all other project impacts would be either less than significant or reduced to less-than significant levels by implementation of the identified mitigation measures.

[125] Metropolitan Transportation Commission and Association of Bay Area Government, Plan Bay Area 2010 Final Supplemental Report: Land Use and Modeling Report. July 2017. This document is available online at: http://2040.planbayarea.org/reports. Accessed November 7, 2018.

[126] San Francisco Planning Department, 2014 Housing Element, San Francisco General Plan, adopted April 27, 2015, http://www.sfplanning.org/ftp/General_Plan/2014HousingElement-AllParts_ADOPTED_web.pdf, accessed February 5, 2019.

[127] U.S. Census Bureau, San Francisco County, California, Families and Living Arrangements, Persons per households, 2013-2017. Available online at: https://www.census.gov/quickfacts/sanfranciscocountycalifornia. Accessed June 12, 2019.

[128] Ibid.

[129] San Francisco Planning Department, Transportation Impact Analysis Guidelines for Environmental Review (Guidelines), February 2019. The estimated number of employees is based on the Guidelines which assumes an average of 1 employee per 350 square feet of retail (4,000 square feet of retail ÷ 350 = 11 employees).

The findings of significance in this EIR are subject to final determination by the planning commission as part of the certification process for this EIR.

Shadow

- Impact SD-1: The proposed project could create new shadow that could substantially and adversely affect the use and enjoyment of publicly accessible open spaces. (*Significant and Unavoidable*)
- Impact C-SD-1: The proposed project, in combination with reasonably foreseeable projects, could create new shadow that could substantially and adversely affect the use and enjoyment of publicly accessible open spaces. (*Significant and Unavoidable*)

5.3 SIGNIFICANT IRREVERSIBLE IMPACTS

In accordance with Section 21100 (b)(2)(B) of CEQA, and Section 15126.2(c) of the CEQA Guidelines, an EIR must identify any significant irreversible environmental changes that could result from implementation of the proposed project. This may include current or future uses of non-renewable resources and secondary or growth-inducing impacts that commit future generations to similar uses. According to the CEQA Guidelines, irretrievable commitments of resources should be evaluated to ensure that such current consumption is justified. The CEQA Guidelines describe three distinct categories of significant irreversible changes: 1) changes in land use that would commit future generations, 2) irreversible changes from environmental actions, and 3) consumption of nonrenewable resources. Each of these categories is discussed below in relation to the proposed project.

5.3.1 Changes In Land Uses That Would Commit Future Generations

As described throughout this EIR, the proposed project is an infill development and would be developed in an urban area. The proposed project would not substantially alter the pattern of land use or transportation in the project vicinity, and, therefore, would not commit future generations of the project site and vicinity to any particular land use or transportation pattern, nor would it mean that the project site could not be feasibly redeveloped again at some unknown date in the future.

5.3.2 Irreversible Changes From Environmental Actions

No significant environmental damage, such as that resulting from accidental spills or the explosion of a hazardous material, is anticipated with implementation of the proposed project. Compliance with federal, state, and local regulations would ensure that construction and operation activities at the project site would not result in the release of hazardous materials into the environment and that associated impacts would be less than significant (refer to Section E.17, Hazards and Hazardous Materials, of the initial study in Appendix A). The proposed project would excavate the project site approximately 55 feet bgs and remove approximately 55,850 cubic yards of soil to construct the three-level below grade parking garage. The proposed project would be constructed in accordance with the recommendations provided in the project-specific geotechnical study. No irreversible changes, such as those that may occur from construction of a large-scale mining project, a hydroelectric dam project, or other industrial project, would result from development of the proposed project.

5.3.3 Consumption of Nonrenewable Resources

Consumption of nonrenewable resources includes increased energy consumption, conversion of agricultural lands, and lost access to mining reserves. No agricultural lands would be converted and no access to mining reserves would be lost with construction of the proposed project (refer to Section E.19, Mineral Resources; and Section E.21, Agriculture and Forestry Resources in the initial study [Appendix A]).

As discussed in Section E.19 of the initial study (Appendix A) and in Section 4.5.7 of the EIR, non-renewable energy consumption would occur during the proposed project construction and operational phases. Construction activities would use the most energy-efficient equipment available to meet state and local goals for criteria air pollutants and GHG emissions reductions and would not have a measurable effect on regional energy supplies or on peak energy demand, resulting in a need for additional capacity. Therefore, as a temporary activity, construction of the proposed project would not be considered inefficient or wasteful.

Operation of the proposed project would be required to comply with the standards of Title 24 and the requirements of the San Francisco Green Building Code, thus minimizing the amount of fuel, water, and energy used. The proposed project would also incorporate transportation demand management measures into its design, such as car-share parking and bicycle parking and a repair station and would be located in proximity to several public transportation options. These features would minimize the amount of transportation fuel consumed. As discussed in Section E.5, Transportation and Circulation, in the initial study (Appendix A), the project site is in an area with a comparably low level of VMT per capita, relative to the regional average, and new residents would most likely engage in vehicle use patterns similar to those of the existing population in the neighborhood and general vicinity. Given the project's features and location, it would not result in wasteful use of fuel from vehicle trips.

As discussed in Section E.8, Greenhouse Gas Emissions, of the initial study (Appendix A), the proposed project would not result in any significant impacts associated with an increase in greenhouse gas emissions or conflict with measures adopted for the purpose of reducing such emissions because the project would comply with the regulations listed in the city's Greenhouse Gas Reduction Strategy. In addition, the proposed project would not require the construction of major new utility lines to deliver energy or natural gas because these services are already provided in the area.

Therefore, the proposed project would not result in a significant impact associated with the consumption of nonrenewable resources.

5.4 AREAS OF KNOWN CONTROVERSY AND ISSUES TO BE RESOLVED

The planning department prepared an initial study checklist and published a NOP for an EIR on October 2, 2019, thereby announcing its intent to prepare and distribute a focused EIR (the NOP and initial study checklist are presented as Appendix A to this EIR). Publication of the NOP and initial study checklist initiated a 30-day public review and comment period that began on October 3, 2019 and ended on November 1, 2019. Individuals and agencies that received these notices included owners of properties within 300 feet of the project site and potentially interested parties, and responsible agencies, including regional and state agencies. Five written communications were received during the public review period. Four of the five comments requested additional information, such as the project sponsor's email address and requests for a hard copy of the initial study document. The planning department provided such requested information to the respective commenters. The fifth comment received noted a concern with vehicular circulation to and from the project site and inquired if the proposed project would implement limitations on the use of vehicles during the morning and afternoon rush hours. Information regarding project site circulation is provided in Section E.5, Transportation and Circulation, of the initial study (Appendix A). As disclosed in the initial study, impacts related to transportation and circulation would be less than significant. Potential areas of controversy for the proposed project include the potential effects of the proposed project related to air quality, wind, shadow, and transportation and circulation.

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6.0 ALTERNATIVES

6.1 INTRODUCTION

This chapter presents the alternatives analysis, as required by CEQA, for the proposed project. The chapter includes a discussion of the CEQA requirements for an alternatives analysis and the methodology used for the selection of alternatives, with the intent of developing potentially feasible alternatives that avoid or substantially lessen the significant impacts identified for the proposed project while still meeting most of the basic project objectives. This chapter identifies a reasonable range of alternatives that meet the above criteria.

The alternatives are evaluated for their comparative merits with respect to minimizing adverse environmental effects. After identifying the alternatives, the chapter evaluates the alternatives' impacts compared to existing environmental conditions and compared to the impacts of the proposed project. Based on this analysis, this chapter then identifies the environmentally superior alternative. Finally, it describes other alternative concepts that were considered but eliminated from detailed consideration and the reasons for their elimination.

6.1.1 CEQA Requirements for Alternatives Analysis

The CEQA Guidelines require the analysis of a reasonable range of alternatives to the proposed project or to the location of the project that would feasibly attain most of the basic objectives of the project and avoid or substantially lessen any of the significant effects of the project (CEQA Guidelines section 15126.6). The range of alternatives required in an EIR is governed by a "rule of reason" that requires the EIR to set forth only those potentially feasible alternatives necessary to foster informed public participation and an informed and reasoned choice by the decision-making body (CEQA Guidelines section 15126.6[f]). CEQA generally defines "feasible" to mean the ability to be accomplished in a successful manner within a reasonable timeframe, taking into account economic, environmental, social, technological, and legal factors. The following factors may also be taken into consideration when assessing the feasibility of alternatives: site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries, and the ability of the proponent to attain site control (CEQA Guidelines section 15126.6[f][1]). An EIR need not consider an alternative whose impact cannot be reasonably ascertained and whose implementation is remote and speculative. Furthermore, an EIR need not consider every conceivable alternative but must consider a reasonable range of alternatives that will foster informed decision-making and public participation.

CEQA also requires the evaluation of a No Project Alternative (CEQA Guidelines section 15126.6[e]). The analysis of the No Project Alternative is based on the assumption that the proposed project would not be approved. In certain instances, the No Project Alternative means "no build" wherein the existing environmental setting is maintained. However, where failure to proceed with the project would not result in preservation of existing environmental conditions, the No Project Alternative should identify the practical result of the project's non-approval rather than create and analyze a set of artificial assumptions that would be required to preserve the existing physical environment.

In addition, an environmentally superior alternative must be identified among the alternatives considered. The environmentally superior alternative is generally defined as the alternative that would

result in the least adverse environmental impacts on the project site and affected environment. If the No Project Alternative is found to be the environmentally superior alternative, the EIR must identify an environmentally superior alternative among the other alternatives (CEQA Guidelines section 15126.6[e][2]).

CEQA Guidelines section 15126.6(c) also requires an EIR to identify and briefly discuss any alternatives that were considered by the lead agency but rejected as infeasible during the scoping process. In identifying alternatives, primary consideration was given to alternatives that would reduce significant impacts while still meeting most of the basic project objectives. Those alternatives that would have impacts identical to or more severe than the proposed project or would not meet most of the basic project objectives, were rejected from further consideration.

6.1.2 Alternatives Selection

This section describes the basis for determining the range of CEQA alternatives and identifies the specific alternatives that are analyzed in this EIR.

Summary of Significant Impacts

As stated in the CEQA Guidelines, alternatives to a project selected for analysis in an EIR must substantially lessen or avoid any of the significant environmental impacts associated with the project. The following summarizes the conclusions for significant impacts resulting from the proposed project as identified in Chapter 4 of this EIR and in the initial study (Appendix A).

Significant and Unavoidable Impacts

The proposed project was determined to have the following significant and unavoidable impacts, as described in detail in Chapter 4 of this EIR.

Shadow

- Impact SD-1: The proposed project could create new shadow that could substantially and adversely affect the use and enjoyment of publicly accessible open spaces. (*Significant and Unavoidable)*
- Impact C-SD-1: The proposed project, in combination with reasonably foreseeable projects, could create new shadow that could substantially and adversely affect the use and enjoyment of publicly accessible open spaces. *(Significant and Unavoidable)*

Significant Impacts Mitigated to Less Than Significant

The proposed project was determined to have the following potentially significant impacts, all of which could be mitigated to a less-than-significant level with implementation of identified mitigation measures, as described in detail in Chapter 4 of this EIR and in the initial study (Appendix A).

Cultural Resources (initial study topic)

- Impact CR-3: The proposed project could result in a substantial adverse change in the significance of an archeological resource. The impact would be mitigated to a less-than-significant level with implementation of Mitigation Measure M-CR-3 (Archeological Testing).
- Impact CR-4: The project could disturb human remains, including those interred outside of formal cemeteries. The impact would be mitigated to a less-than-significant level with implementation of Mitigation Measure M-CR-3 (Archeological Testing).
- Impact C-CR-1: The proposed project, in combination with reasonably foreseeable projects in the vicinity, could result in a cumulatively considerable contribution to a significant cumulative impact related to cultural resources. The impact would be mitigated to a less-than-significant level with implementation of Mitigation Measure M-CR-3 (Archeological Testing).

Tribal Cultural Resources (initial study topic)

- Impact TCR-1: Project-related activities could cause a substantial adverse change in the significance of a tribal cultural resource, as defined in Public Resources Code section 21074. The impact would be mitigated to a less-than-significant level with implementation of Mitigation Measure M-TCR-1 (Tribal Cultural Resources Interpretive Program).
- Impact C-TCR-1: The proposed project, in combination with reasonably foreseeable future projects, could result in a cumulatively considerable contribution to a cumulative tribal cultural resources impact. The impact would be mitigated to a less-than-significant level with implementation of Mitigation Measure M-TCR-1 (Tribal Cultural Resources Interpretive Program).

Noise (initial study topic)

- Impact NO-1: Construction of the proposed project would result in a temporary or periodic increase in ambient noise levels. The impact would be mitigated to a less-than-significant level with implementation of Mitigation Measure M-NO-1 (Construction Noise).
- Impact NO-2: The proposed project would generate noise levels in excess of standards established in the local general plan or noise ordinance and could result in a substantial permanent increase in ambient noise levels in the project vicinity. The impact would be mitigated to a less-than-significant level with implementation of Mitigation Measure M-NO-2 (HVAC and Mechanical Equipment Exterior Noise).
- Impact C-NO-1: Construction of the proposed project, in combination with reasonably foreseeable projects, would result in a significant cumulative impact related to noise and the project's contribution would be cumulatively considerable. The impact would be mitigated to a less-than-significant level with implementation of Mitigation Measure M-NO-1 (Construction Noise).

Air Quality (EIR topic)

- Impact AQ-3: Construction and operation of the proposed project would generate toxic air contaminants, including DPM, at levels that would expose sensitive receptors to substantial pollutant concentrations. This impact would be reduced to less than significant with

implementation of mitigation measures M-AQ-3a (Off-road Construction Equipment Emissions Minimization) and M-AQ-3b (Diesel Backup Generator Specifications).

- Impact C-AQ-1: The proposed project during construction and operations, in combination with reasonably foreseeable projects, would result in significant health risk impacts to sensitive receptors. This impact would be reduced to less than significant with implementation of mitigation measures M-AQ-3a (Off-road Construction Equipment Emissions Minimization) and M-AQ-3b (Diesel Backup Generator Specifications).

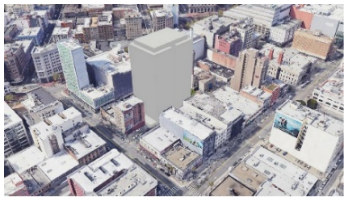
Selected Alternatives

This section describes the following project alternatives that were selected and evaluated in this analysis:

- **Alternative A: No Project Alternative.** The No Project Alternative is based on what would reasonably be expected to occur on the project site if the proposed project is not approved, in accordance with CEQA Guidelines section 15126.6(e). The No Project Alternative assumes that physical conditions on the project site would remain the same.
- **Alternative B: Reduced Density Alternative.** The purpose of the Reduced Density Alternative is to consider a project that would lessen the significant and unavoidable shadow impact on Mint Plaza that would occur from construction of the proposed project. The Reduced Density Alternative would redevelop the project site with a new mixed-use residential project, similar to the proposed project, but would construct a shorter and less dense building than under the proposed project and include only two basement levels.
- **Alternative C: No Residential Parking, Tower Only.** The purpose of the No Residential Parking, Tower Only Alternative is to propose a project that would lessen the significant air quality, noise, archeological and tribal cultural resources impacts of the proposed project associated with the grading and excavation needed to build the three below-grade levels for parking and loading spaces. This alternative would redevelop the project site with a new mixed-use residential project, similar to the proposed project, but with 28 less residential units and would include only one basement level (as opposed to the three basement levels included in the proposed project). This alternative would result in a taller building, but with 28 fewer units than under the proposed project by slightly changing the design to eliminate the podium height massing along the four corners and relocate that square footage to the top of the building creating a streamlined single tower.

The selected alternatives are described in further detail below. Table 6.1-1 compares the features of each alternative.

Table 6.1-1: Characteristics of the Proposed Project and Project Alternatives

Project Component	Proposed Project	Alternative A: No Project Alternative	Alternative B: Reduced Density Alternative	Alternative C: No Residential Parking, Tower Only Alternative
				
Building Heights	274 feet (with an additional 10 feet for rooftop mechanical equipment)	--	160 feet (with an additional 10 feet for rooftop mechanical equipment)	284 feet (with an additional 10 feet for rooftop mechanical equipment)
No. of Stories	27 stories 3 below grade levels	--	17 stories 2 below grade levels	28 stories 1 below grade level
Total No. Units	495	--	346	467
Studio	192	--	42	0
Junior one-bedroom	33	--	0	0
1 Bedroom	116	--	204	349
2 Bedroom	96	--	64	60
3 Bedroom	50	--	36	58
5 Bedroom	8	--	0	0
Square Footage by Use	475,000 sf residential; 4,000 sf commercial retail	28,790 sf surface parking lot	259,110 sf residential; 6,357 sf commercial retail	343,813 sf residential; 3,651 sf of commercial retail
Total gross square feet (gsf)	535,000 gsf	28,790 gsf	338,629 gsf	479,957 gsf

Project Component	Proposed Project	Alternative A: No Project Alternative	Alternative B: Reduced Density Alternative	Alternative C: No Residential Parking, Tower Only Alternative
Open Space	11,000 sf common residential open space; 14,000 sf private residential open space:	--	16,423 sf common residential open space; 252 sf private residential open space	16,756 sf common residential open space; 5,937 sf of private residential open space
On-Site Vehicular Parking & Loading	1 off-street loading and 2 service vehicle parking; 178 residential vehicular parking spaces; 3 car-share spaces; 56,000 sf	176 public vehicular spaces; 28,790 sf	2 off-street loading and 2 service vehicle parking; 150 residential vehicular parking spaces; 2 car-share spaces; 57,000 sf	1off-street loading and 2 service vehicle parking; 2 accessible parking; No car-share parking
Bicycle Parking	200 class 1 27 class 2	None	192 class 1 23 class 2	193 class 1 25 class 2
Entitlements	Conditional Use Authorization; Individually Requested State Density Bonus	None	Conditional Use Authorization	Conditional Use Authorization; Individually Requested State Density Bonus
Excavation Depth	55 feet; 55,850 cubic yards	None	35 feet; 37,600 cubic yards	10 feet; 10,740 cubic yards

Notes:
All numbers rounded to the nearest thousand or hundred thousand.
Common residential open space = solariums, podium terraces/balconies, common areas.

6.2 ALTERNATIVES ANALYSIS

This analysis evaluates the impacts of each of the selected alternatives and identifies whether those impacts would be less than, similar to, or greater than the impacts of the proposed project. The alternatives analysis focuses on the topics analyzed in detail in the EIR (air quality, wind, and shadow) as well as the topics that the initial study determined would require mitigation for the project's impacts to be reduced to a less-than-significant level (cultural resources, tribal cultural resources, and noise). A brief analysis is also provided for other topics scoped out from further analysis in the initial study. Following the alternatives analysis, Table 6.2-1 compares the significant impacts of the proposed project and the alternatives.

6.2.1 Alternative A: No Project Alternative

Description

Under the No Project Alternative, the project site would remain substantially in its existing physical condition and the proposed new residential uses would not be developed. The existing onsite parking lot would remain unaltered.

Ability to Meet Project Objectives

The No Project Alternative would maintain the existing physical environment of the project site and no residential uses would be constructed. Therefore, the alternative would not meet any of the project sponsor's objectives.

Impacts

Air Quality

Under the No Project Alternative, the project site would remain substantially in its existing physical condition and the proposed new residential and commercial retail uses would not be developed. The existing onsite parking lot would remain unaltered. There would be no heavy construction activity at the project site. During operation of the No Project Alternative, no change in existing emissions would occur because the No Project Alternative would result in equivalent vehicle trips and energy use associated with vehicles accessing the parking lot and the provision of security lighting. Relative to the proposed project, the No Project Alternative would result in no increase in criteria air pollutant emissions during operation. The proposed project would result in greater emissions during construction and operations compared to the No Project Alternative. In summary, the No Project Alternative would result in no impact related to criteria air pollutant emissions and would not have the potential to contribute to cumulative criteria air pollutant impacts.

The No Project Alternative would not increase the cancer risk or localized concentrations of $PM_{2.5}$ because no construction would occur, it would not require a new stationary source (emergency diesel generator), and no increase in vehicle trips to the project site would occur. Compared to the proposed project, the No Project Alternative would not increase cancer risks or $PM_{2.5}$ concentrations at nearby sensitive receptors. Further, because the No Project Alternative would have no impact with respect to health risks, the No Project Alternative would not have the potential to combine with cumulative projects and result in a cumulative health risk impact.

The proposed project would not interfere with implementation of the 2017 Bay Area Clean Air Plan because it would not increase emissions. The No Project Alternative would continue existing operations and would not implement any of the measures included in the 2017 Bay Area Clean Air Plan, but it would not conflict with the 2017 Bay Area Clean Air Plan as no measures from that plan would apply to the No Project Alternative.

In summary, the No Project Alternative would result in no air quality impact and air quality impacts of the No Project Alternative would be lower when compared to the proposed project. No mitigation measures are necessary.

Wind

Under the No Project Alternative, the project site would remain as an existing surface parking lot and would not change the existing wind conditions on or around the project site. The No Project Alternative would not result in the construction or operation of any new buildings or structures that would alter the existing wind conditions and affect publicly accessible areas of substantial pedestrian use. Therefore, unlike the proposed project, the No Project Alternative would have no impact related to increasing wind speeds and would not have the potential to combine with cumulative projects to result in a cumulative wind hazard impact.

Shadow

Under the No Project Alternative, there would be no change in existing sunlight conditions. The project site would remain as an existing surface parking lot and no new buildings or structures would be constructed on the project site that would cast net new shadow on UN Plaza or Mint Plaza. Therefore, compared to the proposed project, which would have a significant and unavoidable project-level and cumulative shadow impact on Mint Plaza, the No Project Alternative would have no impact related to shadow.

Topics Analyzed in the Initial Study

Cultural Resources, Tribal Cultural Resources, and Noise

The No Project Alternative would not require subsurface ground disturbance that could impact undiscovered archeological resources, human remains, or tribal cultural resources. There would be no demolition or construction activities, and no new operational sources of noise on the project site; therefore, noise conditions in the area would remain the same as existing conditions. With respect to these topics, no impact would occur; Mitigation Measures M-CR-3, M-TCR-1, M-NO-1, and M-NO-2 would not apply to the No Project Alternative.

Other Initial Study Topics

The initial study concluded that the proposed project would have no impacts or less than significant impacts for the following environmental topics: Land Use and Land Use Planning, Population and Housing, Odors, Greenhouse Gas Emissions, Recreation, Utilities and Service Systems, Public Services, Biological Resources, Geology and Soils, Hydrology and Water Quality, Hazards/Hazardous Materials, Mineral Resources, Energy Resources, Agriculture and Forestry Resources, and Wildfire. Under the No Project Alternative, the proposed project would not be constructed or operated, and the project site

would continue to operate as a public surface parking lot. Therefore, the No Project Alternative would result in no impacts related to these other initial study topics.

6.2.2 Alternative B: Reduced Density Alternative

Description

The purpose of the Reduced Density Alternative is to consider a project alternative that would lessen the significant impacts on Mint Plaza that would occur from construction of the proposed project. The Reduced Density Alternative would redevelop the project site with a new mixed-use residential project, similar to the proposed project, but would construct a shorter and less dense building than under the proposed project.

The Reduced Density Alternative would include a maximum FAR of 338,629 gsf and a building height of approximately 160 feet (with an additional 10 feet for rooftop mechanical equipment). The proposed density and building height would be consistent with the planning code.

Under this alternative, the site would be redeveloped to provide 346 units comprised of approximately 42 studios, 204 one-bedroom units, 64 two-bedroom units, and 36 three-bedroom units, compared to the 495 units that would be provided by the proposed project. On floors two through eight, 34 residential units would be provided on each floor. On the ninth floor, the building footprint would be reduced allowing for the common terraces and 12 residential units. Twelve residential units would also be provided on floors 9 through 17.

Similar to the proposed project, primary access to the units would be via a 1,951 square foot residential lobby located along Jessie Street with secondary access along Stevenson Street and through the below-grade parking garage. Two retail spaces totaling 6,357 square feet would be provided along Jessie Street flanking the residential lobby, which is slightly more than the retail space provided by the proposed project (4,000 square feet). An 8,242 square foot residential amenity space would be provided along Stevenson Street.

Unlike the proposed project, the Reduced Density Alternative would only provide two levels of below grade parking (as opposed to the three levels with the proposed project). As a result, the Reduced Density Alternative only requires 37,600 cubic yards of excavation compared to 55,850 cubic yards for the proposed project.

The Reduced Density Alternative would include 150 residential vehicular parking spaces (a 0.43 parking ratio) below grade, which is 28 fewer total residential vehicular parking spaces than the proposed project, 2 service vehicle parking spaces, and 2 car-share spaces. One off-street freight loading space would also be provided at grade like the proposed project. All access to off-street parking and freight loading would be provided via a single curb-cut along Stevenson Street, similar to the proposed project. The Reduced Density Alternative would also provide 192 class 1 bicycle parking spaces in a bicycle storage room on the ground floor accessed via the public lobby. Twenty-three class 2 bicycle parking spaces would also be provided along Stevenson and Jessie streets. A bicycle workshop area would be provided in the below grade parking garage, similar to the proposed project.

Open space would be provided in a series of common terraces at the podium and tower levels. A 7,141 square foot common open space would be provided on the second floor fronting Stevenson Street and two common open space terraces totaling 9,282 square feet would be provided on the ninth floor.

Construction of the Reduced Density Alternative is expected to follow a 29-month construction schedule, which would be 7 months shorter than the proposed project construction schedule. The same discretionary project approvals identified for the proposed project would be required for this alternative.

Figure 24 provides a visual rendering and Figure 25 provides an elevation plan of the Reduced Density Alternative.

Ability to Meet Project Objectives

The Reduced Density Alternative could feasibly attain most of the project sponsor objectives. However, this alternative would provide 149 fewer residential units than the proposed project (346 units with the Reduced Density Alternative compared to 495 units with the proposed project). As a result, the Reduced Density Alternative would not maximize the opportunity to alleviate the current housing shortage and to contribute to the City's Regional Housing Needs Allocation to the same extent as the proposed project (Objective 2). In addition, by providing fewer residential units, the Reduced Density Alternative would also provide fewer affordable units, thereby not promoting the construction of affordable units to the same extent as the proposed project (Objective 3). Finally, the reduced density could make redevelopment of the site economically infeasible (Objective 8).

Impacts

Air Quality

Under the Reduced Density Alternative, the project site would be redeveloped with a new mixed-use residential project, like the proposed project, but it would construct a shorter and less dense building than under the proposed project. The Reduced Density Alternative would only provide two levels of below-grade parking (as opposed to the three below grade levels with proposed project). As such, the Reduced Density Alternative would require only 37,600 cubic yards of excavation compared to 55,850 cubic yards of excavation required for the proposed project.

Criteria Air Pollutants

Relative to the proposed project, the Reduced Density Alternative would result in slightly fewer emissions of criteria air pollutants, fugitive dust during construction and operational emissions. This alternative would require marginally less heavy-duty diesel equipment and fewer construction vehicles, truck trips, and worker trips due to the reduced excavation activities. Additionally, the overall construction duration would be reduced from 36 months to 29 months, reducing the period for construction related emissions to occur by seven months. With reduced excavation, fugitive dust emissions would be reduced during construction compared with the proposed project. In addition, as with the proposed project, the Reduced Density Alternative would be required to comply with the construction dust control ordinance, which would ensure that fugitive dust impacts would be less than significant.

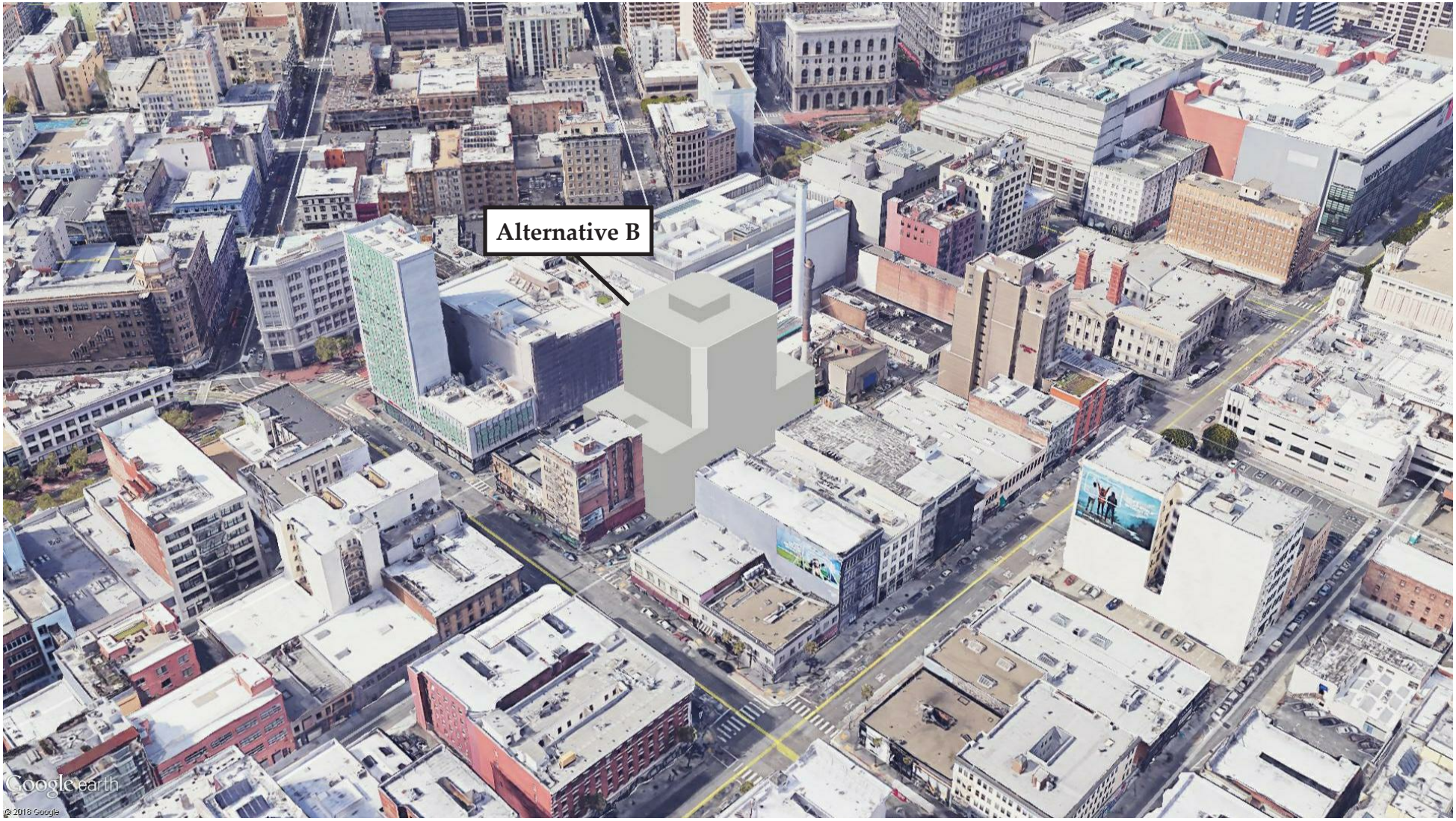


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Figure 24: Visual Rendering of the Reduced Density Alternative

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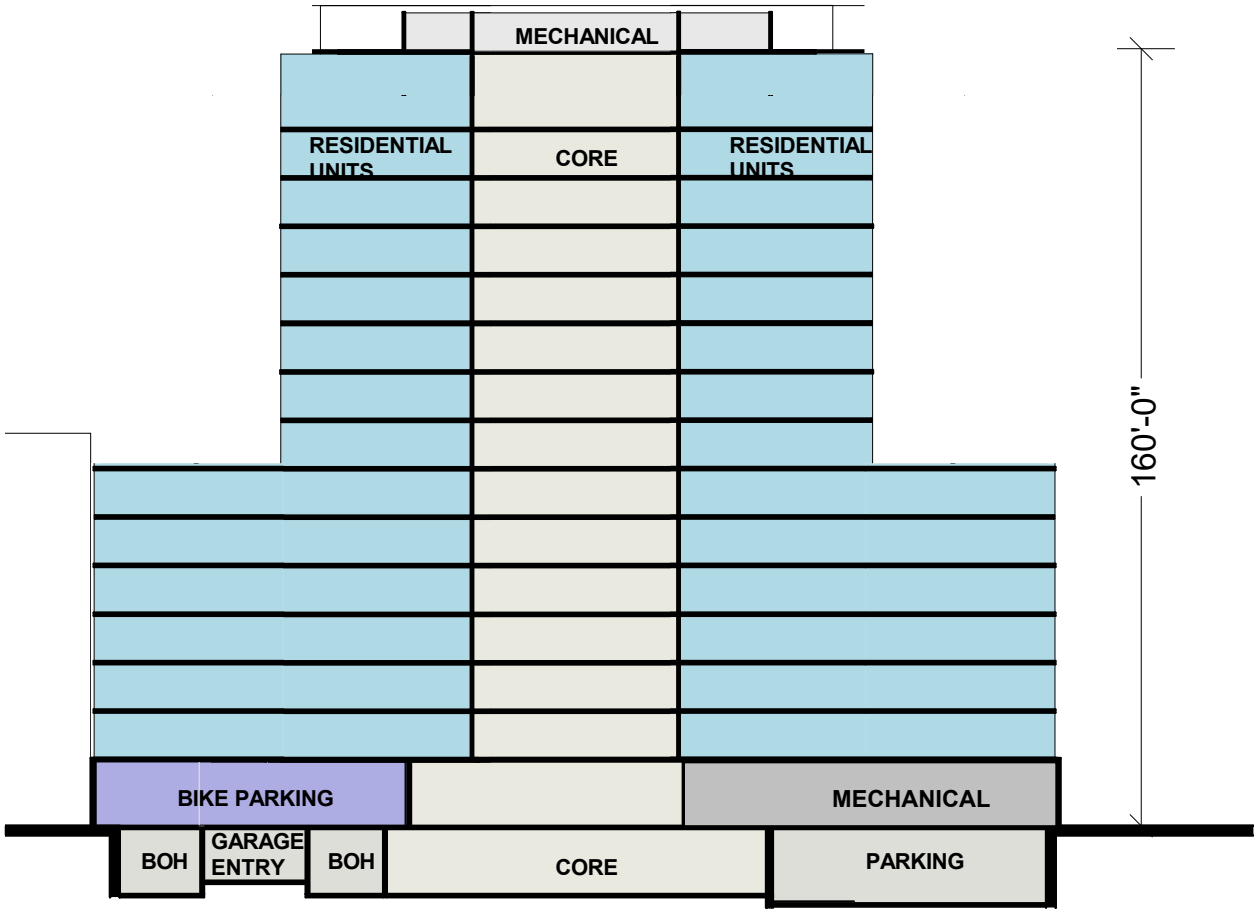

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Figure 25: Building Elevation of the Reduced Density Alternative

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With the Reduced Density Alternative's marginally lower amounts of heavy-duty diesel equipment and construction vehicle, truck trips and worker trips, and shorter construction period, this alternative would result in lower construction period criteria air pollutant impacts than the proposed project. Like the proposed project, construction criteria air pollutant impacts resulting from the Reduced Density Alternative would be less than significant.

The Reduced Density Alternative would result in the construction of fewer residential units and parking at the project site compared with the proposed project, thereby resulting in less energy consumption, fewer vehicle trips, and fewer related air emissions. Therefore, like the proposed project, operational criteria air pollutant impacts resulting from the Reduced Density Alternative would be less than significant.

Health Risks

With respect to toxic air contaminants, compared to the proposed project, the Reduced Density Alternative would result in a lower cancer risk and lower localized $PM_{2.5}$ concentration because this alternative would require marginally less heavy-duty diesel equipment (below levels shown in Table 4.2-8 in Section 4.2, Air Quality, pp. 4-48). Because the Reduced Density Alternative would result in less construction, it would be anticipated to result in less toxic air contaminants relative to the proposed project, but it would likely still exceed the cancer risk and $PM_{2.5}$ significance thresholds for projects within an air pollutant exposure zone and require implementation of mitigation measures M-AQ-3a, Off-road Construction Equipment Emissions Minimization and M-AQ3b, Diesel Generator Specifications, like the proposed project

Overall, like the proposed project, construction and operational health risk impacts due to the Reduced Density Alternative would be less than significant with implementation of the mitigation measures discussed above.

Consistency with the Clean Air Plan

Like the proposed project, the Reduced Density Alternative would be required to comply with various local regulations such as the Transportation Demand Management Ordinance and the Construction Dust Control Ordinance. These regulations implement the control measures in the 2017 Bay Area Clean Air Plan. Therefore, the Reduced Density Alternative would also not conflict with the 2017 Bay Area Clean Air Plan.

Cumulative Impacts

Regarding cumulative air quality impacts, the Reduced Density Alternative (like the proposed project) would make a less-than-significant contribution to cumulative regional criteria air pollutant impacts, and no mitigation measures would be necessary. Cumulatively, the Reduced Density Alternative would result in slightly lower localized health risk impacts when compared to the proposed project because it would require less construction equipment and would generate less vehicle trips resulting in lower increases in cancer risk and $PM_{2.5}$ concentrations. However, the Reduced Density Alternative would likely still make a considerable contribution to cumulative cancer risks and $PM_{2.5}$ concentrations, requiring implementation of mitigation measures M-AQ-3a (Off-road Construction Equipment Emissions Minimization) and M-AQ-3b (Diesel Backup Generator Specifications). Thus, like the proposed project, the Reduced Density Alternative would result in a less-than-significant-with-mitigation localized health risk impact.

Wind

Under the Reduced Density Alternative, the project site would be redeveloped with a new mixed-use development, like the proposed project, but it would construct a shorter and less dense building than the proposed project. The Reduced Density Alternative would be 160-feet tall (with an additional 10 feet for rooftop mechanical equipment, for a total height of 170 feet) and required to comply with section 148 of the planning code. This alternative consists of three volumetric elements, including a 15-foot-tall podium and a 64-foot-tall building block that support an 82-foot-tall tower. No additional design features are required for this alternative. The wind analysis for this alternative determined that none of the locations tested exceed the hazard criterion of 36 mph. Therefore, like the proposed project, the Reduced Density Alternative would not result in a significant project-level wind impact or a significant cumulative wind impact.[130]

Informational

The wind tunnel test also evaluated wind comfort speeds for the Reduced Density Alternative. With the Reduced Density Alternative, the average wind speed for all 63 test locations were measured at 11.3 mph, and would reduce wind speeds by 0.3 mph. The highest wind speed in the immediate vicinity of the site for the Reduced Density Alternative is 13 mph at location #1, #2, and #19, compared to the proposed project where the highest wind speed is 19 mph at location #12 and 17 mph at location #13. For the Reduced Density Alternative, the wind exceeds the seating comfort criterion approximately 40 to 46 percent of the time and the pedestrian comfort criterion about 16 to 18 percent of the time at locations #1, #2, and #19. This would be less than the proposed project, which exceeds the seating comfort criterion approximately 55 to 57 percent of the time and the pedestrian comfort criterion about 32 to 35 percent of the time at locations #12 and #13.

Under the cumulative conditions with the Reduced Density Alternative, the average wind speed for all 63 test locations were measured at 11.1 mph, which is 0.1 mph greater than the cumulative conditions without the Reduced Density Alternative. For the Reduced Density Alternative, the highest wind speed in the immediate vicinity of the site under cumulative conditions is 12 mph at locations #1, #2, #4, and #5 along Stevenson Street, and locations #12, #13, and #19 along Jessie Street, compared to the proposed project where the highest wind speed in the immediate vicinity of the site is 19 mph at locations #12 and #17 along Jessie Street under cumulative conditions. For the Reduced Density Alternative, the wind exceeds the seating comfort criterion approximately 29 to 42 percent of the time and the pedestrian comfort criterion about 10 to 14 percent of the time under cumulative conditions at locations #1, #2, #4, #5, #12, #13, and #19. This would be less than the proposed project, which under the cumulative scenario exceeds the seating comfort criterion approximately 56 to 62 percent of the time and the comfort criterion about 35 to 40 percent of the time at locations #12 and #17.

Overall, the Reduced Density Alternative would exceed the wind comfort criteria like the proposed project; however, the average wind comfort speeds would be less compared to the proposed project.

[130] ARUP. January 2020. Wind Study for 469 Stevenson Street Project.

Shadow

Under the Reduced Density Alternative, the project site would be developed with a 160-foot-tall mixed-use residential building (up to 170 feet tall with rooftop mechanical equipment). The proposed building would be 114 feet shorter than the proposed project and would not cast net new shadow on UN Plaza based on the shadow analysis prepared for this alternative (Figure 26).[131] Therefore, unlike the proposed project, the Reduced Density Alternative would have no shadow impact on UN Plaza and would also not have the potential to contribute to cumulative shadow on UN Plaza.

The shadow analysis prepared for the Reduced Density Alternative also determined that this alternative would cast less shadow on Mint Plaza compared to the proposed project. The Reduced Density Alternative would cast 4,610 sfh of shadow on Mint Plaza compared to the proposed project, which would cast 325,407 sfh. Under this alternative, net new shadow would be cast for approximately 90 days a year between November 2nd and February 7th and occur for approximately 15 minutes in the mid- to-late afternoon. Therefore, this alternative would cast shadow for a shorter duration compared to the proposed project, which would occur for approximately 180 days a year between September 21st and March 21st and last for 90 minutes during the mid-to-late afternoon.

The largest area of net new shadow cast on Mint Plaza for this alternative would be 400 square feet and would occur on January 4th and December 6th. The largest area of net new shadow created by this alternative would be less than the proposed project, which would be approximately 5,811 square feet and would occur on the northeastern portion of the plaza on November 1st and February 8th.

The largest area of net new shadow for the Reduced Density Alternative would occur on approximately 2.58 percent of the northeastern portion of Mint Plaza near the Fifth Street public entry and reach one of the two landscape planter/seating wall areas. Mint Plaza users occupying the affected seating wall area in the late afternoon would experience additional net new shadow falling on that area lasting 5 minutes or less as compared to current conditions. Other areas of the plaza would either be unaffected due to the presence of existing shadow or observed to be areas of predominantly transitory uses. As such, the shadow impact on Mint Plaza with the Reduced Density Alternative would be less than significant and would have fewer shadow impacts than the proposed project.

Under the cumulative scenario, the only cumulative project that would shade Mint Plaza is the 921 Howard Street project. The project at 921 Howard Street would shade Mint Plaza in the early morning, lasting less than 15 minutes, while the Reduced Density Alternative would shade Mint Plaza in the afternoon for about 16 minutes. Combined, the Reduced Density Alternative and the 921 Howard Street Project would shade various portions of Mint Plaza for short durations and would not be expected to substantially and adversely affect the use or enjoyment of this open space. Therefore, unlike the proposed project, the Reduced Density Alternative would result in a less than significant cumulative shadow impact.

[131] Prevision Design. March 2020. Shadow Analysis Report for the Proposed 469 Stevenson Street Project

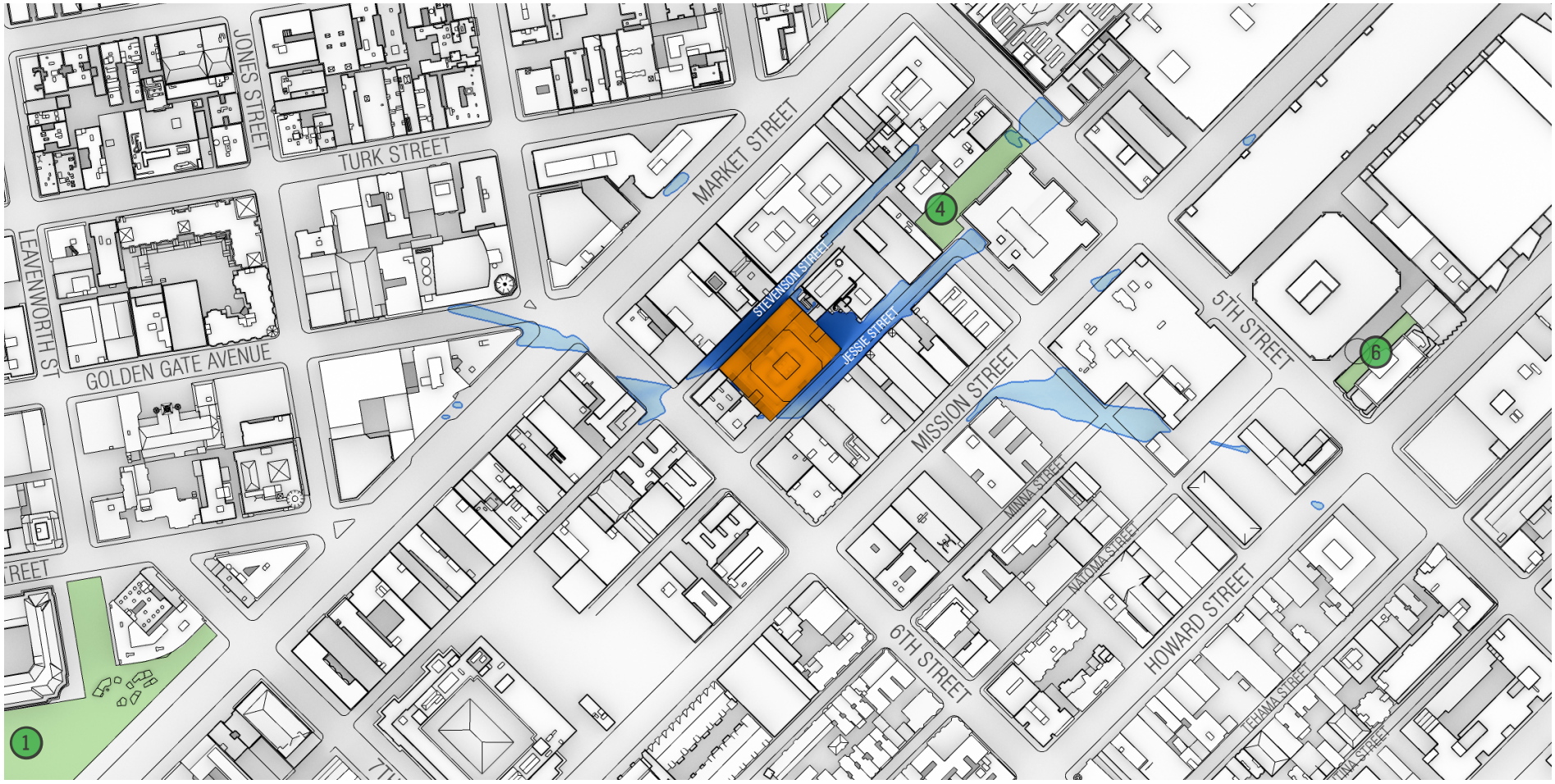
Topics Analyzed in the Initial Study

Cultural Resources, Tribal Cultural Resources, and Noise

Under the Reduced Density Alternative, there would still be subsurface ground disturbance required for construction of the two-level below grade parking garage. With the reduced excavation and earth movement required for the Reduced Density Alternative, as described above, the potential for excavation activities to encounter below-ground human remains, archaeological resources, and tribal cultural resources would be lessened compared to the proposed project. Noise impacts under the Reduced Density Alternative would be similar in character to, but less than those identified for the proposed project due to the shorter duration of construction activities and the reduced intensity of land uses. However, the Reduced Density Alternative would still have the potential to result in significant impacts to archeological resources, human remains, tribal cultural resources and noise. As with the proposed project, the Reduced Density Alternative would be required to implement Mitigation Measures M-CR-3, M-TCR-1, M-NO-1, and M-NO-2 to reduce impacts to archaeological resources, human remains, tribal cultural resources, and noise to a less than significant level.

Other Initial Study Topics

The initial study concluded that the proposed project would have no impacts or less than significant impacts for the following environmental topics: Land Use and Land Use Planning, Population and Housing, Odors, Greenhouse Gas Emissions, Recreation, Utilities and Service Systems, Public Services, Biological Resources, Geology and Soils, Hydrology and Water Quality, Hazards/Hazardous Materials, Mineral Resources, Energy Resources, Agriculture and Forestry Resources, and Wildfire. Impacts of the Reduced Density Alternative for these topics would be similar in character to, but less than those identified for the proposed project due to the shorter duration of construction activities and the reduced intensity of construction activities and land uses. The Reduced Density Alternative would not result in any new potentially significant impacts for these environmental topics evaluated in the initial study (Appendix A). As such, impacts related to these other initial study topics would be similar to those of the proposed project and either result in a less than significant impact or no impact.



469 Stevenson Street

Parks and Open Spaces (Jurisdiction)

1 UN Plaza (DPW)

4 Mint Plaza (POPOS)

6 Intercontinental Roof Terrace (POPOS)

469 Stevenson Street Project

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Figure 26: Shadow Fan Diagram for Reduced Density Alternative

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6.2.3 Alternative C: No Residential Parking, Tower Only Alternative

Description

The purpose of the No Residential Parking, Tower Only Alternative is to propose a project that would lessen the significant air quality, noise, archeological and tribal cultural resources impacts of the proposed project associated with the grading and excavation needed to build the three below-grade levels for parking and loading spaces. The No Residential Parking, Tower Only Alternative would redevelop the project site with a new mixed-use residential project, similar to the proposed project, but would include only one basement level (as opposed to the three basement levels included in the proposed project). The No Residential Parking, Tower Only Alternative would result in a taller building, but with 28 fewer units than the proposed project by slightly changing the design to eliminate the podium height massing along the four corners and relocate that square footage to the top of the building creating a streamlined single tower.

The No Residential Parking, Tower Only Alternative would include a single tower with one basement level with a maximum FAR of 479,957 square feet. The tower would be approximately 284-feet-tall (with additional 10 feet for rooftop mechanical equipment).

This alternative would include 467 units comprised of approximately 349 one-bedroom units, 60 two-bedroom units, and 58 three-bedroom units. Residential uses would begin at the second floor, which includes 17 units and a 11,078-square-foot common open space podium balcony. The 3rd through 28th floors would include 18 residential units per floor with the units on the 28th floor having 576 square feet (total) of private balconies.

Primary access to the residential units would be from the residential lobby located along Jessie Street with secondary access along Stevenson Street. The ground floor would include two retail spaces along Jessie Street totaling approximately 3,651 square feet and on each side of the 1,453 square foot lobby. A 747 square foot common open space would be provided along Jessie Street and a 9,500 square foot solarium for residents would be provided along Stevenson Street.

The No Residential Parking, Tower Only Alternative would require 45,110 cubic yards less excavation (10,740 cubic yards total) than the proposed project (55,850 cubic yards) for below-grade foundation and structural work because it would only provide one basement level.

The single basement level would be for off-street loading and service vehicle parking, accessible parking, and bicycle parking. No car-share parking would be provided for this alternative pursuant section 166 of the planning code. This alternative would provide 193 class 1 bicycle parking spaces in a bicycle storage room located in the basement and accessed via the ground floor lobby. This alternative would also provide 25 class 2 bicycle parking spaces along Jessie and Stevenson streets.

Open space would include a ground floor solarium, a second story podium terrace, and private balconies at the rooftop level.

Construction of the No Residential Parking, Tower Only Alternative is expected to follow a 34-month construction schedule, which is two months shorter than the proposed project's construction schedule. The same discretionary project approvals identified for the proposed project would be required for this alternative.

Figure 27 provides a visual rendering and Figure 28 provides an elevation plan of the No Residential Parking, Tower Only Alternative.

Ability to Meet Project Objectives

The No Residential Parking, Tower Alternative could feasibly attain most of the project sponsor objectives, including providing much-needed housing. However, by not providing any residential parking, the alternative would fail to meet the objective of providing adequate off-street vehicle parking for the residential use and to meet investment capital parking requirements (Objective 6). The lack of residential parking could also create financing challenges as it would render a standard construction loan unattainable and potentially make development of the site economically infeasible (Objective 8).

Impacts

Air Quality

The No Residential Parking, Tower Only Alternative would redevelop the project site with a new mixed-use residential project, similar to the proposed project, but would construct a larger building than under the proposed project by slightly changing the design to eliminate the podium height massing along the four corners and relocating that square footage to the top of the building creating a streamlined single tower. The No Residential Parking, Tower Only Alternative would require 45,110 cubic yards less excavation (10,740 cubic yards total) than the proposed project (55,850 cubic yards) for below-grade foundation and structural work since it is only providing one basement level. The No Residential Parking, Tower Only Alternative is anticipated to have a shorter construction duration and require less heavy construction equipment compared to the proposed project.

Criteria Air Pollutants

Relative to the proposed project, the No Residential Parking, Tower Only Alternative would result in fewer emissions of criteria air pollutants and fugitive dust emissions during construction and operation. The No Residential Parking, Tower Only Alternative would require less excavation and the overall construction duration would be reduced from 36 months to 34 months, reducing the period for construction related emissions to occur by two months. With reduced excavation, this alternative would require marginally less heavy-duty diesel equipment and fewer construction vehicles, truck trips, and worker trips due to the reduced excavation activities. Therefore, fugitive dust emissions would be reduced during construction compared with the proposed project. In addition, as with the proposed project, the No Residential Parking, Tower Only Alternative would be required to comply with the construction dust control ordinance, which would ensure that fugitive dust impacts would be less than significant. With the No Residential Parking, Tower Only Alternative's lower amount of heavy-duty diesel equipment, construction vehicles, truck and worker trips, and shorter construction period, this alternative would result in lower construction period criteria air pollutant impacts than the proposed project. Like the proposed project, construction criteria air pollutant impacts resulting from the No Residential Parking, Tower Only Alternative would be less than significant.

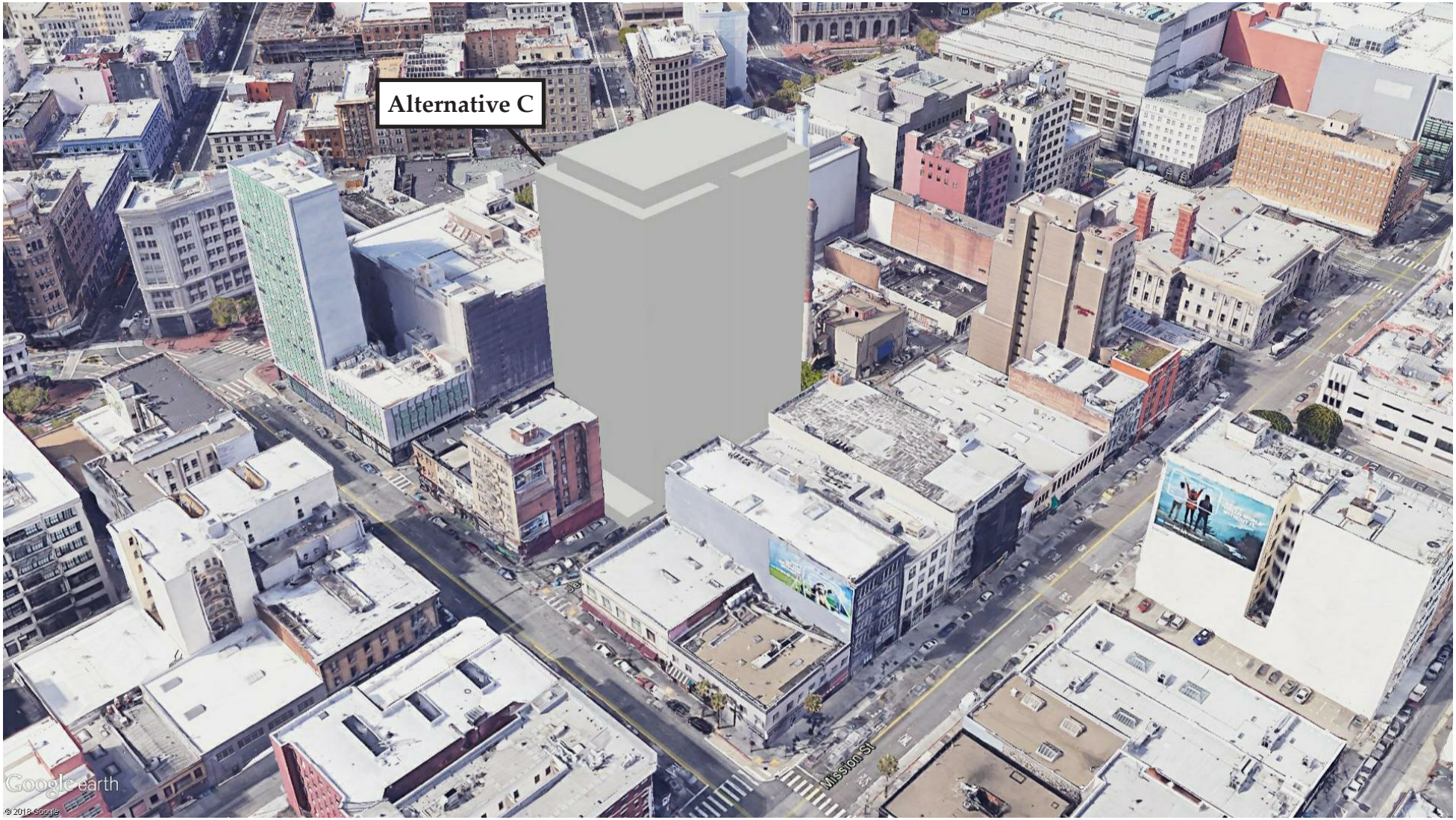

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Figure 27: Visual Rendering of the No Residential Parking, Tower Only Alternative

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469 Stevenson Street Project
Case No. 2017-014833ENV

Figure 28: Building Elevation of the No Residential Parking, Tower Only Alternative

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The No Residential Parking, Tower Only Alternative would result in the construction of fewer residential units and parking at the project site compared with the proposed project, thereby resulting in less energy consumption, fewer vehicle trips, and fewer related air emissions. Therefore, like the proposed project, operational criteria air pollutant impacts resulting from the No Residential Parking, Tower Only Alternative would be less than significant.

Health Risks

Compared to the proposed project, the No Residential Parking, Tower Only Alternative would result in a reduced cancer risk and a lower localized $PM_{2.5}$ concentration because it would require marginally less heavy-duty diesel equipment (below levels shown in Table 4.2-8 in Section 4.2, Air Quality, pp. 4.48). Because the No Residential Parking, Tower Only Alternative would result in less construction, it would be anticipated to result in less toxic air contaminants relative to the proposed project, but it would likely still exceed the cancer risk and $PM_{2.5}$ significance thresholds for projects within an air pollutant exposure zone and require implementation of Mitigation Measures M-AQ-3a, Off-road Construction Equipment Emissions Minimization, and M-AQ-3b, Diesel Generator Specifications, like the proposed project. As such, construction and operational health risk impacts for the No Residential Parking, Tower Only Alternative would be less than that of the proposed project and would be less than significant with implementation of the mitigation measures discussed above.

Consistency with the Clean Air Plan

Like the proposed project, the No Residential Parking, Tower Only Alternative would be required to comply with various local regulations such as the Transportation Demand Management Ordinance and the Construction Dust Control Ordinance. These regulations implement the control measures of the 2017 Bay Area Clean Air Plan. Therefore, like the proposed project, the No Residential Parking, Tower Only Alternative would not conflict with the 2017 Bay Area Clean Air Plan.

Cumulative Impacts

The No Residential Parking, Tower Only Alternative would make a less-than-significant contribution to cumulative regional criteria air pollutant impacts, and no mitigation measures would be necessary. Cumulatively, the No Residential Parking, Tower Only Alternative would result in slightly lower localized health risk impacts when compared to the proposed project because it would require less construction equipment and would generate less vehicle trips, resulting in lower increases in cancer risk and $PM_{2.5}$ concentrations. However, the No Residential Parking, Tower Only Alternative would still make a considerable contribution to cumulative cancer risks and $PM_{2.5}$ concentrations, requiring implementation of Mitigation Measures M-AQ-3a (Off-road Construction Equipment Emissions Minimization) and M-AQ-3b (Diesel Backup Generator Specifications). Like the proposed project, the No Residential Parking, Tower Only Alternative would result in a less-than-significant-with-mitigation localized health risk impact.

Wind

The No Residential Parking, Tower Only Alternative would redevelop the project site with a new mixed-use development, like the proposed project, but it would construct a slightly taller building compared to the proposed project. The proposed tower would be approximately 284 feet tall and required to comply with section 148 of the planning code. This alternative would incorporate similar

design features as the proposed project, including a change in the position of the tower (about 26 feet away from the northeast side of the podium), 20-foot-tall solid screens on the podium along Stevenson Street, and 15-foot-tall solid screens on the northeast side of the podium. These design features have been selected to ensure that wind speeds in the vicinity of the project site would not exceed the 36 mph wind hazard criteria. As such, like the proposed project, the No Residential Parking, Tower Only Alternative would not result in a significant project-level wind impact or a significant cumulative wind impact.[132]

Informational

The wind tunnel test also evaluated wind comfort speeds for the No Residential Tower, Parking Only Alternative. Under the No Residential Parking, Tower Only Alternative, the average wind speed for all 63 test locations measured 12.5 mph and would increase existing windiness by 1.5 mph. The highest wind speeds in the immediate vicinity of the site are 19 mph at location #12 and 17 mph at locations #4, #5, #13, and #17. This would be similar to the proposed project where the highest wind speed is 19 mph at location #12 and 17 mph at location #13.

For the No Residential Parking, Tower Only Alternative, the wind exceeds the seating comfort criterion approximately 56 to 60 percent of the time and the pedestrian comfort criterion about 30 to 35 percent of the time at locations #4, #5, #12, #13, and #17. This would be similar to the proposed project, which exceeds the seating comfort criterion approximately 55 to 57 percent of the time and the pedestrian comfort criterion about 32 to 35 percent of the time at locations #12 and #13.

Under the cumulative conditions with the No Residential Parking, Tower Only Alternative, the average wind speed for all 63 test locations measured 12.1 mph, which is 1.1 mph greater than the cumulative conditions without the No Residential Parking, Tower Only Alternative. For the No Residential Parking, Tower Only Alternative, the highest wind speeds in the immediate vicinity of the site under cumulative conditions are 19 mph at locations #12 along Jessie Street towards Mint Plaza and 18 mph at locations #4 and #17 along Stevenson Street and Jessie Street, respectively. This is similar to the proposed project where the highest wind speed in the immediate vicinity of the site is 19 mph at locations #12 and #17 along Jessie Street under cumulative conditions.

For the No Residential Parking, Tower Only Alternative, the wind exceeds the seating comfort criterion approximately 55 to 61 percent of the time and the pedestrian comfort criterion about 29 to 37 percent of the time under cumulative conditions at locations #4, #12, and #17. This would be similar to the proposed project, which under the cumulative conditions exceeds the seating comfort criterion approximately 56 to 62 percent of the time and the comfort criterion about 35 to 40 percent of the time at locations #12 and #17.

Overall, wind comfort speeds with the No Residential Parking, Tower Only Alternative would be similar as the proposed project, but would be greater than the proposed project under the cumulative scenario.

[132] ARUP. January 2020. Wind Study for 469 Stevenson Street Project.

Shadow

The 284-foot-tall No Residential Parking, Tower Only Alternative would be approximately 10 feet taller than the proposed project. The No Residential Parking, Tower Only Alternative would cast shadow on UN Plaza and Mint Plaza. The amount of shadow cast on UN Plaza and Mint Plaza would be comparable, if not slightly greater than the proposed project due to the increase in building height.

The shadow analysis prepared for the No Residential Parking, Tower Only Alternative determined that this alternative would cast 10,603 sfh of shadow (0.003 percent increase) on UN Plaza. The amount of shadow cast created by the No Residential Parking, Tower Only Alternative would be similar to the proposed project which would cast 9,693 sfh and increase the amount of shadow on UN Plaza by 0.003 percent.

Under the No Residential Parking, Tower Only Alternative, net new shadow would be cast for approximately 85 to 97 days a year between May 4th and August 8th and occur for approximately 10 minutes in the early morning. Therefore, this alternative would cast shadow on UN Plaza for a similar duration as the proposed project. The largest area of net new shadow cast for the No Residential Parking, Tower Only Alternative would be 1,823 square feet and occur on 1.7 percent of the northeastern portion of the plaza on June 21st. The largest area of net new shadow created by this alternative would be similar to the proposed project, which would be approximately 1,649 square feet and occur on 1.6 percent of the northeastern portion of the plaza on June 21st. As such, net new shadow on UN Plaza would be similar to the proposed project and would result in a less than significant shadow impact because it would only occur in the early morning and only for a limited duration.

Furthermore, because the No Residential Parking, Tower Only Alternative would only increase sfh of shadow by 0.003 percent above current levels and only occur in the early morning for a limited duration, the No Residential Parking, Tower Only Alternative's shadow contribution on UN Plaza would be similar to the proposed project and would be less than cumulatively considerable, and therefore would result in a less than significant cumulative shadow impact.

With regard to Mint Plaza, given that the No Residential Parking, Tower Only Alternative would be slightly taller than the proposed project, this alternative would shade similar areas of the plaza for similar durations during similar times of the year. This alternative would cast 342,763 sfh of shadow on Mint Plaza compared to the proposed project, which would cast 325,407 sfh. The No Residential Parking, Tower Only Alternative would cast shadow on the same days as the proposed project for approximately 170 to 182 days a year between September 21st and March 21st and occur for approximately 90 minutes in the mid- to late afternoon. The largest area of net new shadow cast for the No Residential Parking, Tower Only Alternative would be 6,049 square feet and occur on October 25th and February 22nd, affecting 39.04 percent of the northeastern portion of the plaza area. The largest area of net new shadow cast by the No Residential Parking, Tower Only Alternative would be greater than the proposed project, which would be 5,811 square feet and occur on November 1st and February 8th at 2:30 p.m., and affect 37.5 percent of the northeastern portion of the plaza area. Thus, for the same reasons as the proposed project, the No Residential Parking, Tower Only Alternative would result in a significant shadow impact on Mint Plaza. Similarly, there is no feasible mitigation for the No Residential Parking, Tower Only Alternative's shadow impact on Mint Plaza. This is because other than a reduction in building height or a change in building mass, no other modification to the No Residential Parking, Tower Only Alternative would eliminate the net new shadow on Mint Plaza. Therefore, the impact would be significant and unavoidable.

The project at 921 Howard Street would also shade portions of Mint Plaza, similar to the proposed project, which combined with the proposed project would result in a significant cumulative shadow impact. Like the proposed project and for the same reasons as the proposed project, the No Residential Parking, Tower Only Alternative's contribution to cumulative shadow would be considerable. Therefore, the No Residential Tower, Parking Only Alternative, would result in a significant and unavoidable project-level and cumulative shadow impact that is slightly greater than the proposed project.

Topics Analyzed in the Initial Study

Cultural Resources, Tribal Cultural Resources, and Noise

Under the No Residential Parking, Tower Only Alternative there would still be subsurface ground disturbance for construction of the basement level. However, with the reduced excavation and earth movement required for the No Residential Parking, Tower Only Alternative, as described above, the potential for excavation activities to encounter below-ground human remains, archaeological resources, and tribal cultural resources would be lessened compared to the proposed project. Construction noise impacts under the No Residential Parking, Tower Only Alternative would be similar in character to, but less than those identified for the proposed project due to the shorter duration of construction activities. The No Residential Parking, Tower Only Alternative would result in 28 fewer residential units on the project site; however, the number of units under this alternative would be comparable to the proposed project and therefore operational noise impacts would similar. For these reasons the No Residential Parking, Tower Only Alternative would still have the potential to result in significant impacts to archeological resources, human remains, tribal cultural resources and noise. As with the proposed project, the No Residential Parking, Tower Only Alternative would be required to implement Mitigation Measures M-CR-3, M-TCR-1, M-NO-1, and M-NO-2 to reduce impacts to archeological resources, human remains, tribal cultural resources, and noise to a less than significant level.

Other Initial Study Topics

The initial study concluded that the proposed project would have no impacts or less than significant impacts for the following environmental topics: Land Use and Land Use Planning, Population and Housing, Odors, Greenhouse Gas Emissions, Recreation, Utilities and Service Systems, Public Services, Biological Resources, Geology and Soils, Hydrology and Water Quality, Hazards/Hazardous Materials, Mineral Resources, Energy Resources, Agriculture and Forestry Resources, and Wildfire. The No Residential Parking, Tower Only Alternative would be similar in character to, but require less construction than identified for the proposed project due to the shorter duration of construction activities and less amount of excavation of the site as there would only be one basement level. The No Residential Parking, Tower Only Alternative would result in 28 fewer residential units on the project site, but the intensity of development under this alternative would be comparable to the proposed project. As such, the No Residential Parking, Tower Only Alternative would not result in any new potential significant impacts for these environmental topics evaluated in the initial study (Appendix A). Impacts related to these other initial study topics would be similar to those of the proposed project and either result in a less than significant impact or no impact.

6.2.4 Environmentally Superior Alternative

The CEQA Guidelines require the identification of an environmentally superior alternative (section 15126.6(e)), which is the alternative that best avoids or lessens any significant impacts of the proposed project, even if the alternative would impede to some degree attainment of the project objectives. If it is determined that the "no project" alternative would be the environmentally superior alternative, then the EIR shall also identify an environmentally superior alternative among the other project alternatives (section 15126.6(3)). Table 6.2-1, Comparison of Significant Impacts of the Proposed Project to Impacts of Alternatives after Mitigation, compares the significant impacts of the proposed project, No Project Alternative, Reduced Density Alternative, and No Residential Parking, Tower Only Alternative.

The No Project Alternative is considered the environmentally superior alternative because the significant impacts of the proposed project related to air quality, shadow, archeological resources, human remains, tribal cultural resources, and noise would not occur under the No Project Alternative. However, the No Project Alternative would not meet any of the project sponsor objectives.

Because CEQA requires selection of an environmentally superior alternative other than the No Project Alternative, the Reduced Density Alternative is identified as the environmentally superior alternative. The Reduced Density Alternative would require implementation of the same mitigation measures as the proposed project to reduce impacts related to archeological resources, human remains, tribal cultural resources, noise, and air quality. However, the severity and potential for impacts to those topic areas would be reduced compared with those of the proposed project because of the reduced amount of excavation and earth movement, shorter construction duration, and fewer residential units constructed. The Reduced Density Alternative would be 114 feet shorter than the proposed project and would not cast net new shadow on UN Plaza and would avoid the significant and unavoidable project-level and cumulative shadow impact on Mint Plaza. As discussed above, the Reduced Density Alternative could feasibly attain most of the project sponsor objectives (refer to Section 6.2.1).

Table 6.2-1: Comparison of Significant Impacts of the Proposed Project to Impacts of Alternatives After Mitigation

Impact Statement	Proposed Project	Alternative A: No Project Alternative	Alternative B: Reduced Density Alternative	Alternative C: No Residential Parking, Tower Only Alternative
Cultural Resources				
Impact CR-3: The proposed project could result in a substantial adverse change in the significance of an archeological resource.	LSM	NI	LSM =/<	LSM =/<
Impact CR-4: The project could disturb human remains, including those interred outside of formal cemeteries.	LSM	NI	LSM =/<	LSM =/<
Impact C-CR-1: The proposed project, in combination with reasonably foreseeable projects in the vicinity, could result in a cumulatively considerable contribution to a significant cumulative impact related to cultural resources.	LSM	NI	LSM =/<	LSM =/<

Impact Statement	Proposed Project	Alternative A: No Project Alternative	Alternative B: Reduced Density Alternative	Alternative C: No Residential Parking, Tower Only Alternative
Tribal Cultural Resources				
Impact TCR-1: Project-related activities could cause a substantial adverse change in the significance of a tribal cultural resource, as defined in Public Resources Code section 21074.	LSM	NI	LSM =/<	LSM =/<
Impact C-TCR-1: The proposed project, in combination with reasonably foreseeable future projects, could result in a cumulatively considerable contribution to a cumulative tribal cultural resources impacts.	LSM	NI	LSM =/<	LSM =/<
Noise				
Impact NO-1: Construction of the proposed project would result in a temporary or periodic increase in ambient noise levels.	LSM	NI	LSM <	LSM <
Impact NO-2: The proposed project would generate noise levels in excess of standards established in the local general plan or noise ordinance and could result in a substantial permanent increase in ambient noise levels in the project vicinity.	LSM	NI	LSM =/<	LSM =/<
Impact C-NO-1: Construction of the proposed project, in combination with reasonably foreseeable projects, would result in a significant cumulative impact related to noise and the project's contribution would be cumulatively considerable.	LSM	NI	LSM <	LSM <
Air Quality				
Impact AQ-3: Construction and operation of the proposed project would generate toxic air contaminants, including DPM, at levels that would expose sensitive receptors to substantial pollutant concentrations.	LSM	NI	LSM <	LSM <
Impact C-AQ-1: The proposed project during construction and operations, in combination with reasonably foreseeable projects, would result in significant health risk impacts to sensitive receptors.	LSM	NI	LSM <	LSM <

Impact Statement	Proposed Project	Alternative A: No Project Alternative	Alternative B: Reduced Density Alternative	Alternative C: No Residential Parking, Tower Only Alternative
Shadow				
Impact SD-1: The proposed project could create new shadow that could substantially and adversely affect the use and enjoyment of publicly accessible open spaces.	SU	NI	LS <	SU >
Impact C-SD-1: The proposed project, in combination with reasonably foreseeable projects, could create new shadow that could substantially and adversely affect the use and enjoyment of publicly accessible open spaces.	SU	NI	LS <	SU >

Notes:
NI (no impact); LS (less than significant); LSM (less than significant with mitigation); SU (significant and unavoidable, no feasible mitigation measures available); = (equal to); < (less than); > (greater than)

6.2.5 Alternatives Considered and Rejected

Section 15126.6(c) of the CEQA Guidelines provides that an EIR should "identify any alternatives that were considered by the lead agency but rejected as infeasible during the scoping process and briefly explain the reasons underlying the lead agency's determination." The screening process for identifying viable EIR alternatives included consideration of the following criteria: ability to meet the project objectives; potential ability to substantially lessen or avoid environmental effects associated with the proposed project; and potential feasibility.

The planning department considered the following three additional alternatives. The first alternative considered was similar to the No Residential Parking, Tower Only Alternative, but it did not include a basement level. This alternative was eliminated from further consideration as the project sponsor determined at least one level of below-grade loading and parking was desirable for the commercial retail component. The second alternative considered was a mid-height alternative that would be slightly taller than the Reduced Density Alternative and would still result in a less than significant shadow impact on Mint Plaza. However, additional shadow modeling determined that this alternative would be substantially similar (only one building floor taller) to the Reduced Density Alternative and was eliminated from further consideration. The third alternative considered was an offsite alternative that was under the project sponsor's control; however, there was already an approved project on that site and it was therefore eliminated from further consideration.

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APPENDIX A NOTICE OF PREPARATION AND INITIAL STUDY

SAN FRANCISCO
PLANNING DEPARTMENT

Notice of Preparation of an Environmental Impact Report

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Date:	October 2, 2019
Case No.:	**2017-014833ENV**
Project Title:	**469 Stevenson Street**
Zoning:	Downtown General Commercial District (C-3-G) 160-F Height and Bulk District
Block/Lot:	3704/045
Lot Size:	28,790 gross square feet (0.66 acre)
Project Sponsor	Victoria Lehman, BUILD (415) 551-7624
Lead Agency:	San Francisco Planning Department
Staff Contact:	Jenny Delumo – (415) 575-9146 CPC.469Stevenson@sfgov.org

PROJECT DESCRIPTION

The project site is a through lot located at 469 Stevenson Street in the South of Market (SoMa) neighborhood of San Francisco (Assessor's Block 3704, Lot 45). The project site is approximately 28,790 square feet (0.66-acre) and currently developed as a public surface parking lot with 176 parking spaces. The proposed project would demolish the existing surface parking lot and construct a new 27-story mixed-use building approximately 274 feet tall (with an additional 10 feet for rooftop mechanical equipment) and three below grade parking levels, providing parking for 171 spaces. The proposed project would total approximately 567,000[1] gross square feet (gsf) consisting of 462 dwelling units, approximately 4,000 square feet of commercial retail use on the ground floor, and approximately 25,000 square feet of private and common open space. The proposed 462 dwelling units would be provided as rental units and include a mix of approximately 358 one-bedroom, 54 two-bedroom, 42 three-bedroom units, and 8 five-bedroom units. The proposed project would use the Individually Requested State Density Bonus Program[2] and provide affordable housing units onsite. The below grade parking would also provide 192 class 1[3] bicycle spaces and 25 class 2[4] bicycle parking spaces are proposed along the frontages of Stevenson and Jessie streets. The proposed project would require 55,850 cubic yards of excavation and is anticipated to be constructed on a mat foundation and no pile driving or piers are proposed or required. The attached initial study contains a comprehensive project description, including figures, and a preliminary list of required project approvals.

---

1 All numbers are rounded to the nearest thousand or hundred thousand.

2 City of San Francisco Planning Department, Individually Requested State Density Bonus Program, Informational and Supplemental Application Packet. http://forms.sfplanning.org/IndividuallyRequestedState_SupplementalApplication.pdf. Accessed September 18, 2019.

3 Class 1 bicycle parking space(s) are spaces in secure, weather-protected facilities intended for use as long-term, overnight, and work-day bicycle storage by dwelling unit residents, non-residential occupants, and employees.

4 Class 2 bicycle parking space(s) are bicycle racks located in a publicly-accessible, highly visible location intended for transient or short-term use by visitors, guests, and patrons to the building or use.

SUMMARY OF POTENTIAL ENVIRONMENTAL EFFECTS

The San Francisco Planning Department has prepared an initial study to evaluate the physical environmental effects of the proposed project. The initial study assessed both project-specific and cumulative impacts for all topics required under the California Environmental Quality Act (CEQA) and identified which environmental topic areas may be significantly impacted by the proposed project.

The initial study determined the potential individual and cumulative environmental effects would be less than significant, or reduced to less than significant with mitigation measures for the following topics: land use and planning, population and housing, cultural resources, tribal cultural resources, transportation and circulation, noise, greenhouse gas emissions, recreation, utilities and service systems, public services, biological resources, geology and soils, hydrology and water quality, hazards and hazardous materials, mineral resources, energy resources, agriculture and forestry resources, and wildfire. The initial study identified mitigation measures to reduce significant impacts to less than significant levels for the following topics: cultural resources, tribal cultural resources, and noise. In addition, the project meets all requirements of a transit-oriented infill development project under Public Resources Code section 21099 (Senate Bill 743); therefore, aesthetics and parking were not considered in determining if the project has the potential to result in significant environmental effects.

The initial study determined the proposed project could result in potentially significant environmental impacts related to air quality, wind, and shadow. These topics will be discussed in an environmental impact report (EIR), as discussed below. The EIR will also address other topics required by CEQA, including growth-inducing impacts; mitigation measures; significant unavoidable impacts; significant irreversible impacts; any known controversy associated with environmental effects, or alternatives; and issues to be resolved by the decision makers.

Air Quality

The air quality analysis will address consistency of the proposed project with applicable air quality plans, and the potential for the proposed project to result in emissions of criteria air pollutants and other toxic air contaminants that may affect sensitive populations. The air quality analysis will include quantification of both construction-related and operational criteria air pollutant emissions. The analysis will also summarize the results of a health risk assessment prepared to evaluate potential health effects resulting from the project's construction and operational emissions. Cumulative air quality impacts will also be evaluated. The initial study determined that the proposed project would not result in significant impacts related to odors. Therefore, odors will not be addressed in the EIR.

Wind

The wind analysis will evaluate the potential for the proposed project to alter pedestrian-level wind conditions in a manner that would substantially affect public areas. The wind analysis will be conducted for existing plus project conditions and cumulative conditions.

Shadow

The shadow analysis will evaluate the potential for the proposed project to create new shadow that substantially affects the use and enjoyment of publicly accessible open spaces. The shadow analysis will be conducted for existing plus project conditions and cumulative conditions.

ALTERNATIVES

The EIR will include an analysis of the comparative environmental impacts of feasible alternatives to the proposed project as required by State CEQA Guidelines, Section 15126.6. Preliminary alternatives to be considered for this project will include the No Project Alternative, which considers reasonably foreseeable conditions at the project site if the proposed project is not implemented; Reduced Density Alternative, which would not utilize the State Density Bonus program and would construct a 160-foot-tall mixed-use residential building with two basement levels for parking that is consistent with the height and density permitted under the planning code; and Reduced Parking, Tower Only Alternative, which would utilize the State Density Bonus program and include a 287-foot-tall single tower with one basement level for parking. Other alternatives will be evaluated as necessary, depending on the results of the impact analyses of the various environmental topics listed above.

FINDING

This project may have a significant effect on the environment and an EIR is required. This determination is based upon the criteria of the State CEQA Guidelines, sections 15063 (Initial Study), 15064 (Determining Significant Effect), and 15065 (Mandatory Findings of Significance), and for the reasons documented in the initial study for the project, which is attached. The purpose of the EIR will be to provide information about potentially significant physical environmental impacts of the proposed project, identify possible ways to minimize the potentially significant impacts, and describe and analyze possible alternatives to the proposed project. Publication of a notice of preparation, initial study, or EIR does not indicate a decision by the city to approve or disapprove a proposed project. However, before making any such decision, the decision makers must review and consider the information contained in the EIR.

PUBLIC SCOPING PROCESS

Written comments concerning the scope of the EIR will be accepted until 5:00 p.m. on **November 1, 2019**. Written comments should be sent to **Jenny Delumo**, EIR Coordinator, San Francisco Planning Department, 1650 Mission Street, Suite 400, San Francisco, CA 94103, or by email at **CPC.469Stevenson@sfgov.org**.

If you work for a responsible State agency, we need to know the views of your agency regarding the scope and content of the environmental information that is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency may need to use the EIR when considering a permit or other approval for this project. Please include the name of a contact person in your agency.

Members of the public are not required to provide personal identifying information when they communicate with the San Francisco Planning Commission or the Department. All written or oral communications, including submitted personal contact information, may be made available to the public for inspection and copying upon request and may appear on the Department's website or in other public documents.

October 2, 2019

Date

Lisa Gibson

Lisa Gibson
Environmental Review Officer

ATTACHMENTS

469 Stevenson Initial Study

Initial Study

469 Stevenson Street Project
Planning Department Case No. 2017-014833ENV

October 2, 2019

Written comments will be accepted until 5:00 p.m. on November 1, 2019 and should be sent to:

Jenny Delumo
Senior Planner, Environmental Planning Division
San Francisco Planning Department
1650 Mission Street, Suite 400
San Francisco, CA 94103
CPC.469Stevenson@sfgov.org

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Acronyms and Abbreviations

ABAG	Association of Bay Area Governments
ADA	Americans with Disabilities Act
ADRP	archeological data recovery plan
air district	Bay Area Air Quality Management District
ARPP	archeological resource preservation plan
ATP	archeological testing plan
BART	Bay Area Rapid Transit
bgs	below ground surface
BMPs	best management practices
BTUs	British thermal units
building department	San Francisco Department of Building Inspection
C-3-G	Downtown-General
Caltrans	California Department of Transportation
California Register	California Register of Historical Resources
CEQA	California Environmental Quality Act
dB	decibel
dB(A)	A-weighted decibel
EIR	environmental impact report
ERO	Environmental Review Officer
FARR	Final Archeological Resources Report
FAR	floor area ratio
FTA	Federal Transit Administration
gpd	gallons per day
GHG	greenhouse gas
gsf	ground square feet
health department	San Francisco Department of Public Health
HVAC	heating, ventilation, and air conditioning
kWh	kilowatt-hours
LOS	level of service
Maher Ordinance	San Francisco Health Code article 22A
MBTA	Migratory Bird Treaty Act
mgd	million gallons per day
MLD	Most Likely Descendant
MRZ	mineral resource zone
MUNI	Municipal Railway
NPDES	National Pollutant Discharge Elimination System

NWIC	Northwest Information Center
OPR	Office of Planning and Research
PCB	polychlorinated biphenyl
PDA	Priority Development Area
PG&E	Pacific Gas and Electric Company
planning department	San Francisco Planning Department
PPV	peak particle velocity
RCNM	Roadway Construction Noise Model
RPD	San Francisco Recreation and Parks Department
SB	Senate Bill
SFLOP	San Francisco Local Oversight Program
SFMTA	San Francisco Municipal Transportation Agency
SFPUC	San Francisco Public Utilities Commission
site assessment	phase 1 environmental site assessment
SoMa	South of Market
TAZ	transportation analysis zones
TCR	tribal cultural resource
TDM	transportation demand management
TDR	transferable development rights
TNCs	Transportation Network Companies
USGS	U.S Geological Survey
UST	underground storage tank
VMT	vehicle-miles-traveled
VOCs	volatile organic compounds

Initial Study

469 Stevenson Street Project

Planning Department Case No. 2017-014833ENV

A. PROJECT DESCRIPTION

A.1. PROJECT LOCATION

The project site is located at 469 Stevenson Street in the South of Market Area (SoMa) neighborhood of San Francisco (Figure 1). As shown in Figure 1, the project site is a through lot with frontages on both Stevenson and Jessie streets and is located mid-block between Fifth and Sixth streets (Assessor's Block 3704, Lot 45). The project site is approximately 28,790 square feet (0.66-acre) and currently used as a public surface parking lot with 176 parking spaces. Access to the project site is available from the existing 24-foot-wide curb cut on Stevenson Street and 12-foot-wide curb cut on Jessie Street. There is no existing vegetation on the project site. However, there are five trees adjacent to the east boundary of the project site on the Clearway Energy property. The topography of the site is generally level with a ground surface elevation of approximately 30 feet above mean sea level.

The project site is located within the C-3-G (Downtown-General) zoning district which allows retail and high-density residential development and a 160-F height and bulk district. This height and bulk designation allow for buildings up to 160 feet in height, and bulk limitations of 110 feet in length and 140 feet along the diagonal for buildings 80 feet in height or taller.

The project site is served by the city's transit network and is located less than one block south of the Powell Street Bay Area Rapid Transit (BART) station and the subsurface San Francisco Municipal Railway (Muni) lines. Additionally, there are several aboveground Muni bus lines that operate within 0.5 mile of the project site, including the 14-Mission, 27-Bryant, 45-Union/Stockton, and 8-Bayshore Express. The closest aboveground Muni stop is located approximately 300 feet north of the project site on Market Street and Sixth Street.

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Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User

469 Stevenson Street Project

Case No. 2017-014833ENV

Figure 1: Project Site Location

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A.2. PROJECT CHARACTERISTICS

The project proposes to use the Individually Requested State Density Bonus Program[5] and must provide at least 11 percent of the base[6] project's residential units as very low affordable dwelling units onsite in order to qualify for a 35 percent increase in density. The project proposes to provide affordable dwelling units at a rate of approximately 19 percent of the base project. The project sponsor will also be requesting waivers from height, bulk, and other physical constraints of the planning code and is reserving its right to use the incentives afforded by providing affordable dwelling units onsite, as allowed by the State Density Bonus program.

The proposed project would replace the existing 176 space surface parking lot with a 27-story (274 foot-tall with an additional 10 feet for rooftop mechanical equipment) mixed-use residential building of approximately 567,000 sf. Figure 2 shows the proposed project site plan. The proposed building would consist of residential and commercial retail uses above a three-level below grade parking garage. The proposed project would provide sidewalk landscaping improvements and open space consisting of solariums, courtyards, and balconies. The proposed project would connect to existing utility lines including sewer, water, electricity, and gas lines. Table 1, Project Summary, lists the characteristics of the individual project components.

---

[5] City of San Francisco Planning Department, Individually Requested State Density Bonus Program, Informational and Supplemental Application Packet. http://forms.sfplanning.org/IndividuallyRequestedState_SupplementalApplication.pdf. Accessed September 18, 2019.

[6] In order to determine how much of a density bonus state law will allow, the density allowed by current controls ("base density" or "base project") must first be calculated. The base density is the maximum gross residential density allowed pursuant to the site's zoning requirements.

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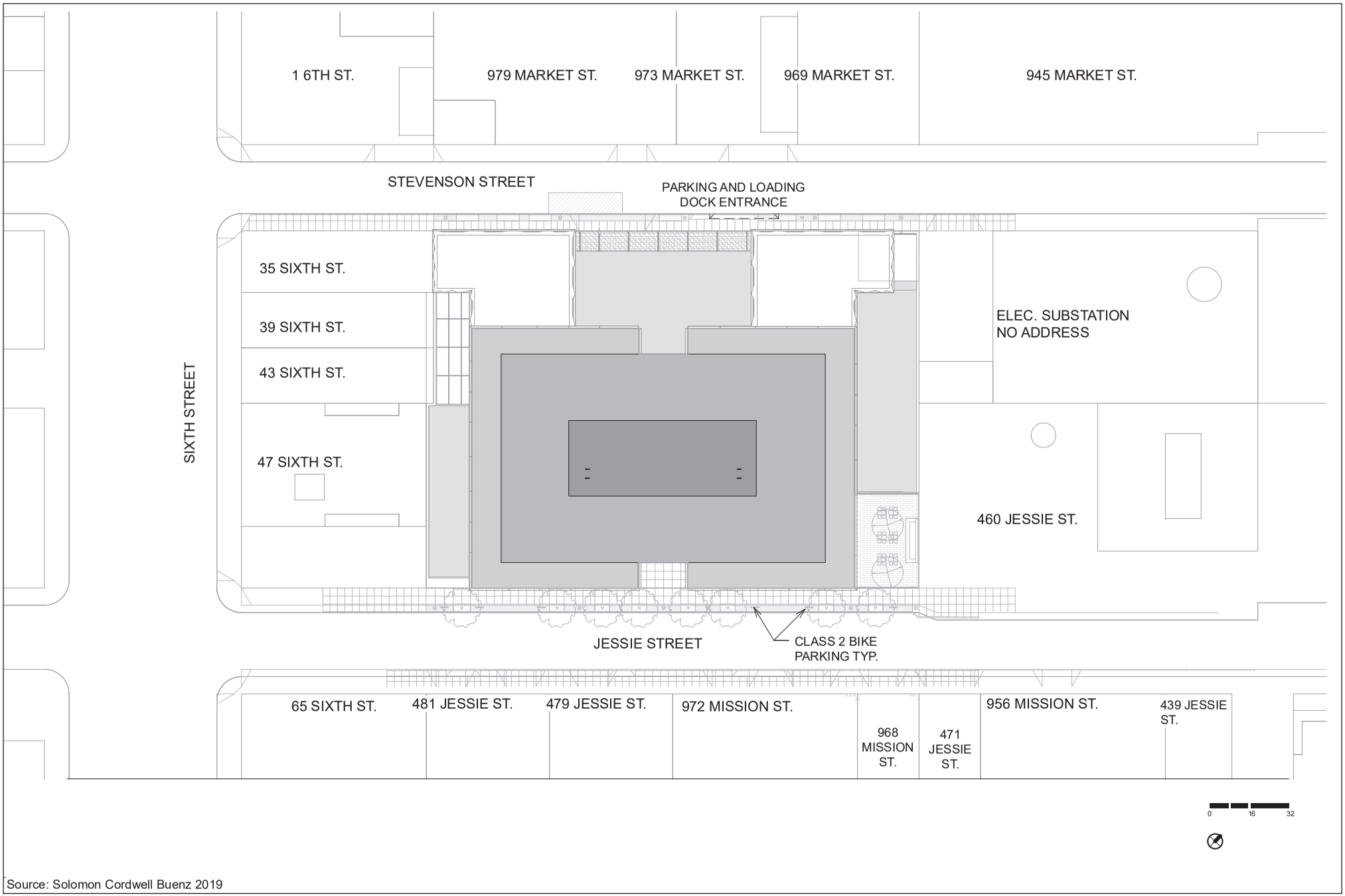

Source: Solomon Cordwell Buenz 2019

469 Stevenson Street Project
Case No. 2017-014833ENV

Figure 2: Proposed Project Site Plan

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TABLE 1: PROJECT SUMMARY

Project Component	Gross Square Feet[1]
Residential	460,500
Retail	4,000
Vehicle Parking	77,500
Subtotal	**542,000**
Common Residential Open Space[2]	14,000
Private Residential Open Space[3]	11,000
Subtotal	**25,000**
Project Total	**567,000**
Dwelling Unit Type	**Number of Units**
One-bedroom	358
Two-bedroom	54
Three-bedroom	42
Five-bedroom	8
Total Dwelling Units	**462**
Parking Spaces	**Number of Spaces**
Residential Parking Spaces	171
Retail Parking Spaces	0
Total Parking Spaces	171
Bicycle Parking	**Number of Spaces**
Bicycle (class 1)	192
Bicycle (class 2)	25

Notes:

[1] All numbers are rounded to the nearest thousand or hundred thousand.

[2] Common residential open space consists of the lounge solarium, approximately 3,500 square feet; fitness solarium, approximately 7,000 square feet; ground floor courtyard, approximately 1,000 square feet; and rooftop amenity area, approximately 2,500 square feet. Common usable open space as defined in section 135(a) of the planning code pertains to areas jointly used by residents of the project.

[3] Private balconies would be provided to 15 dwelling units, each on the 2nd, 6th, and 27th floors.

RESIDENTIAL COMPONENT

The proposed project would provide approximately 462 dwelling units within 460,500 square feet of residential space. Levels 2 through 5 would contain 20 units consisting of 14 one-bedroom units, 2 two-bedroom units, 2 three-bedroom units, and 2 five-bedroom units. Levels 6 through 26 would contain 18 units consisting of 14 one-bedroom units, 2 two-bedroom units, and 2 three-bedroom units. The 27th level

would include approximately 11,000 square feet of residential space which would consist of 4 two-bedroom units. The project floor plans are depicted in Figure 3 through Figure 8. The building elevations are depicted in Figure 9 and Figure 10.

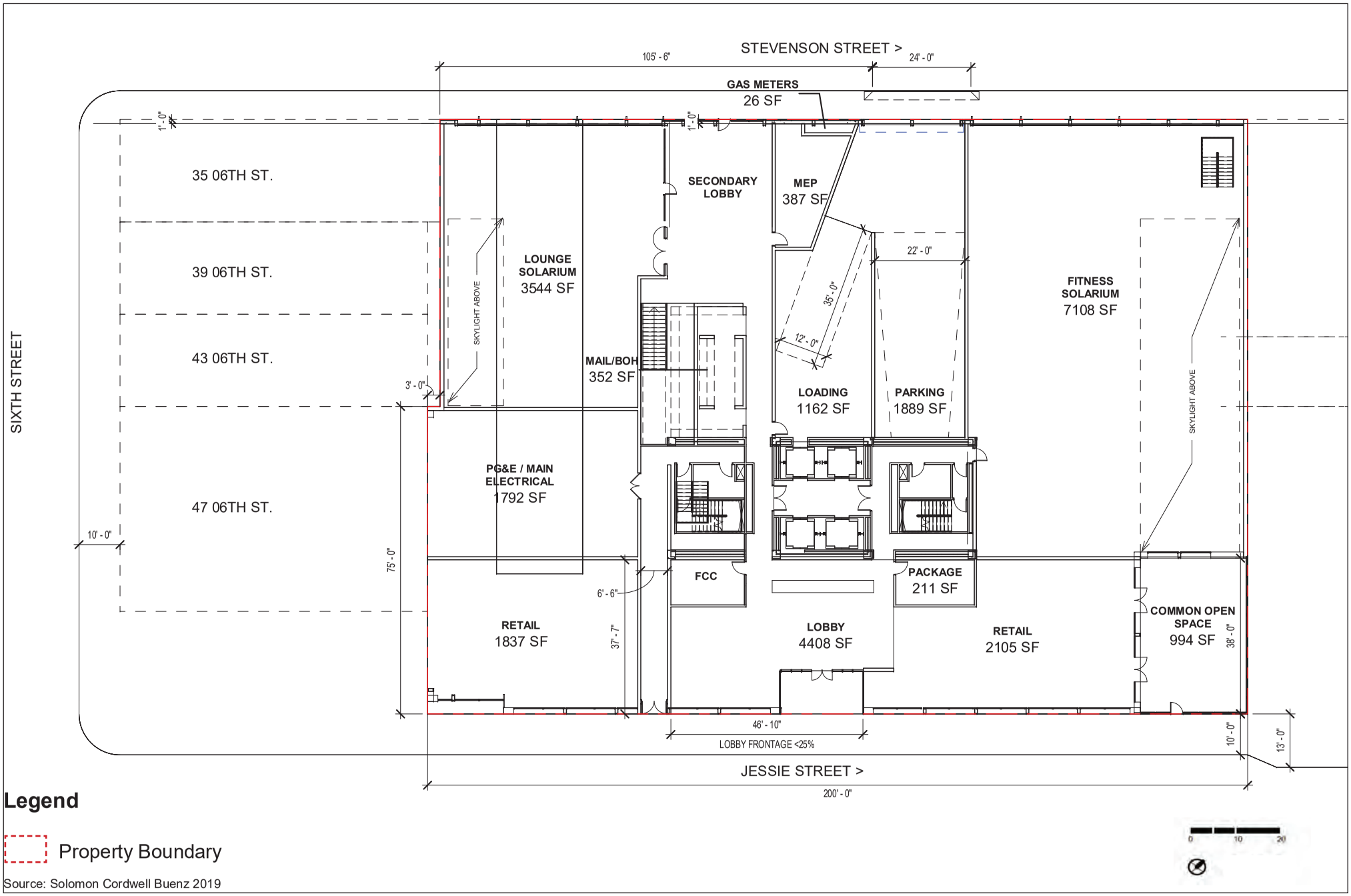
COMMERCIAL RETAIL COMPONENT

The proposed project would include two commercial retail spaces on the ground floor along Jessie Street. The commercial retail spaces would total approximately 4,000 square feet (Figure 3).

BUILDING FEATURES

The proposed project would incorporate building massing features, including massing articulation, to improve the building's performance with respect to wind safety and comfort to meet the wind hazard requirements of planning code section 148. The proposed project would also include a 12-foot tall glass wind screen along the full perimeter of the private open space areas on the second and sixth levels to further reduce wind speeds and enhance pedestrian safety and comfort.

The proposed heating, ventilation, and air conditioning (HVAC) equipment would be located on the roof and concealed behind a 10-foot tall roof screen (Figure 8). The HVAC system is required to be designed to include a MERV-13 filtration system in accordance with Health Code article 38. The proposed project would include one emergency back-up generator within the building's main electrical room on the ground floor (Figure 3).



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Property Boundary

Source: Solomon Cordwell Buenz 2019

469 Stevenson Street Project

Case No. 2017-014833ENV

Figure 3: Ground Floor Plan

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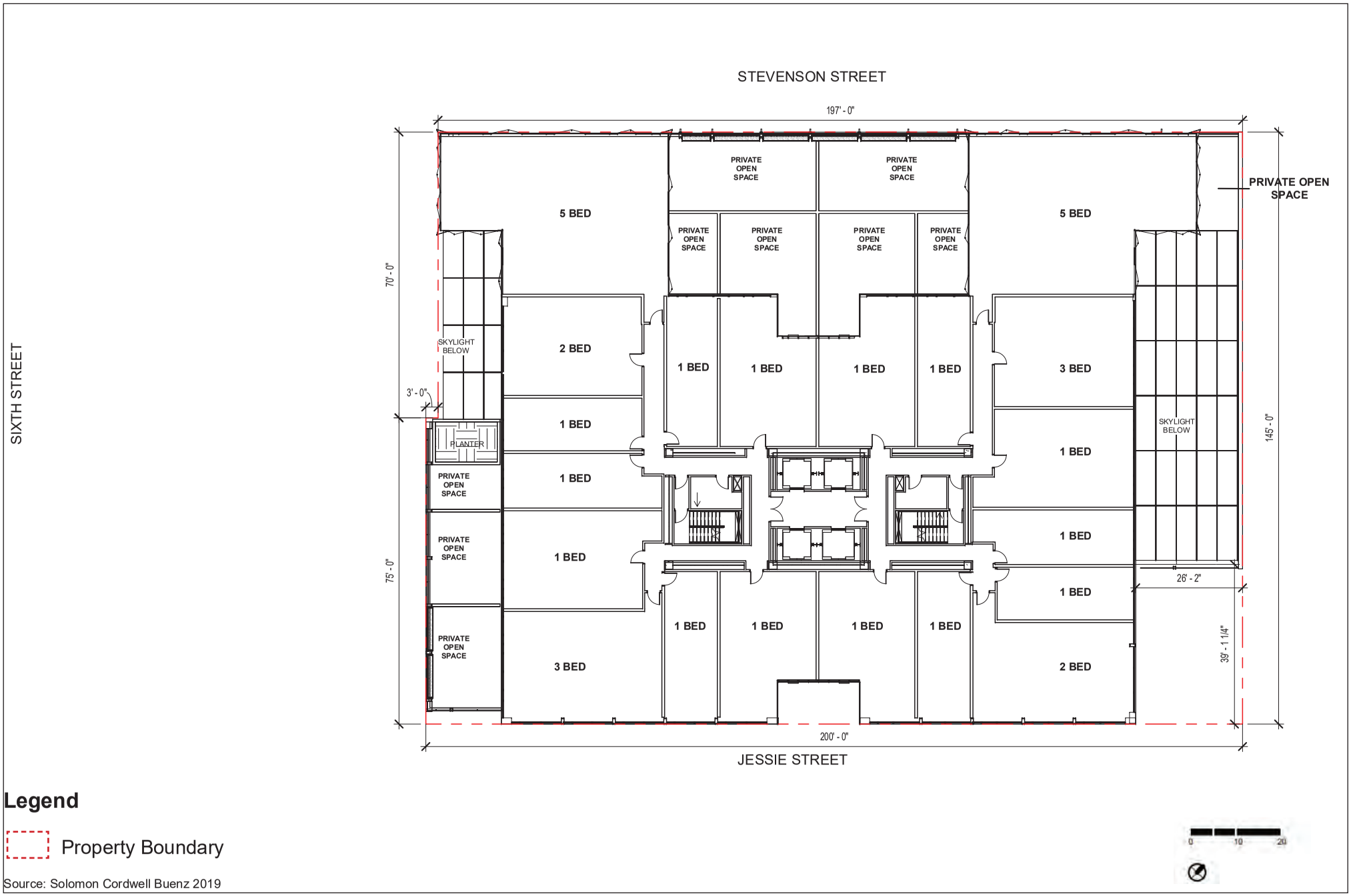

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Property Boundary

Source: Solomon Cordwell Buenz 2019

469 Stevenson Street Project

Case No. 2017-014833ENV

Figure 4: Level 2 Plan

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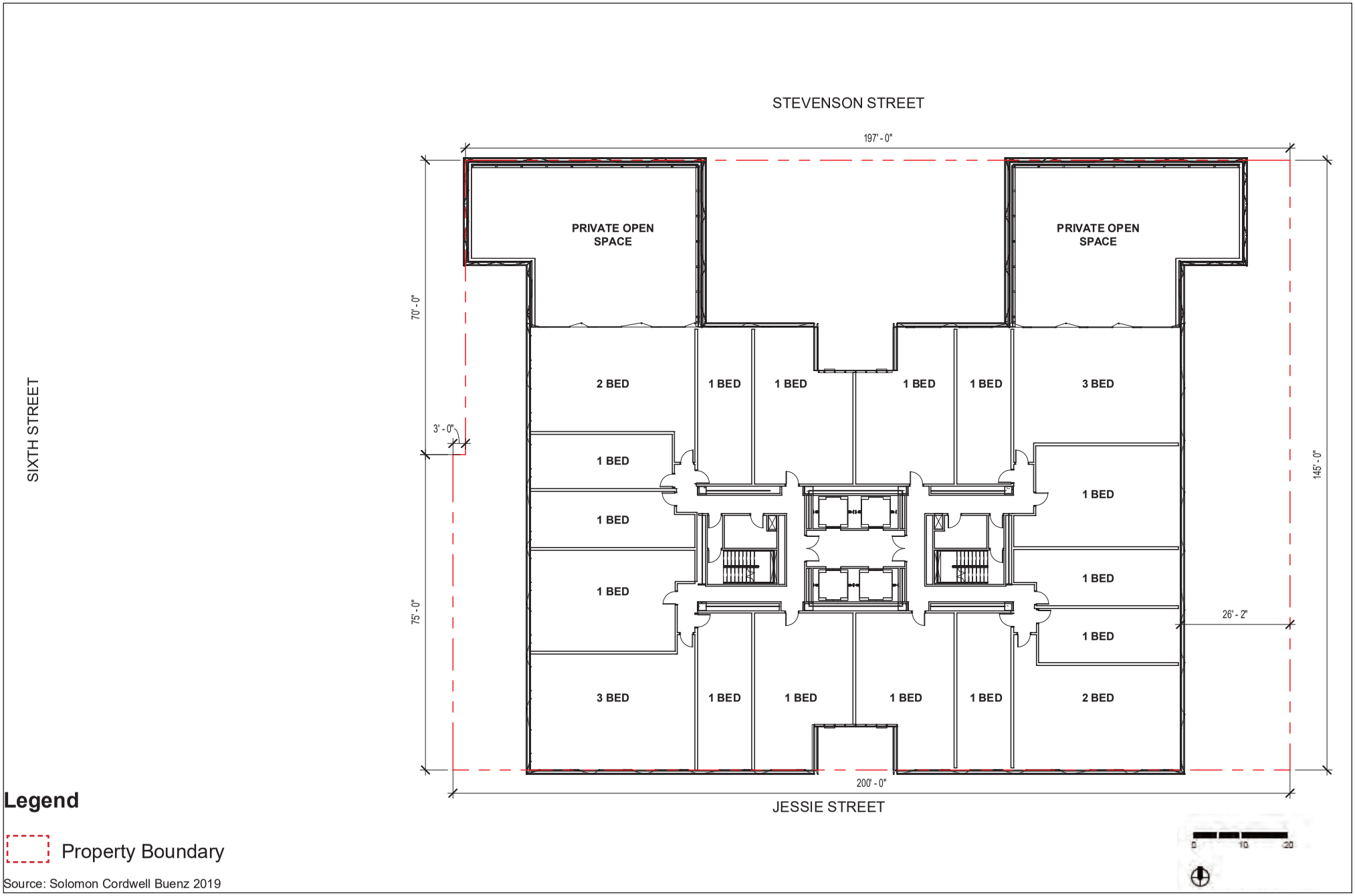

469 Stevenson Street Project
Case No. 2017-014833ENV

Figure 5: Level 6 Plan

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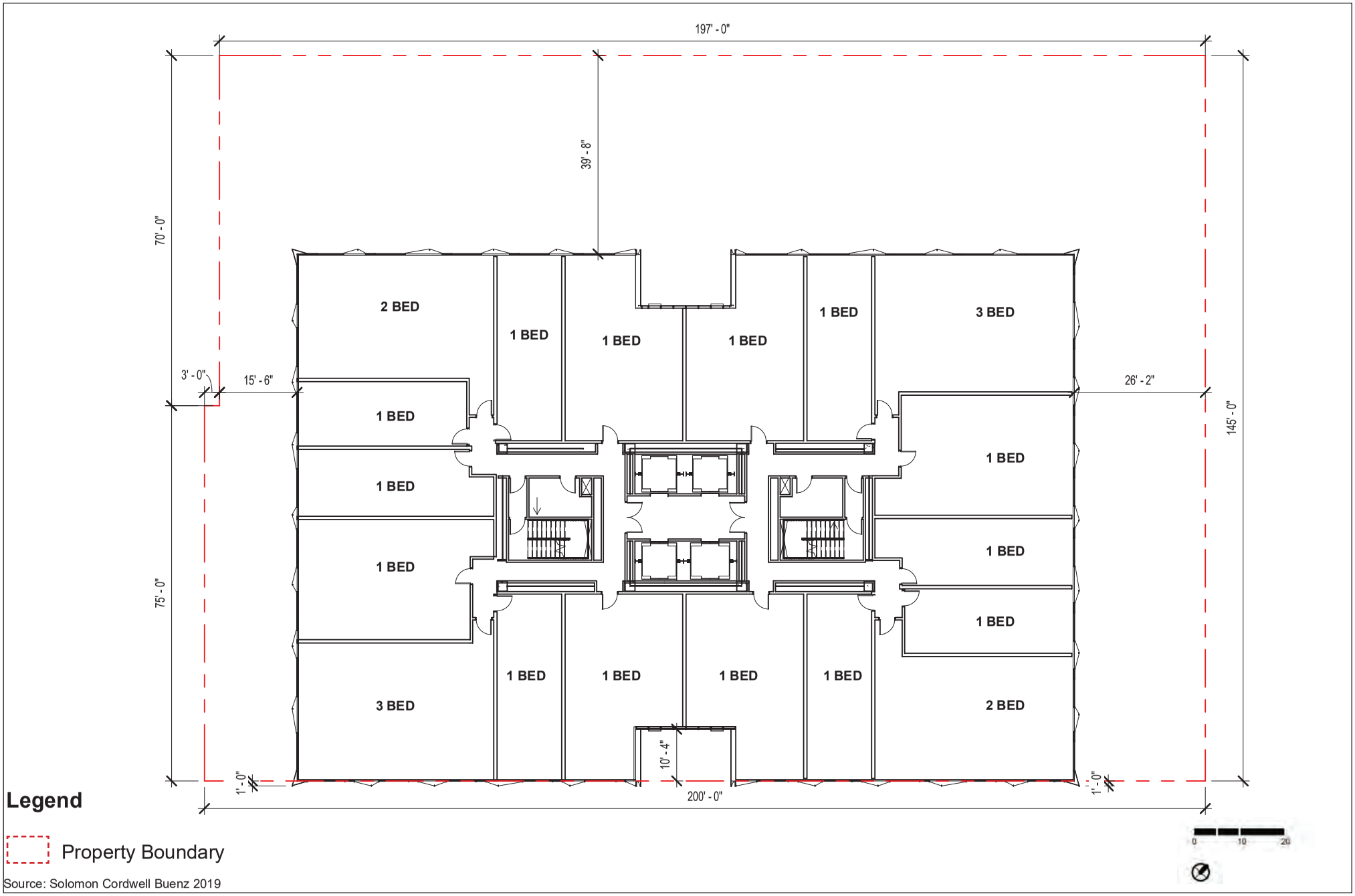

469 Stevenson Street Project
Case No. 2017-014833ENV

Figure 6: Levels 7 through 26 Plan

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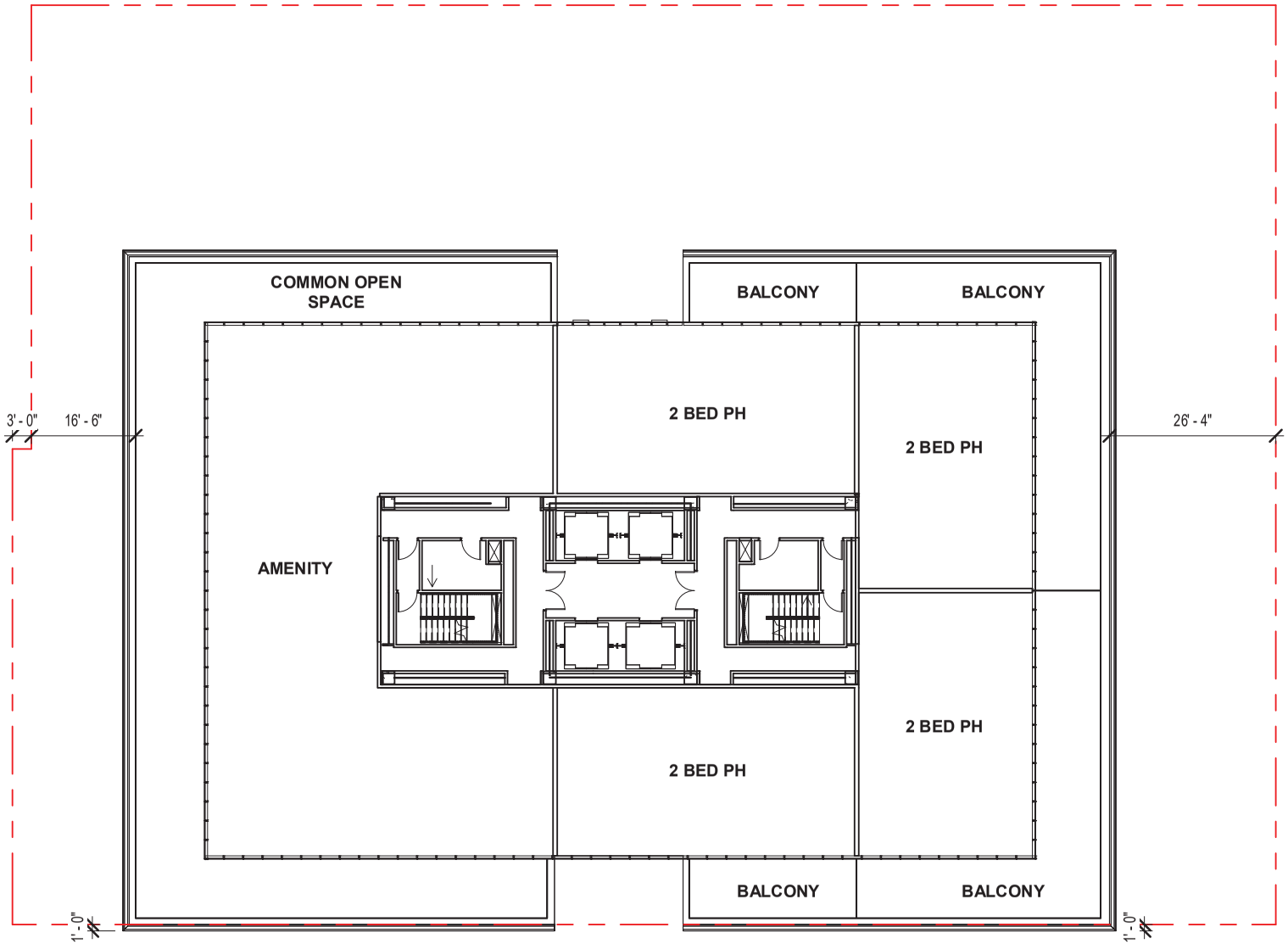

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Property Boundary

Source: Solomon Cordwell Buenz 2019

469 Stevenson Street Project
Case No. 2017-014833ENV

Figure 7: Level 27 Plan

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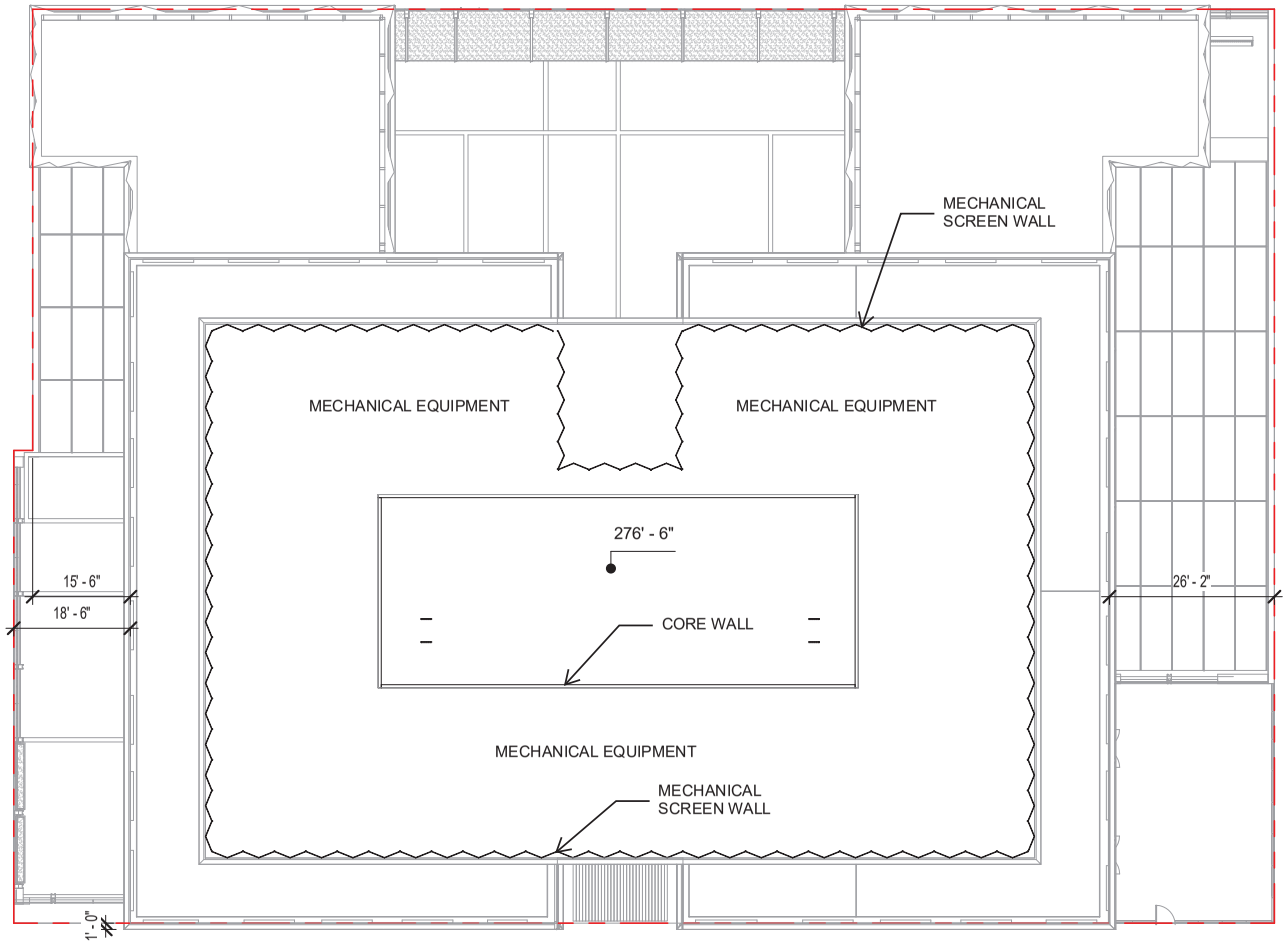

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Property Boundary

Source: Solomon Cordwell Buenz 2019

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469 Stevenson Street Project

Case No. 2017-014833ENV

Figure 8: Roof Plan

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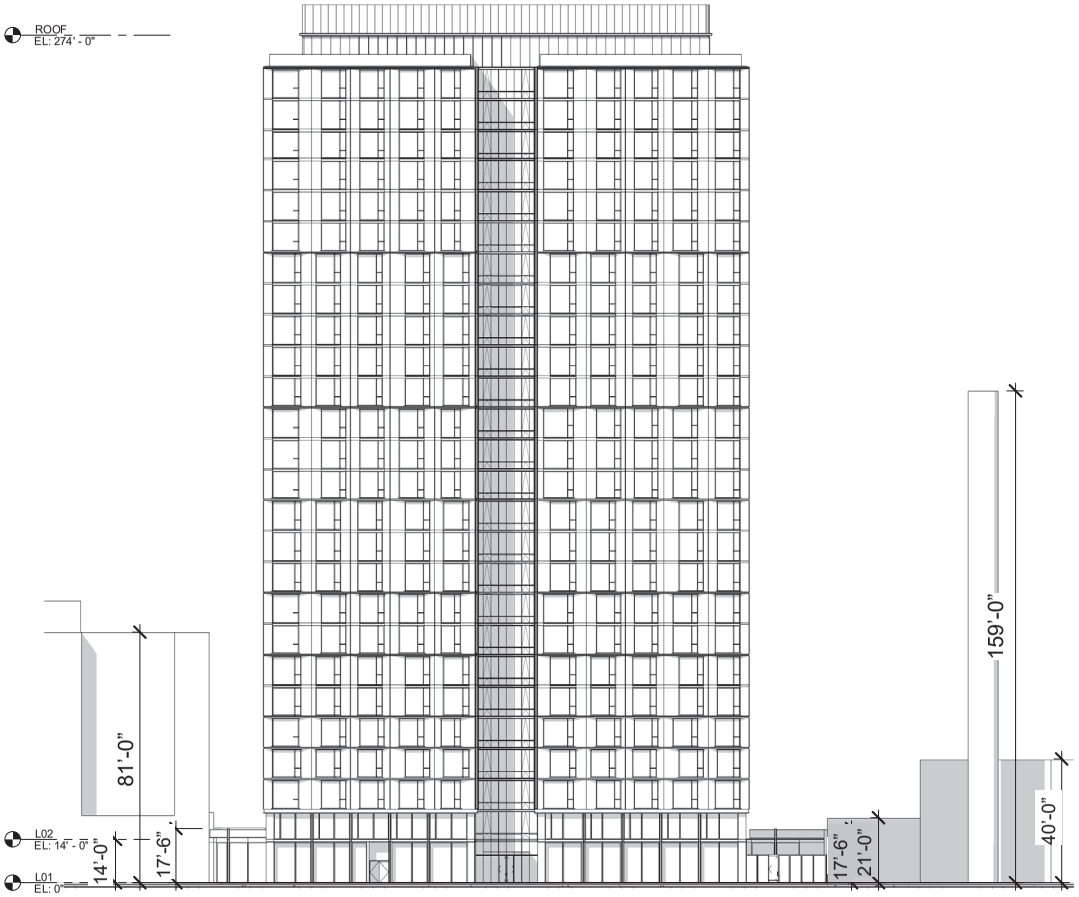
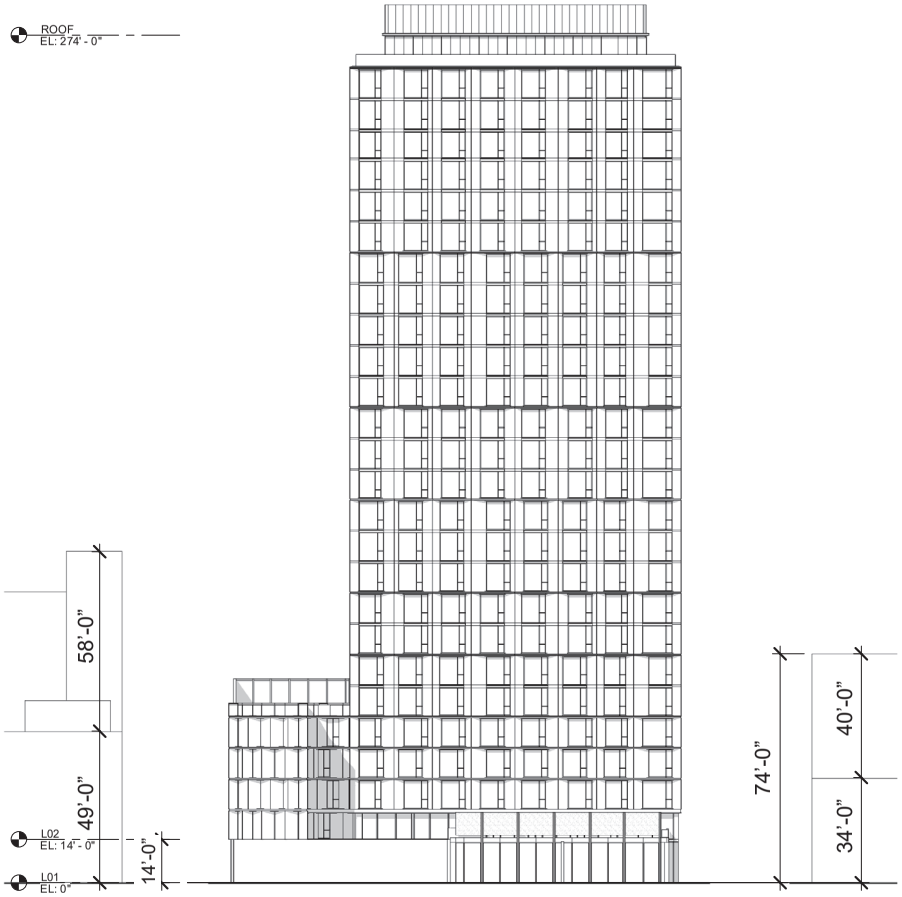


SOUTH ELEVATION - JESSE STREET



WEST ELEVATION

0 20 40

Source: Solomon Cordwell Buenz 2019

469 Stevenson Street Project
Case No. 2017-014833ENV

Figure 9: South and West Elevations

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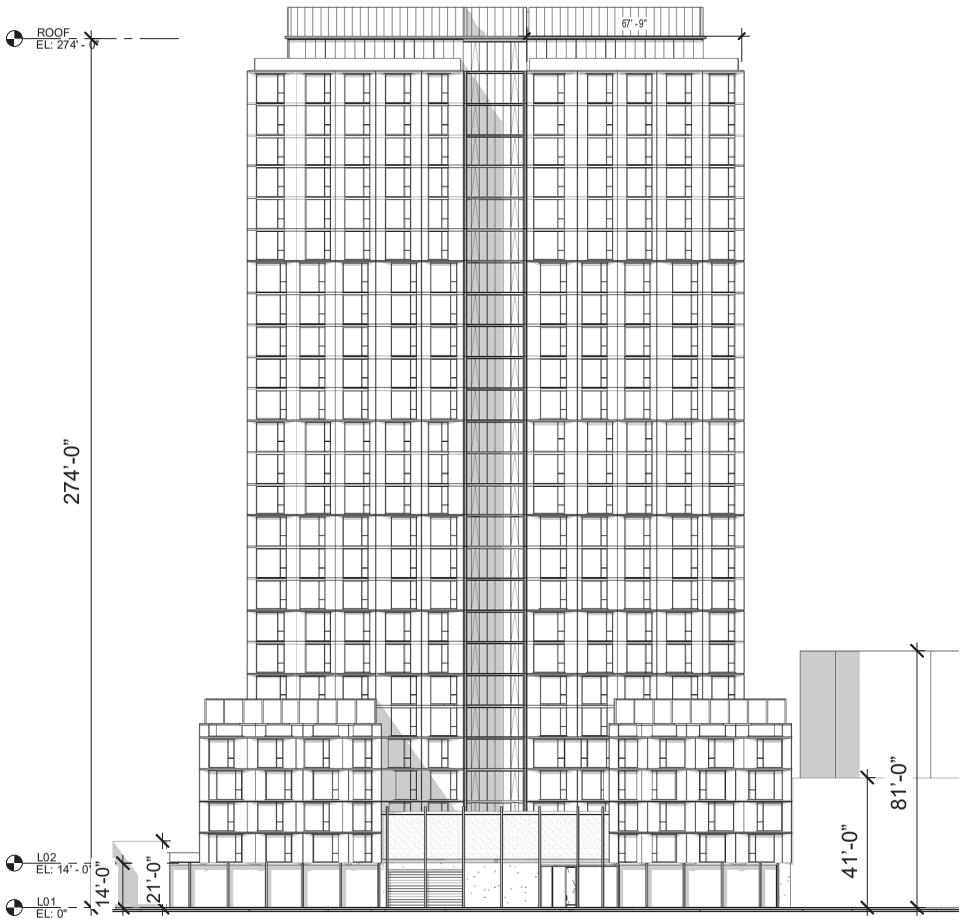
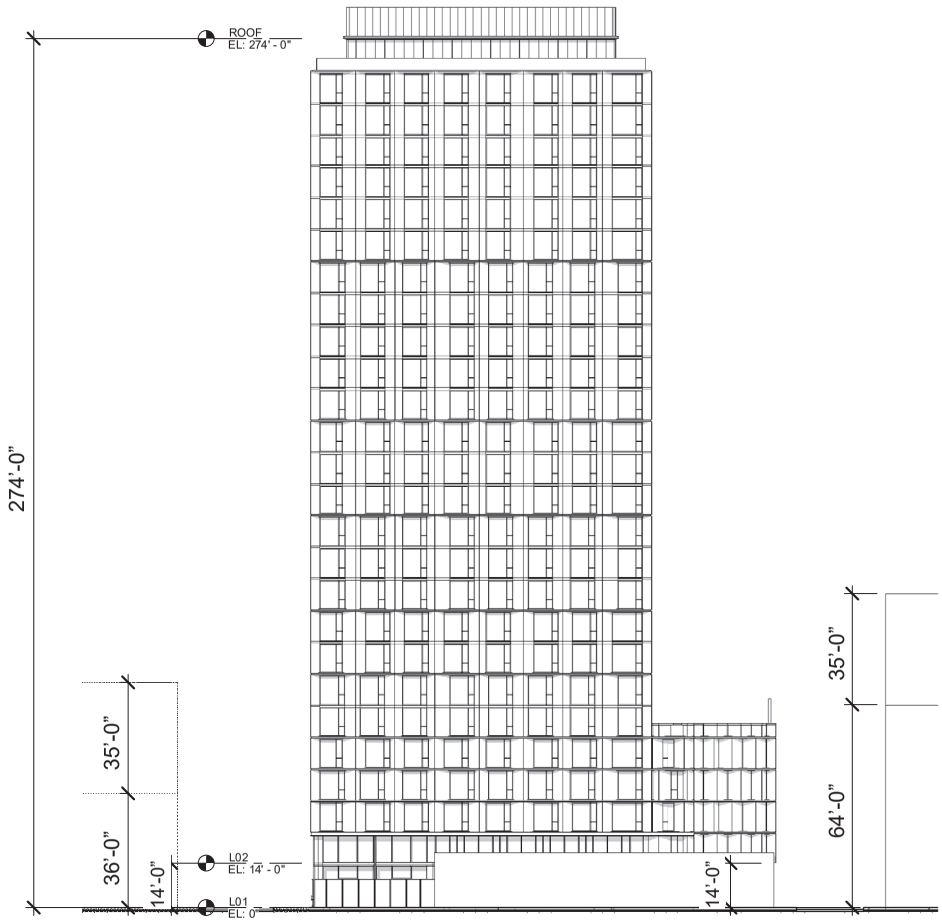


NORTH ELEVATION - STEVENSON STREET



EAST ELEVATION

0 20 40

Source: Solomon Cordwell Buenz 2019

469 Stevenson Street Project
Case No. 2017-014833ENV

Figure 10: North and East Elevations

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OPEN SPACE, LANDSCAPING, AND STORMWATER RETENTION

Open Space

The proposed project would provide approximately 14,000 square feet of common open space. Common open space areas would consist of a fitness solarium, approximately 7,000 square feet; a lounge solarium, approximately 3,500 square feet; a courtyard area on the ground floor, approximately 1,000 square feet; and rooftop amenity area, approximately 2,500 square feet. In addition, the proposed project would include approximately 11,000 square feet of private open space. Private open space would consist of balconies for 15 dwelling units. The private balconies would be provided to units on the 2nd, 6th, and 27th floors.

Landscaping

Landscaping at the project site would include approximately eight street tree planting areas along Jessie Street. Due to the narrow sidewalks along Stevenson Street, street trees cannot be planted. Therefore, the proposed project would provide seven vegetated landscape strips along Stevenson Street. Trees would also be planted in the building's outdoor courtyard. Raised planters would be provided in the private balcony areas on the 2nd, 6th, and 27th floors. An 18-foot-tall "green screen" made from plants grown on a vertical trellis would be placed around the private balconies on the second floor. The landscape plans for the proposed project are provided on Figure 11 through Figure 14.

Stormwater Retention

Landscaped areas along Jessie Street and Stevenson Street would retain and treat runoff before entering the city's stormwater system. The proposed project would also incorporate the following low impact design measures to reduce the amount of stormwater entering into the city's combined sewer system: vegetated sidewalk planting areas, roof drains to direct runoff from flow-through-planters, permeable pavement, and a rainwater cistern.

Streetscape and Sidewalk Improvements

The proposed project would provide sidewalk improvements along Stevenson Street and Jessie Street in accordance with the city's Better Streets Plan. These sidewalk improvements would include enhanced sidewalk paving, tree planting areas along Jessie Street, landscaped strips along Stevenson Street, bicycle racks, and relocation of one existing streetlight along Jessie Street to Stevenson Street near the driveway entrance. The proposed project would not alter the existing sidewalk widths on Stevenson Street or Jessie Street. The proposed project would also not result in any new bus stops or changes to existing bus stops in the vicinity of the project site.

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LEGEND

1. Entry Door to Lobby
2. 10'-0" wide Sidewalk
3. 7'-0" wide Sidewalk
4. Enhanced Paving
5. Street Tree
6. 3'-0" x 7'-0" Street Tree Planting Area
7. 2'-6" x 9'-0" Landscape Strip
8. Class 2 Bike Rack
9. 24' Wide Driveway w/ Wings
10. Existing Street Light
11. Fire Hydrant
12. Outdoor Courtyard for Retail
13. Red Curb
14. Passenger Loading Zone
15. Street Parking
16. Commercial Loading Zone
17. Existing Driveway
18. Existing Curb
19. Pedestrian Lighting Poles

0 10 20

Source: Solomon Cordwell Buenz 2019

469 Stevenson Street Project
Case No. 2017-014833ENV

Figure 11: Ground Floor Landscape Plan

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LEGEND

1. Private Patio w/ Pedestal Pavers
2. 18'-0" high Green Screen
3. Skylight
4. Raised Planter
5. Movable Furniture
6. Planter pots

0 10 20

Source: Solomon Cordwell Buenz 2019

469 Stevenson Street Project
Case No. 2017-014833ENV

Figure 12: Level 2 Landscape Plan

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LEGEND

1. Private Patio w/ Pedestal Pavers
2. 12'-0" high Glass Wind Screen
3. Raised Tree Planter
4. Raised Planter
5. Movable Furniture
6. Festival Lights

0 10 20

Source: Solomon Cordwell Buenz 2019

469 Stevenson Street Project
Case No. 2017-014833ENV

Figure 13: Level 6 Landscape Plan

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LEGEND

1. Common Open Space w/ Pedestal Pavers
2. Private Balcony w/ Pedestal Pavers
3. Planter Pots
4. Access for window washing at perimeter
5. Movable Furniture
6. Private Screens with Gates

Source: Solomon Cordwell Buenz 2019

469 Stevenson Street Project
Case No. 2017-014833ENV

Figure 14: Level 27 Landscape Plan

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PARKING, LOADING, AND BICYCLE FACILITIES

Site Access and Circulation

The proposed project would remove the existing 24-foot-wide curb cut on Stevenson Street and 12-foot-wide curb cut on Jessie Street and replace them with a new, single 24-foot wide driveway on Stevenson Street. This driveway would provide vehicle access to the parking garage and the onsite commercial loading area for residents and retail visitors.

Stevenson Street and Jessie Street are each currently eastbound one-way roads and the proposed project would not result in a change of this designation. Vehicles would have to turn on Stevenson Street from Sixth Street and turn right to enter the garage. Vehicles exiting the garage would have to turn right onto Stevenson Street to reach Fifth Street. Each parking garage level would contain a central set of elevators and stairs to access the building's ground floor. The ground floor would contain a separate set of elevators and stairs to access the upper residential floors. Additionally, residents would be able to enter the building at the street level from the main lobby doorway on Jessie Street, or from the second lobby doorway on Stevenson Street.

Vehicle Parking

The proposed project would include approximately 77,500 square feet of off-street parking with a total of 171 parking spaces at a proposed parking ratio of 0.5 space per unit. Per sections 155(i) and 166 of the planning code, the proposed project would provide at least 9 accessible parking spaces and 3 car-share spaces. In addition, at least 8 percent of the total proposed parking spaces would be designated for low-emitting, fuel efficient, and carpool/van pool vehicles. The parking garage would be restricted to use by residents and retail employees.

The off-street loading area for freight deliveries would be within the parking garage and accessed by the driveway on Stevenson Street. Two service vehicle parking spaces would also be provided on the first parking level. The site plans for the three-level parking garage are depicted in Figure 15 through Figure 17.

Bicycle Parking

The proposed project would provide 192 class 1 and 25 class 2 bicycle parking spaces. Class 1 parking would be provided in a designated 2,000 square foot room on the first parking garage level and would be equipped with space efficient bicycle racks (Figure 15). Class 2 bicycle parking spaces would consist of bicycle racks installed along the sidewalks on Jessie Street and Stevenson Street.

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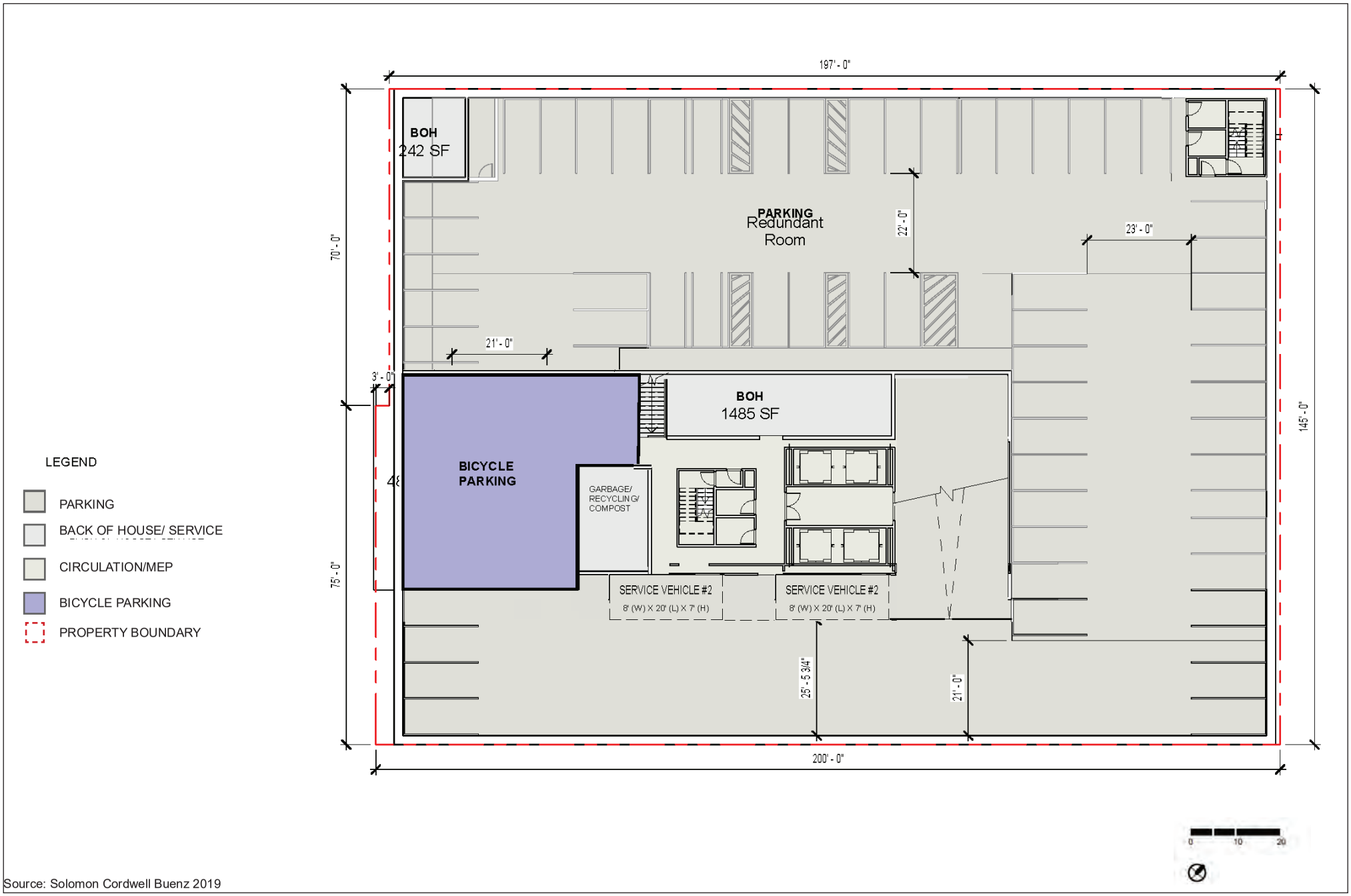

Source: Solomon Cordwell Buenz 2019

469 Stevenson Street Project
Case No. 2017-014833ENV

Figure 15: Parking Garage Plan - Level 1

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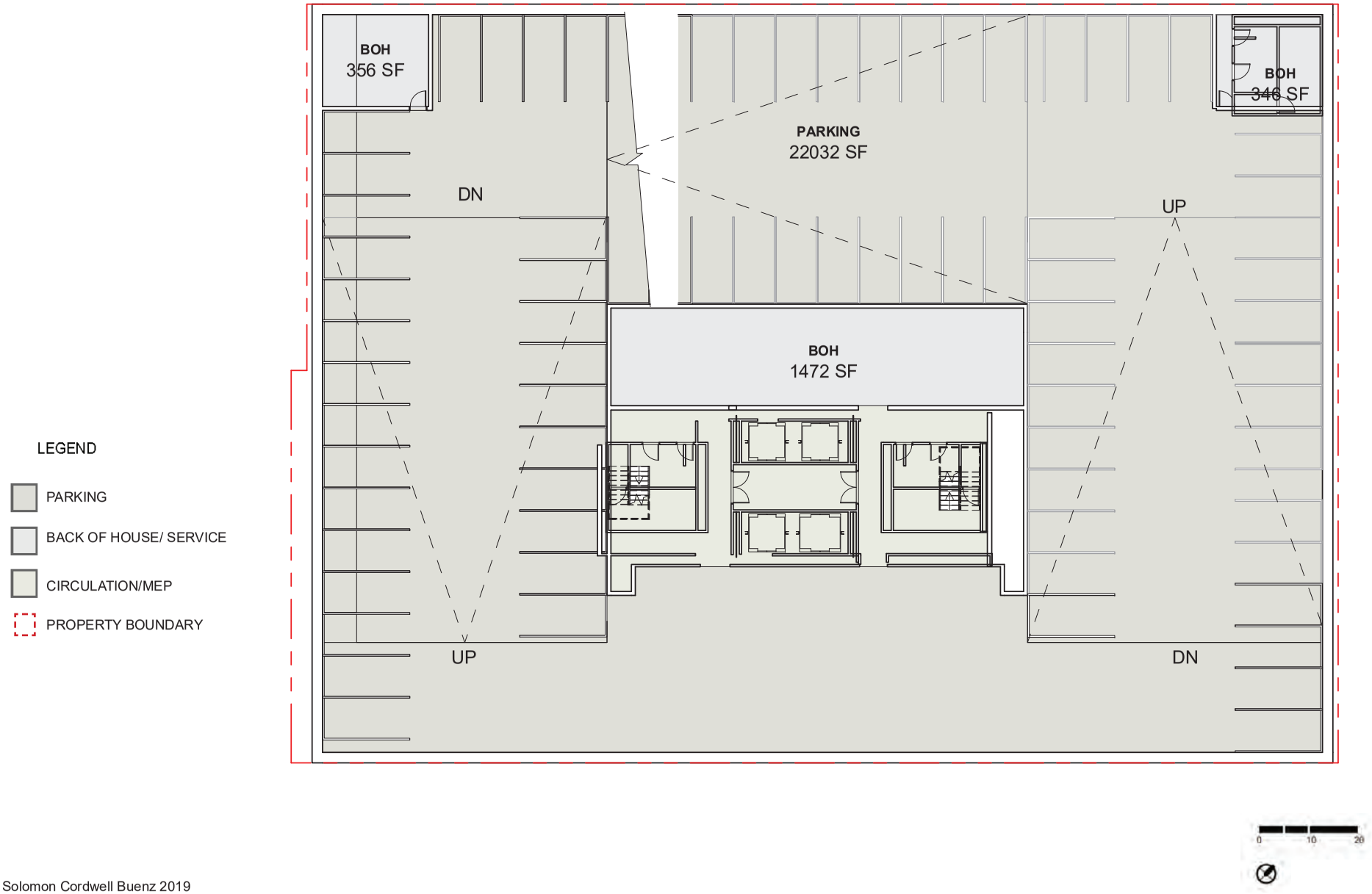

Source: Solomon Cordwell Buenz 2019

469 Stevenson Street Project
Case No. 2017-014833ENV

Figure 16: Parking Garage Plan - Level 2

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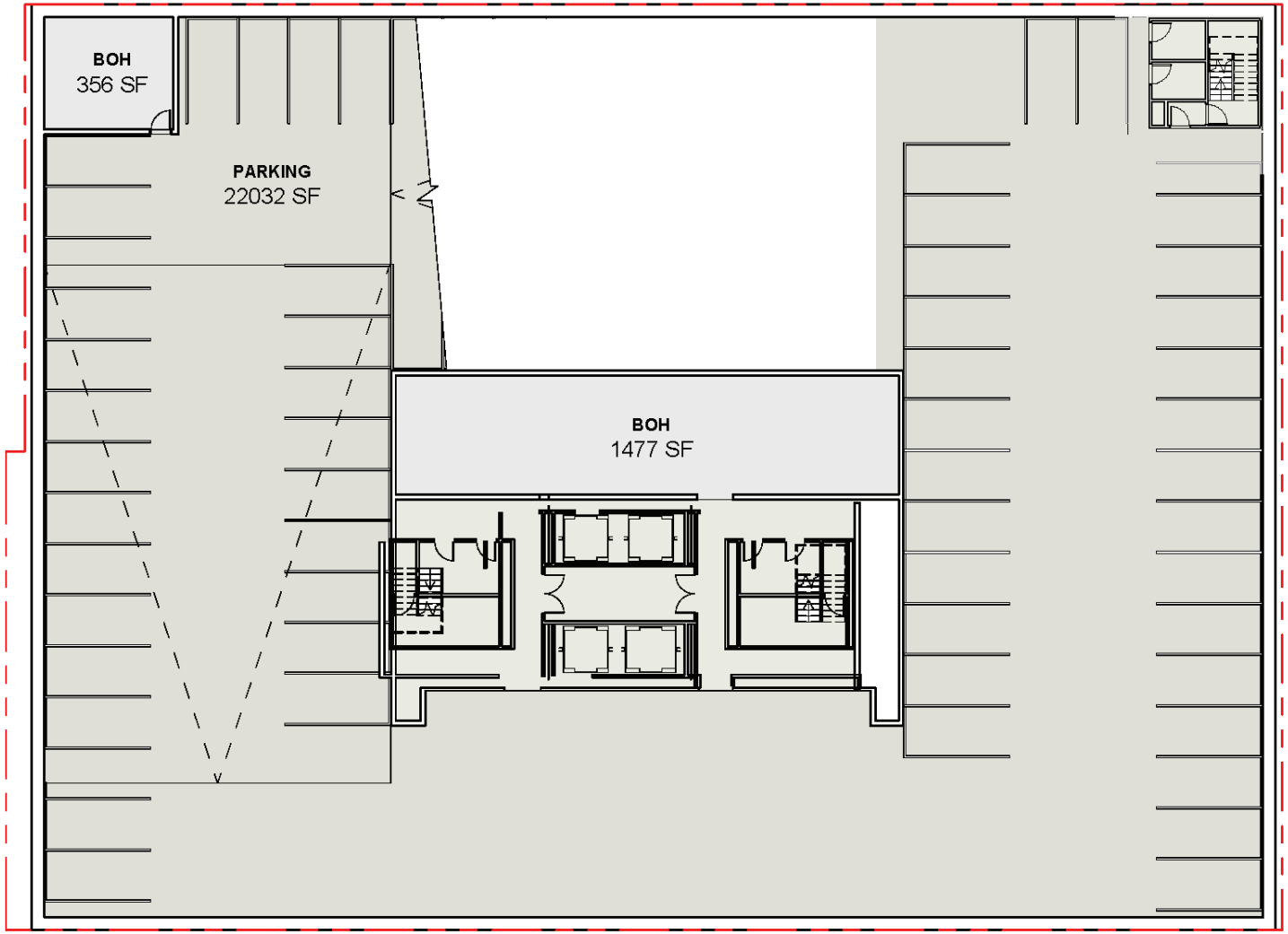

LEGEND

- PARKING
- BACK OF HOUSE/ SERVICE
- CIRCULATION/MEP
- PROPERTY BOUNDARY

0 10 20

Source: Solomon Cordwell Buenz 2019

469 Stevenson Street Project
Case No. 2017-014833ENV

Figure 17: Parking Garage Plan - Level 3

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TRANSPORTATION DEMAND MANAGEMENT PLAN

The project sponsor proposes the following transportation demand management (TDM) measures for the proposed project. Additional TDM measures that are proposed are included in the project's TDM application.[7] The TDM measures are subject to review and approval as part of San Francisco Planning Department (planning department) approvals:

1. ACTIVE-1: Improve Walking Conditions (Option D): The project would provide streetscape improvement elements consistent with the Better Streets Plan.

2. ACTIVE-2: Bicycle Parking (Option B): The project would provide 100 class 1 bicycle spaces plus two class 1 bicycle spaces for every two dwelling units over 100, and two class 2 bicycle spaces for every 20 dwelling units.

3. ACTIVE-4: Bike Share Membership (Location B). The project would offer one complimentary bike share membership to each dwelling unit and/or employee, at least once annually, for the life of the project.

4. ACTIVE-5A: Bicycle Repair Station: The project would provide an indoor bicycle repair station in the below grade parking level that is equipped with tools and supplies necessary to perform basic bicycle maintenance.

5. ACTIVE-5B: Bicycle Maintenance Services. The property owner shall offer bicycle maintenance services to each dwelling unit and/or employee, at least once annually, for 40 years.

6. ACTIVE-6: Fleet of Bicycles: The project would provide five shared bicycles for building residents, visitors, or employees to use.

7. CSHARE-1: Carshare (Option E): The project would provide one car-share membership for each dwelling unit and reserve three parking spaces for car-share services.

8. DELIVERY-1: Delivery Supportive Amenities: The project would facilitate delivery support amenities by providing an area for receipt of deliveries that offers one of the following: (1) clothes lockers for delivery services; (2) temporary storage for package deliveries, laundry deliveries, and other deliveries; or, (3) providing temporary refrigeration for grocery deliveries.

9. FAMILY-1: Family TDM – Amenities (Option A + B): The project would provide family amenities that include onsite storage for family gear, utility carts, and cargo bicycles.

10. FAMILY-3: Family TDM Package. The project would include CSHARE-1 Option E and FAMILY-1, Options A and B.

---

[7] San Francisco Planning Department, *Transportation Demand Management Program Application*, submitted August 29, 2018.

11. HOV-1: Contributions or Incentives for Sustainable Transportation (Option A). The project shall offer contributions or incentives to each dwelling unit and employee, at least once annually, for the Life of the Project. The project will provide at least 25 percent (Muni M pass = $81/month. As such, $81 x 25% = $20.25/month/DU) contribution or incentive.

12. INFO-1: Multimodal Wayfinding Signage. The project would provide multimodal wayfinding signage that can withstand weather elements in key locations. That is, the signs shall be located externally and/or internally so that the residents, tenants, employees, and visitors are directed to transportation services and infrastructure, including: transit, bike share, car-share, bicycle parking and amenities, showers and lockers, taxi stands, and carpool/shuttle/vanpool pick-up/drop-off locations.

13. INFO-2: Real Time Transportation Information Displays. The project would provide real time transportation information on displays in prominent locations on the project site to highlight sustainable transportation options and support informed trip-making.

14. INFO-3: Tailored Transportation Marketing Services (Option C). The project would provide individualized, tailored marketing and communication campaigns, including incentives to encourage the use of sustainable transportation modes.

15. LU-2: On-site Affordable Housing (Option B). The project would use the Individually Requested State Density Bonus Program and provide onsite affordable housing. At least 19 percent of the dwelling units will be affordable.

16. PKG-1: Unbundle Parking (Location E). The project would lease or sell all parking spaces separately from the rental for the life of the project, so that tenants have the option of renting or buying a parking space at an additional cost, and would, thus, experience a cost savings if they opt not to rent or purchase parking.

17. PKG-4: Parking Supply (Option A). The project would provide off-street private vehicular parking (Accessory Parking) in an amount no greater than the off-street parking rate for the neighborhood (neighborhood parking rate), based on the transportation analysis zone for the project site.

A.3. CONSTRUCTION ACTIVITIES AND SCHEDULE

The proposed project is anticipated to be constructed on a mat foundation and no pile driving or piers are proposed or required. To accommodate the below-grade parking and foundation, the proposed project would entail excavation to a maximum depth of 55 feet. The entire 0.66-acre project site would be permanently disturbed and approximately 55,850 cubic yards of soil would be excavated and hauled offsite for disposal and recycling.

Construction of the proposed project is anticipated to begin in 2020 and be completed by 2023, requiring approximately 36 months of construction. Construction activities would include site

preparation/demolition, excavation and shoring, building construction, architectural coating, and sitework/paving. Construction would generally occur between the hours of 7:00 a.m. and 8:00 p.m. up to seven days a week. However, during the total 36-month construction phase, nighttime construction work may be required on up to five (5) nights and include the following activities:

1. Erection and dismantling of the tower crane;
2. Miscellaneous utility work;
3. Fire alarm testing; and
4. Concrete pour for the mat slab foundation.

This required nighttime work would occur at different times throughout the 36-month construction period and not for five (5) sequential nights. Depending on the construction phase, the number of onsite construction workers would range from approximately 15 to 75 workers per day.

Construction equipment and materials would be staged primarily onsite, although it is expected portions of the sidewalks along Stevenson Street and Jessie Street would be used for staging of materials, requiring temporary partial sidewalk closures. Additionally, both Stevenson Street and Jessie Street would require occasional closures to allow for project construction activities, such as installation of the tower crane, mat foundation construction, or material deliveries. During this time, both streets would not be entirely closed or closed at the same time. It is not expected that construction activities would block Jessie Street for more than one week at a time. Jessie Street could be used for temporary staging of the tower crane; however, that has not been determined. It is anticipated that construction activities would only block 100 feet of Jessie Street for the width of the sidewalk and one travel lane primarily for the tower crane erection and dismantling.

A.4. PROJECT APPROVALS

The following is a preliminary list of the anticipated approvals required for the proposed project; the list is subject to change. These approvals may be reviewed in conjunction with the required environmental review but may not be granted until after the required environmental review is completed.

PLANNING COMMISSION

- Approval of an Individually Requested State Density Bonus project with up to two incentives/concessions and unlimited waivers from the following requirements: height, bulk, floor area ratio, and dwelling unit exposure.
- Adoption of findings under the California Environmental Quality Act (CEQA)
- Approval of a Downtown Project Authorization (planning code section 309)
- Approval of Conditional Use Authorization (planning code section 124[f])
- Approval of a TDM Plan (planning code section 169)

ACTIONS BY OTHER CITY DEPARTMENTS

Department of Building Inspection

- Review and approval of demolition, grading, and building permits

San Francisco Public Works

- If sidewalk(s) are used for construction staging and pedestrian walkways are constructed in the curb lane(s), approval of a street space permit from the Bureau of Street Use and Mapping
- Approval of an encroachment permit or a street improvement permit for streetscape improvements
- Approval of the placement of bicycle racks in the public right-of-way
- Approval of a new curb cut and removal of existing curb cuts

San Francisco Municipal Transportation Agency

- Approval of modifications to color curb designations for on-street parking and loading spaces
- Approval of a special traffic permit from the Sustainable Streets Division if sidewalk(s) are used for construction staging and pedestrian walkways are constructed in the curb lane(s)

San Francisco Public Utilities Commission (SFPUC)

- Review and approval of stormwater design features, including a stormwater control plan, in accordance with city's 2016 Stormwater Management Requirements and Design Guidelines
- Review and approval of the project's landscape and irrigation plans per the Water Efficient Irrigation Ordinance and the SFPUC Rules and Regulations Regarding Water Service to Customers
- Review and approval of groundwater dewatering wells (if they are to be used during construction), per San Francisco Health Code article 12B (Soil Boring and Well Regulation Ordinance) (joint approval with the San Francisco Department of Public Health)

San Francisco Department of Public Health

- Review and approval of a site mitigation plan, in accordance with San Francisco Health Code article 22A (Maher Ordinance)
- Review and approval of a construction dust control plan, in accordance with San Francisco Health Code article 22B (Construction Dust Control Ordinance)
- Review and approval of groundwater dewatering wells (if they are to be used during construction) (joint approval with the SFPUC)

- Approval of an enhanced ventilation proposal in compliance with San Francisco Health Code article 38

- Approval to operate an alternative water source system under San Francisco Health Code article 12C

ACTIONS BY OTHER GOVERNMENT AGENCIES

- Approval of any necessary air quality permits for installation, operation, and testing (e.g., Authority to Construct/Permit to Operate) of individual air pollution sources, such as the proposed backup emergency generator and any necessary boilers (Bay Area Air Quality Management District)

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B. PROJECT SETTING

B.1 EXISTING SETTING

As described above, the project site is a through lot located at 469 Stevenson Street in the SoMa neighborhood of San Francisco (Assessor's Block 3704, Lot 45). The project site is rectangular in shape and currently developed as a 28,790 square foot surface parking lot with 176 parking spaces.

Land uses in the surrounding area consist of a mix of uses including retail, commercial office, industrial, hotel, and residential uses. The east boundary of the project site is adjacent to Clearway Energy's thermal power station, Station T, which produces space heating, domestic hot water, air conditioning, and industrial process uses. The thermal power station is fully operational and includes six boilers and two gas stacks approximately 160 feet tall. Four buildings are adjacent to the west boundary of the project site consisting of two three-story hotels, a three-story mixed-use building with commercial and hotel uses, and a seven-story mixed-use building with commercial and residential uses. Three buildings are located directly across from the project site on Stevenson Street. These buildings front Market Street and include two seven-story mixed-use buildings with commercial and office uses, and a two-story commercial building. Four buildings are located directly across from the project site on Jessie Street consisting of automotive and office uses ranging from one to five-stories.

The average height of buildings in the immediate area ranges from one to seven stories, approximately 40 to 100 feet in height. The height of buildings generally increases east of the project site along Market Street with the maximum building height allowed up to 400 feet.

The project site is within walking distance to the Downtown, SoMa, and mid-market employment centers. Class 2[8] and class 3[9] bicycle facilities currently run along Market Street in both directions. The nearest Bay Area Bike Share Station is less than one block north of the project site at the northwest corner of Market and Fifth streets.

The nearest parks or public open spaces include Mint Plaza, approximately 0.1-mile to the northeast; Father Alfred E. Boeddeker Park, approximately 0.3-mile to the northwest; Gene Friend Recreation Center Park, approximately 0.3-mile to the southeast; Turk-Hyde Mini Park, approximately 0.4-mile to the north; Tenderloin Recreation Center, approximately 0.4-mile to the north; UN Plaza, approximately 0.4-mile to the southwest; Victoria Manalo Draves Park, approximately 0.5-mile to the south; Joseph L. Alioto Performing Arts Piazza, approximately 0.5-mile to the northwest; Union Square, approximately

8 Class 2 bicycle facilities are standard bike lanes within a portion of road reserved for the preferential or exclusive use of people biking, indicated by road markings. California Department of Transportation, A Guide to Bikeway Classification, July 2017. http://www.dot.ca.gov/d4/bikeplan/docs/caltrans-d4-bike-plan_bikeway-classification-brochure_072517.pdf. Accessed March 26, 2019.

9 Class 3 bicycle facilities are typically wide travel lanes shared by bicyclists and vehicles. They are commonly marked with the standard or greenback sharrows and wayfinding signs to indicate shared use. California Department of Transportation, A Guide to Bikeway Classification, July 2017. http://www.dot.ca.gov/d4/bikeplan/docs/caltrans-d4-bike-plan_bikeway-classification-brochure_072517.pdf. Accessed March 26, 2019.

0.7-mile to the north; and Yerba Buena Gardens open space and recreational facilities, approximately 0.5-mile northeast of the project site.

In addition, five projects within a 0.25-mile radius are currently under construction and therefore are considered part of the existing environmental conditions. These projects include the following:

- *5M Project, 925-927 Mission Street (Case No: 2011.0409E):* Involves retention and rehabilitation of two buildings on the site, demolition of six existing buildings on the site, and the construction of five new buildings. Buildings would range in height from approximately 50 feet to 400 feet. The total square footage of renovated existing buildings and new construction would include approximately 1.85 million gsf of new and existing uses, comprising 1,132,200 gsf of office uses, 552,800 gsf of residential uses (approximately 748 dwelling units), up to 146,900 gsf of active ground floor retail/office/cultural/ educational uses, and 18,200 gsf of arts/cultural/educational uses. This project is approximately 600 feet southeast of the project site.
- *950-974 Market Street (Case No: 2013.1049E):* Involves demolition of the existing buildings and parking structure to construct an approximately 406,000 gsf building containing 242 dwelling units, a 232-room hotel, and approximately 16,600 gsf of retail uses, in a 12-story, 120-foot-tall building. This project is approximately 400 feet north of the project site.
- *1066 Market Street (Case No: 2013.1753E):* The project involves demolition of the existing building and parking lot and construction of a new 12-story, 120-foot-tall, approximately 297,950 gsf residential building with ground floor retail space and two levels of subterranean parking. The mixed-use building would provide approximately 304 dwelling units and 4,540 gsf of ground-floor commercial retail space. This project is approximately 750 feet northwest of the project site.
- *Central Subway Project (Case No: 1996.281E):* The project involves extension of the Muni Metro T Third Street Line through SoMa, Union Square, and Chinatown. Construction is currently under way and is expected to be complete in 2019. Once the Central Subway is completed, the T Third Line will travel mostly underground from the 4th Street Caltrain Station to Chinatown. Four new stations will be built along the 1.7-mile alignment: 4th and Brannan Station at 4th and Brannan streets, Yerba Buena/Moscone Station at 4th and Folsom streets, Union Square/Market Street Station on Stockton Street at Union Square, and Chinatown Station at Stockton and Washington streets.
- *Sixth Street Pedestrian Safety Project (Case No. 2014.1010E):* The Sixth Street Pedestrian Safety Project would alter Sixth Street between Market and Howard streets by reducing the number of vehicle lanes on Sixth Street from four lanes to three lanes; widening the sidewalks on both sides of Sixth Street; installing new corner curb bulbouts at all intersections; installing new traffic signals at the intersections of Sixth Street/Stevenson Street and Sixth Street/Natoma Street; installing new crosswalk striping at all alleys crossing Sixth street; and installing new roadway striping and streetscape improvements (e.g., decorative sidewalks, pedestrian lighting).

B.2. CUMULATIVE PROJECT SETTING

CEQA guidelines section 15355 defines cumulative impacts as, "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Cumulative projects within a 0.25-mile radius of the project site are listed below in Table 2 and mapped on Figure 18. These cumulative projects are projects that are currently under review by the planning department or a building permit is on file or has been approved by the San Francisco Department of Building Inspection (building department).

TABLE 2: CUMULATIVE PROJECTS WITHIN 0.25-MILE RADIUS OF THE PROPOSED PROJECT

Map No. Address (Case No.)	Description	Dwelling Units	Retail/ Commercial (gsf)	Office (gsf)	Hotel (gsf)	PDR[1] (gsf)	Group Housing Rooms	Status
1. 1025 Howard Street (2015-005200ENV)	Demolition of an existing building and construction of a new 8-story hotel with a ground floor retail space and below ground parking.	--	2,445	--	77,510 173 rooms	--	--	Under review
2. 1055 Market Street (2014.0408E)	Demolition of an existing commercial building and construction of a 10-story hotel with a ground floor retail space.	--	2,187	--	71,534 160 rooms	--	--	Approved - not yet under construction
3. 1082 Howard Street (2015-010371ENV)	Demolition of a 2-story retail sales building and construction of a 9-story multi-family residential building.	9	--	--	--	--	--	Under Review
4. 1088 Howard Street (2017-009796ENV)	The proposed project would preserve the existing one story over mezzanine industrial building and construct an approximately 20,402 gsf, 74-foot-tall residential addition.	24	--	--	--	--	--	Under Review
5. 1125 Market Street (2013.0511E)	Construction of a 12-story,	--	5,587	18,737	95,506 181	--	--	Under Review

Map No. Address (Case No.)	Description	Dwelling Units	Retail/ Commercial (gsf)	Office (gsf)	Hotel (gsf)	PDR[1] (gsf)	Group Housing Rooms	Status
	138,101 sf building containing 181 hotel rooms, 5,587 sf of restaurant/retail, and a 18,737 sf co-working space/office.				rooms			
6. 219 Sixth Street (2017-001590CUA)	Change of use that would result in a net increase of 9 rooms.	--	--	--	--	--	9 guest rooms	Under Review
7. 270 Turk Street (2017-015701PRJ)	Addition of four accessory dwelling units at the basement level of the building.	4	--	--	--	--	--	Under Review
8. 415-417 Tehama Street (2017-016278PRJ)	Construction of one accessory dwelling unit.	1	--	--	--	--	--	Under Review
9. 457-475 Minna Street (2018-016055ENV)	Demolition of an existing 2-story building and proposed merger of four lots and construction of a new 16-story, 270-room group housing building.	--	--	--	--	--	270	Under Review
10. 481-483 Tehama Street (2015-006765 ENV)	Proposed demolition of an existing 2-story building. Construction of a new 4-story residential/ PDR building.	6	--	--	--	1,790	--	Under Review
11. 527 Stevenson Street (2018-012429ENV)	Demolition of an existing 1-story commercial building and new construction of a 7-story commercial building.	--	--	7,062	--	--	--	Under Review
12. 57 Taylor Street aka 111 Turk Street (2015-007525ENV)	Subdivision of parcel containing a mixed-use residential and	--	11,000	--	--	--	77	Under Review

Map No. Address (Case No.)	Description	Dwelling Units	Retail/ Commercial (gsf)	Office (gsf)	Hotel (gsf)	PDR[1] (gsf)	Group Housing Rooms	Status
	retail building and a surface parking lot. Demolition of a portion of the existing structure (vacant retail space). New construction of a 12-story over basement mixed-use residential group housing with ground floor retail.							
13. 611 Minna Street (2018-009426PRJ)	Addition of two new studio accessory dwelling units at the basement level of an existing 12-unit building.	2	--	--	--	--	--	Under Review
14. 921 Howard Street (2017-000275ENV)	Construction of a new, 18-story, 180-foot-tall mixed-use residential tower and podium.	205	4,999	--	--	--	--	Under Review
15. 984 Folsom Street (2017-013741ENV)	Demolition of a 3-story building and construction of a new 8-story building with a restaurant on the ground floor and group housing on the remaining seven floors.	--	9,115	--	--	--	111	Under Review
16. 996 Mission Street (2015-015253 ENV)	Demolition of 2-story existing residential hotel building. New construction of an 8-story hotel (2 floors residential hotel units, 5 floors tourist hotel) with ground floor retail.	--	--	--	5,645 (105 rooms)	--	--	Under Review
17. Better Market Street	The multi-agency project	--	--	--	--	--	--	Under Review

Map No. Address (Case No.)	Description	Dwelling Units	Retail/ Commercial (gsf)	Office (gsf)	Hotel (gsf)	PDR[1] (gsf)	Group Housing Rooms	Status
(2014.0012E)	would replace and upgrade aging infrastructure – including streetlights, traffic signals, streetcar tracks, overhead wires, and underground utilities.							

[1] PDR – Production, Distribution, Repair

Sources:

San Francisco Planning Department. 2019. San Francisco Planning Department – Permits in my Neighborhood Map. https://sfplanning.org/resource/permits-my-neighborhood.

San Francisco Public Works Department. 2019. Projects Database. https://sfpublicworks.org/projects.

1. 1025 Howard Street
2. 1055 Market Street
3. 1082 Howard Street
4. 1088 Howard Street
5. 1125 Market Street
6. 219 Sixth Street
7. 270 Turk Street
8. 415-417 Tehama Street
9. 457-475 Minna Street
10. 481-483 Tehama Street
11. 527 Stevenson Street
12. 57 Taylor Street (aka 111 Turk Street)
13. 611 Minna Street
14. 921 Howard Street
15. 984 Folsom Street
16. 996 Mission Street
17. Better Market Street

Source: City of San Francisco

469 Stevenson Street Project

Case No. 2017-014833ENV

Figure 18: Cumulative Projects

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C. COMPATIBILITY WITH EXISTING ZONING AND PLANS

	Applicable	*Not Applicable*
Discuss any variances, special authorizations, or changes proposed to the Planning Code or Zoning Map, if applicable.	☒	☐
Discuss any conflicts with any adopted plans and goals of the City or Region, if applicable.	☒	☐
Discuss any approvals and/or permits from City departments other than the Planning Department or the Department of Building Inspection, or from Regional, State, or Federal Agencies.	☒	☐

This section discusses potential inconsistencies of the proposed project with applicable local plans and policies, as well as potential conflicts with regional plans and policies, as applicable. Inconsistencies with existing plans and policies do not, in and of themselves, indicate a significant physical environmental effect. To the extent that adverse physical environmental impacts may result from such inconsistencies, these impacts are analyzed in this initial study under the specific environmental topic sections below in Section E, Evaluation of Environmental Effects.

The proposed project would intensify land uses on an urban infill site and to the extent that there are conflicts between the proposed project and applicable plans, policies, and regulations, those conflicts would be considered by city decision-makers when they decide whether to approve, modify, or disapprove the proposed project.

C.1. SAN FRANCISCO PLANNING CODE

The planning code, which incorporates by reference the city's zoning maps, governs permitted uses, densities, and the configuration of buildings in San Francisco. Permits to construct new buildings (or to alter or demolish existing ones) may not be issued unless either the proposed action conforms to the planning code, or an exception is granted pursuant to provisions of the planning code.

ALLOWABLE USES

The proposed project would be constructed in the C-3-G zoning district and 160-F Height and Bulk District. Pursuant to section 210.2 of the planning code, the C-3-G District "is composed of a variety of uses: retail, offices, hotels, entertainment, clubs and institutions, and high-density residential. Many of these uses have a citywide or regional function, although the intensity of development is lower here than in the downtown core area." The project site is also within the SoMa neighborhood, a rapidly changing neighborhood as its old industrial areas have been redeveloped into new residential uses, convention centers, and office parks.

The proposed project would be consistent with the zoning district as ground floor commercial and residential uses are a permitted use in the C-3-G zoning district. The proposed project includes a request for additional exceptions to permit construction such as waivers from height, bulk, and other physical constraints of the planning code, as allowed under the State Density Bonus

program. These exceptions, including the applicable planning code sections, are described in detail in Section A.4, Project Approvals.

AFFORDABLE HOUSING

The project proposes to use the Individually Requested State Density Bonus program and must provide at least 11 percent of the base[10] project's residential units as very low affordable dwelling units onsite in order to qualify for a 35 percent increase in density. The project proposes to provide 19 percent of the base project's residential units as very low affordable dwelling units onsite. Therefore, the proposed project would comply with the city's Residential Inclusionary Affordable Housing Program requirements (planning code sections 415, et seq.), by including the applicable required number of units per current legislation.

HEIGHT AND BULK CONTROLS

The project site is within the 160-F Height and Bulk District. This height and bulk district allows for buildings up to 160 feet in height. For buildings over 80 feet in height, all portions of structures above the podium height are subject to the bulk restrictions in section 270(a) of the planning code. The proposed project is requesting a 35 percent increase in density and waivers from height and bulk, in exchange for providing affordable dwelling units. As a result, a waiver requesting exceedance of the maximum height and bulk limits would be included in the motions as part of the project's approval. The environmental effects of the project's proposed height and bulk are evaluated in Section E, Evaluation of Environmental Effects.

FLOOR AREA RATIO

Floor area ratio (FAR) is a measure of building intensity based on the ratio between the total floor area to be built on a site and the size of that site. In the C-3-G District, a base 6:1 FAR is allowed under planning code section 124, with a FAR of up to 9:1 with the purchase of transferable development rights (TDR).[11] The proposed project would have a FAR of approximately 19:1. The project sponsor is requesting a waiver from the FAR limits under the Individually Requested State Density Bonus program; however the environmental effects of the full project's increase in density are evaluated in Section E, Evaluation of Environmental Effects.

STREET TREES

The project site currently does not contain any trees or landscaping and no street trees are present along the project site's frontages. Planning code section 138.1(c)(1) requires that the project sponsor plant and maintain street trees as set forth in Article 16, sections 805(a) and (d) and 806(d)

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10 In order to determine how much of a density bonus state law will allow, the density allowed by current controls ("base density" or "base project") must first be calculated. The base density is the maximum gross residential density allowed pursuant to the site's zoning requirements.

11 Transferable Development Rights: Units of gross floor area that may be transferred, pursuant to the provisions of section 128 and article 11 of the planning code, from a transfer lot to increase the allowable gross floor area of development on a development lot.

of the public works code. The proposed project would comply with section 138.1(c)(1) by providing approximately eight street trees along Jessie Street and seven vegetated landscape strips along Stevenson Street.

SETBACKS AND OPEN SPACE REQUIREMENTS

The proposed project would not provide setbacks as required by planning code sections 132.1 and 134. The proposed project is requesting a waiver from the rear yard requirements in planning code section 134(g) under the Individually Requested State Density Bonus Program.

The proposed project would provide 11,000 square feet of private open space and 14,000 square feet of common usable open space. Private open space would consist of private balcony spaces for 15 dwelling units. The private balconies would be provided between the 2nd, 6th, and 27th floors. The common usable open space would consist of the ground floor courtyard and solariums, and the rooftop amenity area.

PARKING AND LOADING REQUIREMENTS

According to section 151.1 of the planning code, there is no minimum requirement for off-street parking in the C-3-G district. Maximum off-street parking is limited to 1 parking space for two dwelling units. The proposed project would include a total of 171 parking spaces at a proposed parking ratio of 0.5 space per unit. At least nine of these parking spaces would be ADA-compliant and three would be car-share spaces.

The proposed project would provide one loading space for freight deliveries, adjacent to the parking garage ramp on Stevenson Street. Two service vehicle parking spaces would also be provided on the first parking garage level.

For new residential buildings containing more than 100 dwelling units, planning code section 155.2 requires one secure (class 1) bicycle parking space for each unit for the first 100 units and one secure space for each four units above that, along with one class 2 space for each 20 units. As such, the proposed 462 residential units would require 192 class 1 spaces and 25 class 2 spaces. The proposed project includes 192 class 1 and 25 class 2 bicycle parking facilities. Therefore, the proposed project would comply with the planning code requirements for parking and loading.

C.2 PLANS AND POLICIES

SAN FRANCISCO GENERAL PLAN

In addition to the planning code, the proposed project is subject to the general plan. The general plan provides policies and objectives to guide land use decisions. The general plan contains 10 elements (housing, commerce and industry, recreation and open space, transportation, urban design, environmental protection, community facilities, community safety, arts, and air quality) that set forth goals, policies, and objectives for the physical development of the city.

The general plan also contains several area plans, which provide more specific policy direction for certain neighborhoods. The project site is within the SoMa neighborhood, an area governed by San Francisco's Downtown Area Plan. The Downtown Area Plan aims to create the physical form and

pattern of a livable, compact, and pedestrian-oriented downtown. The area plan contains objectives and policies that address retail space, housing, open space, and urban form.

As discussed below, the proposed project would not substantially conflict with any goals, policies, or objectives of the general plan, including those of the Downtown Area Plan. The compatibility of the proposed project with general plan goals, policies, and objectives that do not relate to physical environmental issues will be considered by decision-makers when deciding whether to approve or disapprove the proposed project. Any potential conflicts identified as part of the process would not alter the physical environmental effects of the proposed project.

URBAN DESIGN ELEMENT

The urban design element of the general plan focuses on the physical character and order of the city and is concerned both with development and preservation. Its goal is to protect public views of open space and water bodies, and to protect and enhance the aesthetic character of San Francisco. The urban design element includes a map titled "Street Areas Important to Urban Design and Views" which identifies particular street segments throughout the city possessing street views of important buildings, streets that define the city form, or streets that extend the effect of public open space. The map identifies Market Street as having "Street View of Important Building" and as one of the "Streets that Define the City Form." The project site and Market Street are visually disconnected by existing buildings. As such, the proposed project would not impact street views from Market Street and surrounding streets.

The proposed project is an infill development on an existing surface parking lot. The proposed project would construct a new 274-foot tall building. The urban design element includes policy 3.1,[12] policy 3.5,[13] and policy 3.6[14] which encourages new development to consider its scale in relation to the existing height and bulk of structures in the area. The proposed project would exceed the existing 160-foot height limit as set forth in the planning code and height maps (see Subsection C.1, San Francisco Planning Code) and would be taller than surrounding structures. However, the proposed project is requesting a 35 percent increase in density and waivers from height and bulk would be part of the planning approvals. The proposed project may be potentially inconsistent with policy 3.5 in that the proposed building would be about 88 feet taller than the tallest of the immediately surrounding buildings. However, the proposed heights would be allowed with application of the Individually Requested State Density Bonus Program.

The proposed project would be potentially inconsistent with policy 3.4, which encourages building forms to respect and improve the integrity of open spaces and other public areas. As discussed in Section E.9, Wind, the proposed 274-foot tall building could increase ground-level wind speeds on the project site and on adjacent sidewalks that could exceed pedestrian comfort

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[12] Policy 3.1: Promote harmony in the visual relationships and transitions between new and older buildings.

[13] Policy 3.5: Relate the height of buildings to important attributes of the city pattern and to the height and character of existing development.

[14] Policy 3.6: Relate the bulk of buildings to the prevailing scale of development to avoid an overwhelming or dominating appearance in new construction.

limits and hazard criteria set forth in the planning code. Additionally, as discussed in Section E.10, Shadow, the 274-foot tall building could potentially result in net new shading on nearby parks and open spaces in a manner that could affect the use and enjoyment of these facilities. The project's potential wind and shadow impacts will be evaluated in detail in the EIR.

AIR QUALITY ELEMENT

The general plan includes the 1997 air quality element, which focuses on adherence to regulatory air quality standards and the reduction of air pollution. Implementation of the proposed project would result in emissions during both construction and operation which may be inconsistent with air quality element objective 1, adhere to state and federal air quality standards and regional programs. The project's emissions will be evaluated in detail in the EIR.

PRIORITY POLICIES

In November 1986, the voters of San Francisco approved Proposition M, the Accountable Planning Initiative, which added section 101.1 to the planning code and established eight priority policies. These policies are (1) preservation and enhancement of neighborhood-serving retail uses and future opportunities for resident employment in and ownership of such businesses; (2) conservation and protection of existing housing and neighborhood character to preserve the cultural and economic diversity of neighborhoods; (3) preservation and enhancement of affordable housing (Question E.2.b, Population and Housing, regarding housing supply and displacement); (4) discouragement of commuter automobiles that impede Muni transit service or that overburden streets or neighborhood parking (Question E.5.a., Transportation and Circulation, regarding public transit); (5) protection of industrial and service land uses from commercial office development and enhancement of resident employment and business ownership; (6) maximization of earthquake preparedness (Questions E.15.a-d., Geology and Soils); (7) preservation of landmarks and historic buildings; and (Question E.3.a., Cultural Resources); and (8) protection of parks and open space and their access to sunlight and vistas (Questions E.10.a., Shadow, and Question E.11.a., Recreation).

Prior to issuing a permit for any project that requires an initial study under CEQA; prior to issuing a permit for any demolition, conversion, or change of use; and prior to taking any action that requires a finding of consistency with the San Francisco General Plan, the city is required to find that the proposed project or legislation is consistent with the priority policies. As noted above, the consistency of the proposed project with the environmental topics associated with the priority policies is discussed under the relevant topics in Section E, Evaluation of Environmental Effects, of this initial study.

REGIONAL PLANS AND POLICIES

The five principal regional planning agencies and their overarching plans and policies to guide planning in the nine-county bay area include the Plan Bay Area 2040, Bay Area Air Quality Management District's (air district) 2017 Bay Area Clean Air Plan, Metropolitan Transportation Commission's Regional Transportation Plan – Transportation 2035, San Francisco Regional Water Quality Control Board's San Francisco Basin Plan, and the San Francisco Bay Conservation and Development Commission's San Francisco Bay Delta Plan. Due to the infill nature of the proposed project, no anticipated inconsistencies with regional plans would occur.

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D. SUMMARY OF ENVIRONMENTAL EFFECTS

The proposed project could potentially affect the environmental factor(s) checked below. The following pages present a more detailed checklist and discussion of each environmental factor.

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

D.1 APPROACH TO ENVIRONMENTAL REVIEW

This initial study examines the proposed project to identify potential effects on the environment. For each item on the initial study checklist, the evaluation has considered the impacts of the proposed project both individually and cumulatively, except for regional air quality and greenhouse gases, which are considered on a cumulative basis due to the cumulative nature of the impact.

All items on the initial study checklist that have been checked "Less-than-Significant Impact with Mitigation Incorporated," "Less-than-Significant Impact," "No Impact," or "Not Applicable," indicate that, upon evaluation, staff has determined that the proposed project could not have a significant adverse environmental effect relating to that issue. A discussion is included for those issues checked "Less-than-Significant Impact with Mitigation Incorporated" and "Less-than-Significant Impact" and for most items checked "No Impact" or "Not Applicable." For all of the items checked "No Impact" or "Not Applicable" without discussion, the conclusions regarding potential significant adverse environmental effects are based upon field observation, staff experience, and expertise on similar projects, and/or standard reference material available within the planning department, such as the department's Transportation Impact Analysis Guidelines for Environmental Review, or the California Natural Diversity Database and maps, published by the California Department of Fish and Wildlife.

EFFECTS FOUND TO BE POTENTIALLY SIGNIFICANT

The designation of topics as "Potentially Significant" in the initial study means that the EIR will consider the topic in greater depth and determine whether the impact would be significant. Based

on this initial study, topics for which there are project-specific effects that have been determined to be potentially significant are related to air quality, wind, and shadow. These topics will be evaluated in the EIR prepared for the proposed project.

EFFECTS FOUND NOT TO BE SIGNIFICANT OR NOT SIGNIFICANT WITH IDENTIFIED MITIGATION MEASURES

The following potential individual and cumulative environmental effects were determined to be less than significant, would be reduced to less than significant with mitigation measures identified in this initial study and agreed upon by the project sponsor, or would result in no physical environmental impact.

- Land Use and Planning
- Population and Housing
- Cultural Resources
- Tribal Cultural Resources
- Transportation and Circulation
- Noise
- Greenhouse Gas Emissions
- Recreation
- Utilities and Service Systems
- Public Services
- Biological Resources
- Geology and Soils
- Hydrology and Water Quality
- Hazards and Hazardous Materials
- Mineral Resources
- Energy Resources
- Agricultural and Forest Resources
- Wildfire

D.2 SENATE BILL 743 AND PUBLIC RESOURCES CODE SECTION 21099

On September 27, 2013, Governor Brown signed Senate Bill (SB) 743, which became effective on January 1, 2014.[15] SB 743 amends CEQA by adding public resources code section 21099 regarding analysis of aesthetics and parking impacts for urban infill projects. The project is identified as an urban infill project.[16]

15 SB 743 can be found online at: http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB743.

16 San Francisco Planning Department. 2019. Eligibility Checklist: CEQA Section 21099 Modernization of Transportation Analysis for 469 Stevenson Street Project, 2017-014833ENV. PDF.

AESTHETICS AND PARKING ANALYSIS

Public resources code section 21099(d), effective January 1, 2014, states, "Aesthetic and parking impacts of a residential, mixed-use residential, or employment center project on an infill site located within a transit priority area shall not be considered significant impacts on the environment." Accordingly, aesthetics and parking are no longer to be considered in determining if a project has the potential to result in significant environmental effects for projects that meet all of the following three criteria:

a) The project is in a transit priority area
b) The project is on an infill site
c) The project is residential, mixed-use residential, or an employment center

The proposed project meets each of the above three criteria because it: (1) is located within one-half mile of several rail and bus transit routes, including the BART and Muni Powell Street Station, (2) is located on an infill site that is already developed as a surface parking lot, and is surrounded by other urban development, and (3) would be a mixed-use residential project with ground floor commercial retail. Therefore, this initial study and the EIR for this project do not consider aesthetics and the adequacy of parking in determining the significance of project impacts under CEQA.

Public resources code section 21099(e) states that a lead agency maintains the authority to consider aesthetic impacts pursuant to local design review ordinances or other discretionary powers and that aesthetic impacts do not include impacts on historic or cultural resources. As such, there is no change in the planning department's analysis methodology related to design and historic review.

The planning department recognizes that the public and decision-makers nonetheless may be interested in information pertaining to the aesthetic effects of a proposed project and may desire that such information be provided as part of the environmental review process. Therefore, some of the information that would have otherwise been provided in an aesthetics section of an initial study or EIR (such as project drawings) is included in the project description. However, this information is provided solely for informational purposes and is not used to determine the significance of environmental impacts of the project pursuant to CEQA.

AUTOMOBILE DELAY AND VEHICLE MILES TRAVELED

Public resources code section 21099(b)(1) requires that the State Office of Planning and Research (OPR) develop revisions to the CEQA Guidelines establishing criteria for determining the significance of transportation impacts of projects that promote the "reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses." Section 21099(b)(2) states that upon certification of the revised CEQA Guidelines for determining transportation impacts pursuant to section 21099(b)(1), automobile delay, as described solely by level of service (LOS) or similar measures of vehicular capacity or traffic congestion, shall not be considered a significant impact on the environment under CEQA.

In January 2016, OPR published for public review and comment its *Revised Proposal on Updates to the CEQA Guidelines on Evaluating Transportation Impacts in CEQA,* recommending that the transportation impacts of projects be measured using a vehicle-miles-traveled (VMT) metric. On

March 3, 2016, based on compelling evidence in that document and the planning department's independent review of literature on LOS and VMT, the Planning Commission adopted OPR's recommendation to use the VMT metric instead of automobile delay in evaluating the transportation impacts of projects (resolution 19579). In December 2018, OPR released its *Technical Advisory on Evaluating Transportation Impacts in CEQA*, finalizing these recommendations. Also, in December 2018, the Natural Resources Agency finalized updates to the CEQA Guidelines that replaced level of service with VMT as a transportation threshold in the Appendix G initial study checklist.

D.3 NEAR-TERM BASELINE ANALYSIS

CEQA Guidelines section 15125 states that the environmental setting will normally constitute the baseline physical conditions by which a lead agency determines whether an impact is significant. The environmental setting typically includes the existing physical conditions on the project site and vicinity, including projects that are under construction. The environmental analysis then presents existing and existing-plus-project scenarios to identify environmental impacts that would occur form implementation of a proposed project. However, where it is certain that near-term improvements would be implemented prior to a project's construction or operation, such analysis could be misleading to decision-makers and the public.

For this initial study and EIR, it is necessary to evaluate the environmental impacts of the proposed project against a near-term baseline that is different from the current existing conditions because two transportation infrastructure projects (Central Subway and the Sixth Street Pedestrian Safety Project) are either under construction or approved, funded and expected to be under construction or completed by the time the proposed project is operational. These projects and how they are included in the environmental analysis are further described below.

The Central Subway project represents the second phase of the Muni T Third Street light rail service, extending service along a 1.7-mile alignment (including 1.5 miles underground) from the Caltrain terminal at Fourth and King Streets north along Fourth and Stockton streets through Central SoMa/Yerba Buena Center and Union Square to Chinatown. Four new stations will be constructed along the 1.7-mile alignment: 4th and Brannan Station, Yerba Buena/Moscone Station, Union Square/Market Street Station, and Chinatown Station. The construction and operational analysis of the proposed project considers the Central Subway project complete and operating because this project is under construction with revenue service anticipated to begin in 2019, which is prior to any approvals that would be issued for this project. As such, there would not be any potential for overlap of construction activities associated with the Central Subway project and the proposed project.

The Sixth Street Pedestrian Safety Project is part of San Francisco's Vision Zero initiative – the city's goal of reducing all traffic deaths by 2024. The Sixth Street Pedestrian Safety Project would transform Sixth Street by providing wider sidewalks, new traffic signals, and streetscape

improvements to create a safe and inviting place for people to walk. Quick-build roadway changes on Sixth Street between Market and Howard Streets are beginning September 2019 to improve traffic safety.[17] Construction of the larger streetscape improvements such as widening sidewalks, adding lighting, and landscaping would occur in spring of 2020 and is anticipated to last approximately 18 months. Given the proposed project's anticipated construction start date of 2021, there is potential for construction of the Sixth Street Pedestrian Safety Project to overlap with that of the proposed project. However, given the proposed length of construction for the Sixth Street Pedestrian Safety Project (18 months) and the expected start date (fall 2021) and length of construction for the proposed project (36 months), it is anticipated that the Sixth Street Pedestrian Safety Project would be completed prior to completion of the proposed project. The near-term baseline operational impact analysis of the proposed project therefore includes the operational changes that would be implemented by the Sixth Street Pedestrian Safety project.

The analysis accounts for any construction effects of the proposed project that could combine with that of the Sixth Street Pedestrian Safety project in the cumulative analysis.

The above projects included in the near-term 2020 baseline condition will result in implementation of transportation network changes that are used in the analysis of the proposed project's operations.

D.4 CUMULATIVE ANALYSIS

CEQA Guidelines section 15355 states that the cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present and reasonably foreseeable future projects. CEQA Guidelines section 15130(b)(1) provides for two approaches to cumulative impacts analysis: list-based and projections-based. For a list-based approach, a list of probable future projects producing related impacts is prepared. For a projections-based approach, a summary of projects contained in an adopted local, regional, or statewide plan that describes or evaluates conditions contributing to the cumulative effect is used.

The discussion of cumulative impacts should reflect the severity of impact and their likelihood of occurrence, but the discussion need not provide as great detail as is provided for effects attributable to the project alone. The discussion of cumulative impacts should be guided by the standards of practicality and reasonableness and should focus on the cumulative impacts to which the identified other projects contribute, rather than the attributes of other projects which do not contribute to the cumulative impact (CEQA Guidelines, section 15130[b]).

In this initial study, cumulative impacts are analyzed for each environmental topic and the proposed project's contribution to a cumulative impact, if any, is discussed. The cumulative impact analysis in this initial study may employ a list-based approach or a projections approach,

[17] San Francisco Municipal Transportation Agency. 2019. Sixth Street Pedestrian Safety Project, Quick-Build Traffic Safety Improvements. Available: https://www.sfmta.com/sites/default/files/reports-and-documents/2019/07/6th_st_quick_build_mailer_7.15.2019.pdf. Accessed: July 26, 2019.

depending on which approach best suits the individual resource topic being analyzed. As described above under Cumulative Project Setting, Table 2 represents cumulative projects within a 0.25-mile radius of the project site. These projects may be considered in determining environmental effects that are more localized. A projections-based analysis would consider county-wide or regional growth and is typically based on growth projections developed by the Association of Bay Area Governments (ABAG) and refined by planning department staff. The cumulative analysis defines the cumulative context appropriate for analysis of each specific environmental topic.

E. EVALUATION OF ENVIRONMENTAL EFFECTS

E.1 Land Use and Planning

Topics:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Not Applicable
1. LAND USE AND PLANNING. Would the project:					
a) Physically divide an established community?	☐	☐	☒	☐	☐
b) Cause a significant physical environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☒	☐	☐

Impact LU-1: The proposed project would not physically divide an established community. (*Less than Significant*)

The division of an established community typically involves the construction of a physical barrier to neighborhood access, such as a new freeway, or the removal of a means of access, such as a bridge or a roadway. Implementation of the proposed project would not result in the construction of a physical barrier to neighborhood access or the removal of an existing means of access; it would result in the construction of a new 27-story, 274-foot-tall building (with an additional 10 feet for rooftop mechanical equipment) within established lot boundaries. The proposed project would not alter the established street grid or permanently close any streets or sidewalks. Although portions of the sidewalks and streets adjacent to the project site could be closed for periods of time during project construction, these closures would be temporary and only occur during construction. Therefore, the proposed project would result in a less-than-significant impact related to physically dividing an established community. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact LU-2: The proposed project would not cause a significant physical environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect. (*Less than Significant*)

Land use impacts could be considered significant if the proposed project would conflict with any plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental impact. The determination as to whether a conflict with a land use plan, policy, or regulation is significant under CEQA is based on whether that conflict would result in a significant physical environmental impact. The proposed project would not obviously conflict with any applicable land use plan, policy, or regulation such that an adverse physical change would result (see Section C, Compatibility with Existing Zoning and Plans).

Applicable land use plans that regulate development on the project site include the San Francisco General Plan and the San Francisco Planning Code. As discussed in Section C, Compatibility with Existing Zoning and Plans, the proposed project would conform to the C-3-G zoning district that allows for both commercial and residential development. The project proposes to use the

Individually Requested State Density Bonus program by providing 19 percent of the base project's residential units as very low affordable dwelling units onsite. In exchange for providing these affordable dwelling units, the proposed project is requesting a 35 percent increase in density and waivers from height, bulk, and other physical constraints of the planning code and is reserving its right to use the incentives afforded by providing affordable dwelling units onsite. As discussed in Section C, Compatibility with Existing Zoning and Plans, these conflicts would be addressed through the proposed project's entitlement process, including required exceptions from planning code requirements and compliance with the Individually Requested State Density Bonus program.

The physical environmental effects of the proposed project related to various resource topics are analyzed in this initial study and its EIR. The impact on land use plans and policies would be less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact C-LU-1: The proposed project, in combination with reasonably foreseeable future projects, would not result in significant cumulative impacts related to land use. (*Less than Significant*)

The cumulative context for land use effects are typically localized, within the immediate vicinity of the project site, or at the neighborhood level. Cumulative development in the project vicinity (within a 0.25-mile radius of the project site) includes the projects identified in Table 2 and on Figure 18. The cumulative development projects in Table 2 consist of residential, mixed-use residential, and hotel infill development projects.

Upon completion of the project, the proposed project would not physically divide an established community, and therefore would have no potential to combine with cumulative projects to result in a significant physical environmental impact related to dividing an established community. During construction, the project may require temporary sidewalk and street closures as could other cumulative construction activity in the project vicinity. Because all sidewalk and street closures are required to maintain pedestrian access through the surrounding areas and because any access detours or restrictions would be temporary in nature, any cumulative impacts related to physically dividing an established community would be less than significant.

All cumulative projects are required to conform with the planning code, including its zoning maps, and required to be generally consistent with the general plan. Therefore, the proposed project in combination with reasonably foreseeable future projects would not result in a significant cumulative impact related to a conflict with a land use plan, policy, or regulation adopted for the purpose of mitigating an environmental impact, and cumulative impacts would be less than significant. No mitigation measures are required.

E.2 Population and Housing

Topics:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Not Applicable
2. POPULATION AND HOUSING. Would the project:					
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☒	☐	☐
b) Displace substantial numbers of existing people or housing units, necessitating the construction of replacement housing?	☐	☐	☐	☒	☐

Impact PH-1: The proposed project would not induce substantial unplanned population growth in an area, either directly or indirectly. (*Less Than Significant*)

The proposed project would be considered growth inducing if its implementation would result in substantial unplanned population increases and/or new development that might not occur if the project were not approved and implemented. The proposed project would include the construction of a mixed-use infill development consisting of approximately 4,000 square feet of commercial space on the ground floor with 462 residential dwelling units above. The project site is in an urbanized area and would not be expected to substantially alter existing development patterns in the Downtown neighborhood in which it is located, or in San Francisco as a whole. Furthermore, the project site is in an established urban neighborhood and would not require, or create new demand for, the extension of municipal infrastructure.

According to the U.S. Census Bureau's most recent American Community Survey,[18] the City and County of San Francisco had an estimated population of about 883,305 residents, and 397,550 housing units in 2018. Census Tract 176.01, which includes the project site and immediate vicinity, has a population of 8,432 and a total of 5,931 housing units.[19]

ABAG prepares projections of employment and housing growth for the Bay Area. The latest projections were prepared as part of Plan Bay Area 2040, which is the current long-range Regional Transportation Plan and Sustainable Communities Strategy adopted by the Metropolitan Transportation Commission and ABAG in March 2018. Plan Bay Area identifies an increasing percentage of Bay Area growth that is expected to occur as infill development in areas with access

18 U.S. Census Bureau, San Francisco County, California, Families and Living Arrangements, Households, 2013-2017. Available online at: https://www.census.gov/quickfacts/sanfranciscocountycalifornia. Accessed May 20, 2019.

19 Census Reporter, Census Tract 176.01, San Francisco, California, 2017. Available online at: https://censusreporter.org/profiles/14000US06075017601-census-tract-17601-san-francisco-ca/. Accessed June 14, 2019.

to transit. To facilitate that, Plan Bay Area 2040 focuses growth and development in nearly 200 Priority Development Areas (PDAs). These existing neighborhoods are served by public transit and have been identified as appropriate for additional, compact development. The project site is located within the Downtown/Van Ness/Geary PDA. The growth projections prepared by ABAG for Plan Bay Area 2040 for San Francisco County anticipate 483,700 households in 2040 (an increase of 137,800 households between 2010 and 2040) and 872,500 jobs in 2040 (an increase of 295,700 jobs between 2010 and 2040).[20] Additionally, the housing element projects a population of 1,085,700 by 2040. [21]

Based on the average household size in the City and County of San Francisco of 2.35 people per household,[22] the addition of 462 new residential units, as the project proposes, would increase the citywide population by approximately 1,086 residents.[23] This would represent a residential population increase of approximately 13 percent over the existing census tract population, and approximately 0.12 percent citywide. The proposed project's 462 residential units would represent a fraction of the expected increase in citywide households and population, as projected in Plan Bay Area 2040 and the housing element. Therefore, the proposed project would not induce population growth but rather accommodate the need for housing within the city.

Based on the size of the proposed commercial space (approximately 4,000 square feet), the new businesses would employ a total of approximately 11 staff.[24] This amount of retail is not anticipated to attract new employees to San Francisco. Therefore, it can be anticipated that most of the employees would live in San Francisco (or nearby communities), and that the proposed project would not generate demand for new housing for the potential commercial employees. In light of the above, additional population and employees associated with the proposed project would have a less-than-significant impact related to population growth, both directly and indirectly. The physical environmental effects of the project's anticipated increase in population (both residents and employees) are analyzed in the environmental topic sections of this initial study and the accompanying EIR. No mitigation measures are required. This topic will not be discussed in the EIR.

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20 Metropolitan Transportation Commission and Association of Bay Area Government, Plan Bay Area 2010 Final Supplemental Report: Land Use and Modeling Report. July 2017. This document is available online at: http://2040.planbayarea.org/reports. Accessed November 7, 2018.

21 San Francisco Planning Department, 2014 Housing Element, San Francisco General Plan, adopted April 27, 2015, http://www.sfplanning.org/ftp/General_Plan/2014HousingElement-AllParts_ADOPTED_web.pdf, accessed February 5, 2019.

22 U.S. Census Bureau, San Francisco County, California, Families and Living Arrangements, Persons per households, 2013-2017. Available online at: https://www.census.gov/quickfacts/sanfranciscocountycalifornia. Accessed June 12, 2019.

23 462 residential units x 2.35 people per household = 1,086 new residents.

24 San Francisco Planning Department, Transportation Impact Analysis Guidelines for Environmental Review (Guidelines), February 2019. The estimated number of employees is based on the Guidelines which assumes an average of 1 employee per 350 square feet of retail (4,000 square feet of retail ÷ 350 = 11 employees).

Impact PH-2: The proposed project would not displace substantial numbers of existing housing units, or substantial numbers of people necessitating the construction of replacement housing. (*No Impact*)

As the project site is currently developed as a parking lot, the proposed project would not displace any residents or housing units. Therefore, the proposed project would have no direct impact related to the displacement of housing units or people and would not necessitate the construction of replacement housing. It is also noted that the planning department, with assistance from ALH Urban & Regional Economics, has completed extensive analysis of gentrification and displacement in the city to determine whether individual projects, including market-rate housing projects, contribute to gentrification and displacement and whether either of these phenomena directly or indirectly result in physical environmental effects. The planning department has not found empirical evidence supporting the position that market-rate housing development leads to residential or commercial displacement that results in secondary physical effects on the environment. No impact would occur. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact C-PH-1: The proposed project, in combination with reasonably foreseeable projects in the vicinity, would not result in a significant cumulative impact related to population and housing. (*Less than Significant*)

As discussed above, Plan Bay Area 2040 includes housing and employment projections anticipated to occur in San Francisco through 2040 and calls for focused growth and development within PDAs. The Plan Bay Area 2040 projections provide the cumulative context for the population and housing analysis. The growth projections in Plan Bay Area 2040 for San Francisco County anticipate 483,700 households in 2040 (an increase of 137,800 households between 2010 and 2040) and 872,500 jobs in 2040 (an increase of 295,700 jobs between 2010 and 2040).[25]

As discussed above, according to the most recent American Communities Survey, San Francisco has an estimated population of 883,305 residents and 397,550 housing units. As of the fourth quarter of 2018, approximately 70,960 net new housing units are in the pipeline (e.g., are either under construction, have building permits approved or filed, or applications filed, including remaining phases of major multi-phased projects).[26] The pipeline also includes the proposed project's 462 residential units. Conservatively assuming that every housing unit in the pipeline is developed and at 100 percent occupancy (no vacancies), the pipeline would accommodate an additional 70,960 households. The pipeline also includes projects with land uses that would result in an estimated 94,600 new employees.[27,28] As such, cumulative household and employment

25 Metropolitan Transportation Commission and Association of Bay Area Government, Plan Bay Area 2010 Final Supplemental Report: Land Use and Modeling Report. July 2017. This document is available online at: http://2040.planbayarea.org/reports. Accessed November 7, 2018.

26 San Francisco Planning Department, 2018 Q4. Housing Development Pipeline. Available online at: https://sfplanning.org/project/pipeline-report. Accessed April 10, 2019.

27 Ibid.

28 San Francisco Planning Department, Citywide Division, Information and Analysis Group, Scott Edmundson, March 19, 2019.

growth is below the ABAG projections for planned growth in San Francisco. Therefore, the proposed project in combination with citywide development would not result in significant cumulative environmental effects associated with inducing unplanned population growth or displacing substantial numbers of people or housing, necessitating the construction of replacement housing elsewhere. For this reason, cumulative population and housing impacts would be less than significant. No mitigation measures are required.

E.3 Cultural Resources

Topics:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Not Applicable
3. CULTURAL RESOURCES. Would the project:					
a) Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5, including those resources listed in article 10 or article 11 of the San Francisco Planning Code?	☐	☐	☒	☐	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☒	☐	☐	☐
c) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☒	☐	☐	☐

Impact CR-1: The proposed project would not cause a substantial adverse change in the significance of a historic architectural resource. (*Less than Significant*)

Historical resources are those properties that meet the definitions in section 21084.1 of the CEQA statute and section 15064.5 of the CEQA Guidelines. Historical resources include properties listed in, or formally determined eligible for listing in, the California Register of Historical Resources (California Register) or in an adopted local historic register. Historical resources also include resources identified as significant in a historical resource survey meeting certain criteria. Additionally, properties that are not listed but are otherwise determined to be historically significant, based on substantial evidence, would also be considered historical resources. The significance of a historical resource is materially impaired when a project "demolishes or materially alters in an adverse manner those physical characteristics of a historical resource that convey its historical significance." The following discussion is based on the cultural resources analysis conducted by the planning department. [29]

The project site is in the city's SoMa neighborhood and developed as a surface parking lot. There are no existing onsite structures at the project site and it is not located within a historic district, or landmark district.[30] However, the project site is directly adjacent to the National Register-eligible Market Street Theatre and Loft Historic District, National and California-Register eligible Sixth Street Lodging House Historic District, and the Mint-Mission article 11 Conservation District,[31]

29 San Francisco Planning Department. Historic Resource Status for Properties Adjacent to 469 Stevenson Street, September 25, 2019]

30 San Francisco Planning Department. 2019. San Francisco Property Information Map, Historic Preservation. Accessed February 4, 2019. https://sfplanninggis.org/pim/.

31 Article 11 contains an adopted local register of historic resources in the C-3 (Downtown) district.

and a property within the Pacific Gas and Electric (PG&E) City Beautiful Substations Discontinuous Thematic Historic District. Buildings that are identified as contributors and non-contributors within the historic and conservation districts adjacent to the project site are listed in Table 3 and shown on Figure 19.

TABLE 3: CONTRIBUTORS AND NON-CONTRIBUTORS WITHIN HISTORIC/CONSERVATION DISTRICTS ADJACENT TO THE PROJECT SITE

Map No. Building Address	Historic/Conservation District	Date of Construction	Contributor to Historic District
1. 35-37 Sixth Street	Sixth Street Lodging House Historic District	1908	Yes
2. 39-41 Sixth Street	Sixth Street Lodging House Historic District	1906	Yes
3. 43-45 Sixth Street	Sixth Street Lodging House Historic District	1907	Yes
4. 47-55 Sixth Street	Sixth Street Lodging House Historic District	1912	Yes
5. 65-83 Sixth Street	Sixth Street Lodging House Historic District	1913	Yes
6. 986 Mission Street / 481 Jessie Street	Mint-Mission article 11 Conservation District	1907	Yes
7. 980-984 Mission Street/ 479 Jessie Street	Mint-Mission article 11 Conservation District	1924	Yes
8. 972-976 Mission Street	Mint-Mission article 11 Conservation District	1925	Yes
9. 968 Mission Street	Mint-Mission article 11 Conservation District	1930	Yes
10. 471 Jessie Street	Mint-Mission article 11 Conservation District	1912	Yes
11. 956-960 Mission Street	Mint-Mission article 11 Conservation District	1910	No
12. Clearway Energy Thermal Power Station (460 Jessie Street)	PG&E City Beautiful Substations Discontinuous Thematic Historic District	1924	Yes
13. 973 Market Street	Market Street Theatre and Loft Historic District	1904	Yes
14. 979-989 Market Street	Market Street Theatre and Loft Historic District	1907	Yes
15. 995 Market Street / 1 Sixth Street	Market Street Theatre and Loft Historic District	1908	No
Source: San Francisco Planning Department. 2019. Historic Resource Status for Properties Adjacent to 469 Stevenson Street.			

September 25.

The proposed project includes the construction of a building that would be a different scale than existing adjacent historic resources, particularly 35-37, 39-41, and 43-45 Sixth Street, which are low-scale 3-story contributing buildings in the National and California-Register eligible Sixth Street Lodging House Historic District. However, the proposed project's setbacks on the north and west elevations would distance the project's tallest massing from these historical resources (; ensuring their setting is not compromised.

Although the project site directly abuts the thermal power plant at 460 Jessie Street, which is identified as a contributor to the California Register-eligible PG&E City Beautiful Substations Discontinuous Thematic Historic District, the industrial nature of the historic resource is such that its setting would not be impacted by the proposed project. Other identified historical resources, such as the article 11 Mint-Mission Conservation District, and the National Register-listed Market Street Theater and Loft Historic District, have primary elevations that front onto streets away from the proposed project (Market Street and Mission Street) or are sufficiently distanced from the project site such that their setting would not be adversely impacted. Therefore, the planning department determined that the project's proposed design would not materially alter in an adverse manner the physical characteristics of the adjacent historical resources such that their historical significance would be affected.

In summary, the proposed project would not result in a significant impact to the National Register-eligible Market Street Theatre and Loft Historic District, National and California-Register eligible Sixth Street Lodging House Historic District, article 11 Mint-Mission Conservation District, or the California Register-eligible PG&E City Beautiful Substations Discontinuous Thematic Historic District. No mitigation measures are required. This topic will not be discussed in the EIR.

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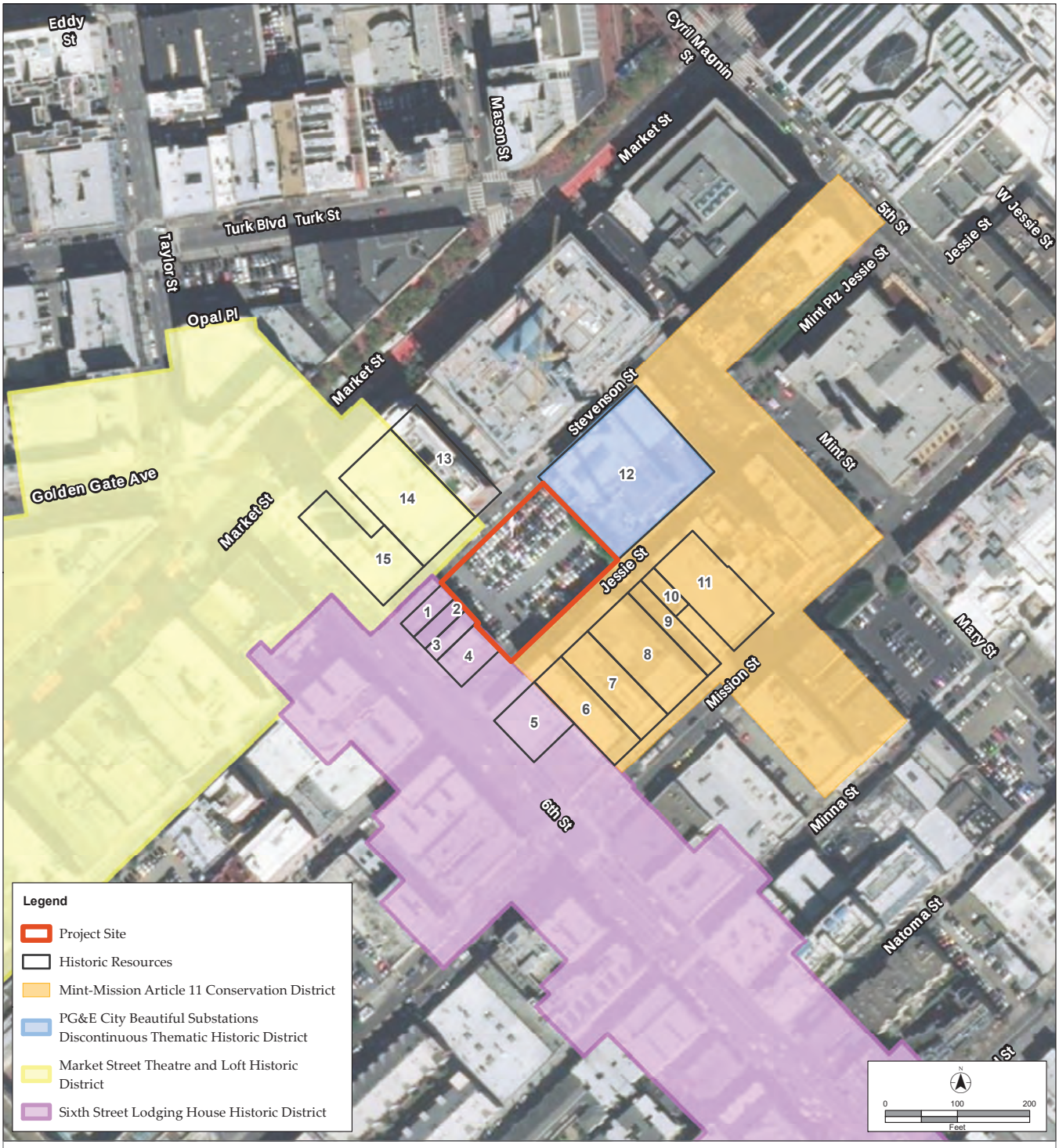

1. 35-37 Sixth Street
2. 39-41 Sixth Street
3. 43-45 Sixth Street
4. 47-55 Sixth Street
5. 65-83 Sixth Street
6. 986 Mission Street/481 Jessie Street
7. 980-984 Mission Street
8. 972- 976 Mission Street
9. 968 Mission Street
10. 471 Jessie Street
11. 956-960 Mission Street (non-contributor)
12. 460 Jessie Street
13. 973 Market Street
14. 979-989 Market Street
15. 995 Market/ 1 Sixth Street (non-contributor)

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Figure 19: Historic Resources in the Project Vicinity

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Impact CR-2: Demolition of the existing surface parking lot and construction of the proposed project would not result in physical damage to adjacent historic resources. (*Less than Significant*)

As noted above, the project site is directly adjacent to the Market Street Theatre and Loft Historic District, Sixth Street Lodging House Historic District, the Mint-Mission article 11 Conservation District, and a property within the Pacific Gas and Electric (PG&E) City Beautiful Substations Discontinuous Thematic Historic District. Buildings that are identified as contributors and non-contributors within the adjacent historic and conservation districts to the project site are listed above in Table 3 and shown on Figure 19. The following paragraph summarizes the results of the project's potential construction vibration impacts to adjacent historic resources. The complete vibration analysis is provided in Appendix A and the results of that analysis are summarized in Section E.6, Noise, of this initial study.

As discussed in Section E.6, Noise, the buildings listed in Table 3 fall within the California Department of Transportation (Caltrans) damage criteria category of "Historic and Some Old Buildings." The proposed project would use vibration-generating equipment during construction activities. The nearest vibration sensitive buildings that would be exposed to this equipment includes the buildings along Sixth Street (35-37, 39-41, 43-45, and 47-55 Sixth Street), which are approximately 20 feet from the project site. Based on Caltrans's suggested vibration damage criteria for "Historic and Some Old Buildings" (0.25 peak particle velocity [PPV]), and the peak particle velocity equation established by the Federal Transit Administration (PPV = PPVref x $[25/\text{Distance}]^{1.5}$) the vibration-generating equipment used during construction activities would generate vibration levels ranging from 0.04 PPV to 0.12 PPV. As such, the vibration levels generated during construction would not exceed the Caltrans vibration damage criteria of 0.25 PPV and the proposed project would not damage adjacent historic resources as a result of construction vibration. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact CR-3: The proposed project could result in a substantial adverse change in the significance of an archeological resource. (*Less than Significant with Mitigation*)

Determining the potential for encountering archeological resources includes relevant factors such as the location, depth, and amount of excavation proposed as well as any recorded information on known resources in the area. Construction of the proposed project would require excavation of the project site to approximately 55 feet below ground surface (bgs) and removal of approximately 55,800 cubic yards of soil for construction of the below grade garage and foundation work. To determine the potential for the proposed project to affect archeological resources, the planning department conducted a preliminary archeological review of the project site.[32] While there are no known prehistoric or historic resources at the project site, the preliminary archaeological review determined that the project site is highly sensitive for prehistoric archeological resources based on proximity of the project site to the resource-rich historic bayshore and Sullivan Marsh. There are

32 San Francisco Planning Department. Environmental Review Preliminary Archeological Review for 469 Stevenson Street, February 19, 2019.

three known prehistoric sites within 0.25 mile of the project site.[33] Intact prehistoric archaeological deposits could be present in the buried dune or marsh deposits, to the full depth of project excavations. Redeposited prehistoric archaeological deposits could also be present in the artificial fill/ reworked native soils that form the uppermost stratum of the project site, as much as 40 feet below surface in native sand and marsh deposits.

Preliminary archaeological review of the project site's development history suggests that earthquake-related debris and fill is likely present in the upper few feet below the surface, but that there is a high potential for the presence of 19th century historic domestic archaeological features under this fill/debris. There also may be the potential for power-generation-related historic industrial features in project soils on the eastern half of the parcel.

As such, given the proposed project's depth of excavation, approximately 55 feet bgs, there is potential for project construction activities to disturb significant archeological resources and the effect of the proposed project on archeological resources would be significant.

Implementation of Mitigation Measure M-CR-3: Archeological Testing, would be required to reduce the potential impact on archeological resources to a less-than-significant level.

MITIGATION MEASURES

Mitigation Measure M-CR-3: Archeological Testing

Based on a reasonable presumption that archeological resources may be present within the project site, the following measures shall be undertaken to avoid any potentially significant adverse effect from the proposed project on buried or submerged historical resources and on human remains and associated or unassociated funerary objects. The project sponsor shall retain the services of an archaeological consultant from the rotational Department Qualified Archaeological Consultants List (QACL) maintained by the planning department archaeologist. After the first project approval action or as directed by the Environmental Review Officer (ERO), the project sponsor shall contact the department archeologist to obtain the names and contact information for the next three archeological consultants on the QACL. The archeological consultant shall undertake an archeological testing program as specified herein. In addition, the consultant shall be available to conduct an archeological monitoring and/or data recovery program if required pursuant to this measure. The archeological consultant's work shall be conducted in accordance with this measure at the direction of the ERO. All plans and reports prepared by the consultant as specified herein shall be submitted first and directly to the ERO for review and comment and shall be considered draft reports subject to revision until final approval by the ERO. Archeological monitoring and/or data recovery programs required by this measure could suspend construction of the project for up to a maximum of four weeks. At the direction of the ERO, the suspension of construction can be extended beyond four weeks only if such a suspension is the only feasible means to reduce

33 Far Western Anthropological Research Group, Inc., and Environmental Science Associates, Archaeological Research Design and Treatment Plan for the Central SoMa Plan Area, April, 2014.

to a less than significant level potential effects on a significant archeological resource as defined in CEQA Guidelines section. 15064.5 (a) and (c).

Consultation with Descendant Communities: On discovery of an archeological site[34] with descendant Native Americans, the Overseas Chinese, or other potentially interested descendant group an appropriate representative[35] of the descendant group and the ERO shall be contacted. The representative of the descendant group shall be given the opportunity to monitor archeological field investigations of the site and to offer recommendations to the ERO regarding appropriate archeological treatment of the site, of recovered data from the site, and, if applicable, any interpretative treatment of the associated archeological site. A copy of the Final Archaeological Resources Report shall be provided to the representative of the descendant group.

Archeological Testing Program. The archeological consultant shall prepare and submit to the ERO for review and approval an *archeological testing plan* (ATP). The *archeological testing program* shall be conducted in accordance with the approved ATP. The ATP shall identify the property types of the expected archeological resource(s) that potentially could be adversely affected by the proposed project, the testing method to be used, and the locations recommended for testing. The purpose of the *archeological testing program* will be to determine to the extent possible the presence or absence of archeological resources and to identify and to evaluate whether any archeological resource encountered on the site constitutes a historical resource under CEQA.

At the completion of the *archeological testing program*, the archeological consultant shall submit a written report of the findings to the ERO. If based on the *archeological testing program* the archeological consultant finds that significant archeological resources may be present, the ERO in consultation with the archeological consultant shall determine if additional measures are warranted. Additional measures that may be undertaken include additional *archeological testing*, *archeological monitoring*, and/or *an archeological data recovery program*. No archeological data recovery shall be undertaken without the prior approval of the ERO or the planning department archeologist. If the ERO determines that a significant archeological resource is present and that the resource could be adversely affected by the proposed project, at the discretion of the project sponsor either:

A. The proposed project shall be re-designed so as to avoid any adverse effect on the significant archeological resource; or

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[34] The term "archeological site" is intended here to minimally include any archeological deposit, feature, burial, or evidence of burial.

[35] An "appropriate representative" of the descendant group is defined here to mean, in the case of Native Americans, any individual listed in the current Native American Contact List for the City and County of San Francisco maintained by the California Native American Heritage Commission and in the case of the Overseas Chinese, the Chinese Historical Society of America. An appropriate representative of other descendant groups should be determined in consultation with the Department archeologist.

B. A data recovery program shall be implemented, unless the ERO determines that the archeological resource is of greater interpretive than research significance and that interpretive use of the resource is feasible.

Archeological Monitoring Program. If the ERO in consultation with the archeological consultant determines that an archeological monitoring program shall be implemented, the archeological monitoring program shall minimally include the following provisions:

- The archeological consultant, project sponsor, and ERO shall meet and consult on the scope of the AMP reasonably prior to any project-related soils disturbing activities commencing. The ERO in consultation with the archeological consultant shall determine what project activities shall be archeologically monitored. The project shall not require pile driving. In most cases, any soils- disturbing activities, such as demolition, foundation removal, excavation, grading, utilities installation, foundation work, site remediation, etc., shall require *archeological monitoring* because of the risk these activities pose to potential archaeological resources and to their depositional context;
- The archeological consultant shall undertake a worker training program for soil-disturbing workers that will include an overview of expected resource(s), how to identify the evidence of the expected resource(s), and the appropriate protocol in the event of apparent discovery of an archeological resource;
- The archeological monitor(s) shall be present on the project site according to a schedule agreed upon by the archeological consultant and the ERO until the ERO has, in consultation with the project archeological consultant, determined that project construction activities could have no effect on significant archeological deposits;
- The archeological monitor shall record and be authorized to collect soil samples and artifactual/ecofactual material as warranted for analysis;
- If an intact archeological deposit is encountered, all soils-disturbing activities in the vicinity of the deposit shall cease. The project shall not require pile driving. The archeological monitor shall be empowered to temporarily redirect demolition/excavation installation/construction activities and equipment until the deposit is evaluated. The archeological consultant shall immediately notify the ERO of the encountered archeological deposit. The archeological consultant shall make a reasonable effort to assess the identity, integrity, and significance of the encountered archeological deposit, and present the findings of this assessment to the ERO.

Whether or not significant archeological resources are encountered, the archeological consultant shall submit a written report of the findings of the monitoring program to the ERO.

Archeological Data Recovery Program. The *archeological data recovery program* shall be conducted in accordance with an *archeological data recovery plan* (ADRP). The archeological consultant, project sponsor, and ERO shall meet and consult on the scope of the ADRP prior to preparation of a draft ADRP. The archeological consultant shall submit a draft ADRP to the ERO. The ADRP shall identify how the proposed *data recovery program* will preserve the significant information the archeological resource is expected to contain. That is, the ADRP

will identify what scientific/historical research questions are applicable to the expected resource, what *data classes* the resource is expected to possess, and how the expected *data classes* would address the applicable research questions. Data recovery, in general, should be limited to the portions of the historical property that could be adversely affected by the proposed project. Destructive data recovery methods shall not be applied to portions of the archeological resources if nondestructive methods are practical.

The scope of the ADRP shall include the following elements:

- *Field Methods and Procedures*. Descriptions of proposed field strategies, procedures, and operations.
- *Cataloguing and Laboratory Analysis*. Description of selected cataloguing system and artifact analysis procedures.
- *Discard and Deaccession Policy*. Description of and rationale for field and post-field discard and deaccession policies.
- *Interpretive Program*. Consideration of an onsite/offsite public interpretive program during the course of the *archeological data recovery program*.
- *Security Measures*. Recommended security measures to protect the archeological resource from vandalism, looting, and non-intentionally damaging activities.
- *Final Report*. Description of proposed report format and distribution of results.
- *Curation*. Description of the procedures and recommendations for the curation of any recovered data having potential research value, identification of appropriate curation facilities, and a summary of the accession policies of the curation facilities.

Human Remains, Associated or Unassociated Funerary Objects. The treatment of human remains and of associated or unassociated funerary objects discovered during any soils disturbing activity shall comply with applicable State and federal laws. This shall include immediate notification of the ERO and the Medical Examiner of the City and County of San Francisco and, in the event of the Medical Examiner's determination that the human remains are Native American remains, notification of the California State Native American Heritage Commission, who shall appoint a Most Likely Descendant (MLD). The MLD will complete his or her inspection of the remains and make recommendations or preferences for treatment within 48 hours of being granted access to the site (Public Resources Code section 5097.98). The ERO also shall be notified immediately upon the discovery of human remains (Public Resources Code section 5097.98). The ERO also shall be notified immediately upon the discovery of human remains.

The project sponsor and ERO shall make all reasonable efforts to develop a Burial Agreement ("Agreement") with the MLD, as expeditiously as possible, for the treatment and disposition, with appropriate dignity, of human remains and associated or unassociated funerary objects (as detailed in CEQA Guidelines section 15064.5(d)). The Agreement shall take into consideration the appropriate excavation, removal, recordation, scientific analysis, custodianship, curation, and final disposition of the human remains and associated or unassociated funerary objects. If the MLD agrees to scientific analyses of the remains and/or associated or unassociated funerary objects, the archaeological consultant shall retain possession of the remains and associated or unassociated funerary objects until completion of

any such analyses, after which the remains and associated or unassociated funerary objects shall be reinterred or curated as specified in the Agreement.

Nothing in existing State regulations or in this mitigation measure compels the project sponsor and the ERO to accept treatment recommendations of an MLD. However, if the ERO, project sponsor and MLD are unable to reach an Agreement on scientific treatment of the remains and associated or unassociated funerary objects, the ERO, with cooperation of the project sponsor, shall ensure that the remains and/or mortuary materials are stored securely and respectfully until they can be reinterred on the property, with appropriate dignity, in a location not subject to further or future subsurface disturbance.

Treatment of historic-period human remains and of associated or unassociated funerary objects discovered during any soil-disturbing activity, additionally, shall follow protocols laid out in the project's archaeological treatment documents, and in any related agreement established between the project sponsor, Medical Examiner and the ERO.

Final Archeological Resources Report. The archeological consultant shall submit a Draft Final Archeological Resources Report (FARR) to the ERO that evaluates the historical significance of any discovered archeological resource and describes the archeological and historical research methods employed in the archeological testing/monitoring/data recovery program(s) undertaken. The Draft FARR shall include a curation and deaccession plan for all recovered cultural materials. The Draft FARR shall also include an Interpretation Plan for public interpretation of all significant archeological features. Copies of the Draft FARR shall be sent to the ERO for review and approval. Once approved by the ERO, the consultant shall also prepare a public distribution version of the FARR. Copies of the FARR shall be distributed as follows: California Archaeological Site Survey Northwest Information Center (NWIC) shall receive one (1) copy and the ERO shall receive a copy of the transmittal of the FARR to the NWIC. The environmental planning division of the planning department shall receive one bound and one unlocked, searchable PDF copy on CD of the FARR along with copies of any formal site recordation forms (CA DPR 523 series) and/or documentation for nomination to the National Register of Historic Places/California Register of Historical Resources. In instances of public interest in or the high interpretive value of the resource, the ERO may require a different or additional final report content, format, and distribution than that presented above.

Significance after Mitigation: Under this measure, an archaeological consultant would implement a project-specific archaeological testing plan, and, if necessary, a monitoring plan and data recovery plan. In the event significant archeological resources are discovered, preservation in place of the resource or implementation of a data recovery program is required. Therefore, the significant information that the archeological resource(s) provides would either be preserved or documented and possibly include a public interpretive display. The measures required by Mitigation Measure M-CR-3: Archeological Testing, would ensure that impacts to archeological resources would be reduced to less than significant. This topic will not be discussed in the EIR.

Impact CR-4: The project could disturb human remains, including those interred outside of formal cemeteries. (*Less than Significant with Mitigation*)

There are no known human remains, including those interred outside of formal cemeteries, located in the immediate vicinity of the project site. However, human remains may be present in prehistoric archaeological deposits, and also may potentially be found in isolation. In the event that human remains are encountered during construction, any inadvertent damage to human remains would be considered a significant impact.

MITIGATION MEASURES

Implement ***Mitigation Measure M-CR-3: Archeological Testing.*** The complete details of this mitigation measure are provided above in this section.

Significance after Mitigation: Mitigation Measure M-CR-3 includes required procedures for the treatment of human remains. With implementation of Mitigation Measure M-CR-3: Archeological Testing, the proposed project would have a less-than-significant impact on previously unknown human remains. This topic will not be discussed in the EIR.

Impact C-CR-1: The proposed project, in combination with reasonably foreseeable projects in the vicinity, could result in a cumulatively considerable contribution to a significant cumulative impact related to cultural resources. (*Less than Significant with Mitigation*)

As discussed above, the project site is a surface parking lot and there are no buildings on the project site that are historically significant. Thus, development on this lot would not result in the direct loss or change to a historic structure. The project site is not within a historic district, conservation district, or thematic district but is directly adjacent to the Market Street Theatre and Loft Historic District, Sixth Street Lodging House Historic District, Mint-Mission article 11 Conservation District, and is in proximity to numerous historic districts. Cumulative projects located nearby, provided in Table 2, include demolition, new construction, and alterations of properties within these historic districts. Of these projects, one project (1055 Market Street) is located within the Market Street Theatre and Loft Historic District and another project (996 Mission Street) is located within the Sixth Street Lodging House Historic District; none of the cumulative projects are within the Mint-Mission article 11 Conservation District. The proposed project is sufficiently distanced from the 1055 Market Street and 996 Mission Street projects such that the proposed project would not combine with the 1055 Market Street and 996 Mission Street project, or other projects, in such a way that there would be a significant cumulative impact on the Market Street Theatre and Loft Historic District, Sixth Street Lodging House Historic District, Mint-Mission article 11 Conservation District, or PG&E City Beautiful Substations Discontinuous Thematic Historic District. Therefore, the proposed project would not combine with cumulative projects to result in significant impacts to historic architectural resources or adjacent historic districts.

Vibration effects are highly localized and vibration attenuates rapidly with distance from the source. Therefore, vibration impacts attributable to construction activities generally would be limited to buildings and structures adjacent to the project site. Since the proposed project would not result in vibration-related damage to adjacent historic structures during construction activities, vibration-generating equipment from the proposed project would not combine with that of cumulative projects (e.g., the 1055 Market Street, 996 Mission Street, Better Market Street, and 527 Stevenson Street projects) to result in cumulative vibration effects that would damage nearby

buildings. Therefore, cumulative vibration effects to nearby historic buildings would be less than significant.

Impacts to archaeological resources and human remains are generally site-specific and limited to the project's construction area. However, there is one cumulative project within 100 feet of the project site (996 Mission Street) that would result in ground disturbance. Given the high sensitivity for prehistoric archeological resources in the immediate vicinity, there is a reasonable potential for the project's construction activities to encounter significant archeological resources that extend beyond the project site and into the areas proposed for excavation by cumulative projects. Therefore, the proposed project in combination with cumulative projects could result in a significant cumulative impact on prehistoric archeological resources. The potential disturbance of archeological resources within the project site could make a cumulatively considerable contribution to a cumulative loss of significant archeological information that would contribute to our understanding of prehistory. Therefore, the proposed project's contribution to this significant impact would be cumulatively considerable.

MITIGATION MEASURES

Implement ***Mitigation Measure M-CR-3: Archeological Testing.*** The complete details of this mitigation measure are provided above in this section.

Significance after Mitigation: As discussed above, implementation of the approved plans for testing, monitoring, and data recovery under Mitigation Measure M-CR-3: Archeological Testing would preserve and realize the information potential of archeological resources discovered during project excavation activities. The recovery, documentation, and interpretation of information about archeological resources that may be encountered within the project site would enhance knowledge of prehistory and history. This information would be available to future archeological studies, contributing to the collective body of scientific and historic knowledge. With implementation of Mitigation Measure M-CR-3: Archeological Testing, the proposed project's contribution to any potential cumulative impacts related to archeological resources or human remains would not be cumulatively considerable. This topic will not be discussed in the EIR.

E.4 Tribal Cultural Resources

Topics:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Not Applicable
4. TRIBAL CULTURAL RESOURCES. Would the project:					
a) Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:					
i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	☐	☒	☐	☐	☐
ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☒	☐	☐	☐

Impact TCR-1: Project-related activities could cause a substantial adverse change in the significance of a tribal cultural resource, as defined in Public Resources Code section 21074. (*Less than Significant with Mitigation*)

CEQA section 21074.2 requires the CEQA lead agency to consider the effects of a project on tribal cultural resources. As defined in section 21074, tribal cultural resources are sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are listed, or determined to be eligible for listing, on the national, state, or local register of historic resources. Pursuant to CEQA section 21080.3.1(d), on March 12, 2019, the planning department contacted Native American individuals and organizations for the San Francisco area, providing a description of the project and requesting comments on the identification, presence, and significance of tribal cultural resources in the project vicinity. During the 30-day comment period, no Native American tribal representatives contacted the planning department to request consultation. On this basis, there are no known tribal cultural resources on the project site.

As discussed in Impact CR-3 in Section E.3, Cultural Resources, the project site is highly sensitive for prehistoric archeological resources based on proximity of the project site to the resource-rich

historic bayshore and Sullivan Marsh. Redeposited prehistoric archaeological deposits could be present in the artificial fill/ reworked native soils that form the uppermost stratum of the project site, as much as 40 feet below surface in native sand and marsh deposits. In San Francisco, based on tribal consultation undertaken by the City and County of San Francisco in 2015, all prehistoric archeological resources are considered also to be potential tribal cultural resources. Impact CR-3 determines that the proposed project's excavation could result in a significant impact to prehistoric archaeological resources should any be encountered. Therefore, the proposed project also has the potential to encounter tribal cultural resources during excavation and other construction activities. Any inadvertent damage to tribal cultural resources would be considered a significant impact. **Mitigation Measure TCR-1, Tribal Cultural Resources Interpretive Program** has been identified to reduce impacts to tribal cultural resources encountered during construction activities to less-than-significant levels.

MITIGATION MEASURES

Mitigation Measure M-TCR-1: Tribal Cultural Resources Interpretive Program

During ground-disturbing activities that encounter archeological resources, if the ERO determines that a significant archeological resource is present, and if in consultation with the affiliated Native American tribal representatives, the ERO determines that the resource constitutes a tribal cultural resource (TCR) and that the resource could be adversely affected by the proposed project, the proposed project shall be redesigned so as to avoid any adverse effect on the significant tribal cultural resource, if feasible.

If the ERO determines that preservation-in-place of the TCR is both feasible and effective, then the archeological consultant shall prepare an archeological resource preservation plan (ARPP). Implementation of the approved ARPP by the archeological consultant shall be required when feasible.

If the ERO, in consultation with the affiliated Native American tribal representatives and the project sponsor, determines that preservation-in-place of the tribal cultural resources is not a sufficient or feasible option, the project sponsor shall implement an interpretive program of the TCR in consultation with affiliated tribal representatives. An interpretive plan produced in consultation with the ERO and affiliated tribal representatives, at a minimum, and approved by the ERO, would be required to guide the interpretive program. The plan shall identify, as appropriate, proposed locations for installations or displays, the proposed content and materials of those displays or installation, the producers or artists of the displays or installation, and a long-term maintenance program. The interpretive program may include artist installations, preferably by local Native American artists, oral histories with local Native Americans, artifacts displays and interpretation, and educational panels or other informational displays.

Significance after Mitigation: Mitigation Measure M-TCR-1 would require either preservation-in-place of the tribal cultural resources if determined effective and feasible, or the project sponsor would coordinate with the affiliated Native American tribal representatives to prepare and implement an interpretive program regarding the TCR. Therefore, with implementation of

Mitigation Measure M-TCR-1, impacts to tribal cultural resources would be reduced to less than significant. This topic will not be discussed in the EIR.

Impact C-TCR-1: The proposed project, in combination with reasonably foreseeable future projects, could result in a cumulatively considerable contribution to a cumulative tribal cultural resources impacts. (*Less than Significant with Mitigation*)

Cumulatively, as discussed above in Impact C-CR-1, development in the project vicinity has the potential to result in impacts to prehistoric archaeological resources, which are also considered tribal cultural resources. If the project were to encounter tribal cultural resources, this could result in a significant cumulative impact. The potential disturbance of tribal cultural resources within the project site could make a cumulatively considerable contribution to a cumulative loss of tribal cultural resources. Therefore, the proposed project's contribution to this significant impact would be cumulatively considerable.

MITIGATION MEASURES

Implement ***Mitigation Measure M-TCR-1: Tribal Cultural Resources Interpretive Program.*** The complete details of this mitigation measure are provided above in this section.

Significance after Mitigation: Should any TCRs be encountered during excavation or other construction activities, M-TCR-1 would require those resources to be preserved in place or an interpretive program would be required. Mitigation Measure M-TCR-1 would ensure that the proposed project's contribution to any cumulative impacts on tribal cultural resources would be less than significant. This topic will not be addressed in the EIR.

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E.5 Transportation and Circulation

Topics:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Not Applicable
5. TRANSPORTATION AND CIRCULATION. Would the project:					
a) Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☒	☐	☐
b) Conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)?	☐	☐	☒	☐	☐
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses?	☐	☐	☒	☐	☐
d) Result in inadequate emergency access?	☐	☐	☒	☐	☐

The following discussion is based on a transportation analysis prepared for the proposed project in accordance with the planning department's 2019 Transportation Impact Analysis Guidelines for Environmental Review (SF Guidelines).[36]

This transportation analysis examines the transportation-related impacts of the proposed project's construction activities, as well as the proposed project's operational impacts on transportation hazards, accessibility, public transit, VMT, and loading. The transportation analysis is included in Appendix B of this initial study.

SETTING

The roadway network surrounding the project site is generally an east-west and north-south grid. The project site is bound by Stevenson Street to the north and Jessie Street to the south. Stevenson Street and Jessie Street are both one-way eastbound alleyways. Stevenson Street connects Sixth Street to Fifth Street, while Jessie Street ends at nearby Mint Plaza, where the roadway turns southbound at Mint Street and ends at Mission Street.

Access to the project site for people walking, bicycling, and driving is provided from Fifth Street and Sixth Street, which are both four-lane, north-south roadways that are designated as major arterials in the San Francisco General Plan. Sixth Street is designated as a neighborhood commercial street between Market Street and Folsom Street.

[36] The guidelines were updated in February 2019. The updated guidelines include revised guidance on travel demand and updated trip generation rates. The updated guidelines are available here: http://default.sfplanning.org/publications_reports/TIA_Guidelines.pdf

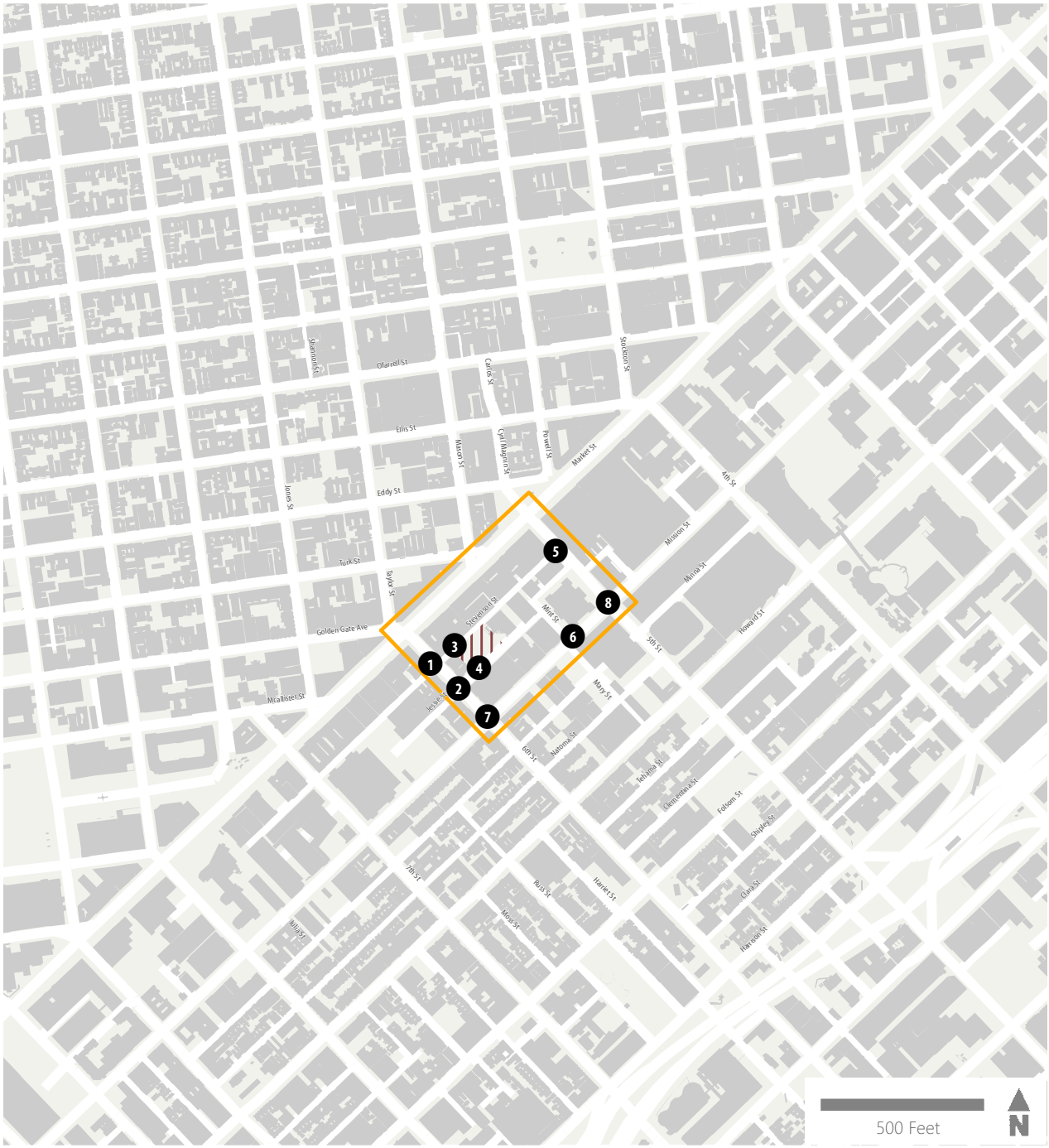
To the north and south of the project site, Market and Mission streets are four-lane, east-west streets designated as transit- and pedestrian-priority streets, with frequent transit service, high ridership, and wider sidewalks encouraging pedestrian-oriented uses. Market Street also has a combination of class 2 and class 3 bicycle facilities near the project site.

Currently, the project site is a 176-space vehicle surface parking lot. Directly adjacent to the project site, on-street parallel parking is provided along the south side of both Stevenson Street and Jessie Street interspersed with several driveways, yellow "commercial loading" zones, white "passenger loading" zones, and red "no parking" zones.

The proposed project is not located in a plan area, although it is adjacent to the Central SoMa Plan and West and Eastern SoMa Plans. The transportation study area generally includes both the areas immediately adjacent to the proposed project and in the nearby vicinity to capture all possible effects on the transportation system. Figure 20 below shows the study areas, including the project site, study intersections, and surrounding street grid.

The project site is well-served by local public transit and regional transit service. The closest surface transit stop is located at Market Street and Sixth Street, approximately 300 feet north of the project site, which serves the F-Market, 6-Haight-Parnassus, 7-Haight-Noriega, 9-San Bruno, 9R-San Bruno Rapid, and 21-Hayes routes. Additionally, local Muni light rail lines K-Ingleside, T-Third Street, J-Church, L-Taraval, M-Oceanview and N-Judah can be accessed from the Powell Street Station located approximately 700 feet northeast of the project site. Regional transit service is provided by BART also via the Powell Street Station. Regional transit service is also provided by SamTrans and Golden Gate Transit. SamTrans routes 292, 397, and 398 serve San Mateo County and run along Mission Street with the closest stop at Mission Street and Fifth Street (approximately 600 feet east of the project site). Golden Gate Transit routes 30, 70, 101, and 101X serve Marin County and also run along Mission Street with the closest stop at Mission Street and Fifth Street. The Muni routes serving the project area provide connections to other regional transit providers, including Alameda County (AC) Transit, Caltrain, and the Golden Gate Ferry Terminal in the Ferry Building.

Sixth Street is identified as a high injury corridor; the Sixth Street Pedestrian Safety Improvement Project, assumed as part of baseline operational conditions in this analysis, is designed to address and improve pedestrian safety along the corridor. The Sixth Street project would add new signals along Sixth Street at Stevenson Street and Jessie Street and provide pedestrian amenities such as widened sidewalks, curb ramps, crosswalks, and pedestrian crossing signal heads at the nearest intersections (Sixth Street/Stevenson Street and Sixth Street/Jessie Street) to the project site. Additionally, in the future, the Sixth Street project would prohibit left turns at these two intersections during the peak hours, reducing the potential for conflicts between turning southbound vehicles and northbound vehicles or people walking or bicycling there.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Jones St
Taylor St
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Polk St
Van Ness Ave
Franklin St
Gough St
Octavia St
Laguna St
Buchanan St
Webster St
Fillmore St
Steiner St
Pierce St
Scott St
Divisadero St
Broderick St
Baker St
Lyon St
Presidio Ave
Masonic Ave
Stanyan St
Shrader St
Cole St
Clayton St
Ashbury St
Cole St
Arguello Blvd
Funston Ave
Stanyan St
Willard St
Grattan St
Parnassus Ave
Frederick St
Carl St
Beulah St
Clarendon Ave
Dolores St
Church St
Sanchez St
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Diamond St
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PROJECT TRAVEL DEMAND

As described in Section A, Project Description, the proposed project would provide approximately 4,000 square feet of commercial retail space on the ground floor, 462 residential units, 171 vehicle parking spaces (including three car share spaces), 192 class 1 bicycle parking spaces, and 25 class 2 bicycle parking spaces. The proposed project land uses and parking supply are summarized in Table 1 under Project Summary.

Estimated project person trip generation (Table 4) was performed pursuant to methodologies outlined in the San Francisco Guidelines. For purposes of calculating the project's travel demand and trip generation, this analysis did not take trip credits[37] associated with the removal of the existing 176-space parking lot. The vehicle trips that use the existing parking lot may continue to drive and park at other nearby parking lots, shift their work schedule, or shift to a non-drive travel mode. However, this analysis assumes no mode shift or time of day shift and does not subtract any existing trips from project trips, resulting in a more conservative estimate of project trips. The analysis does assume that the vehicle trips to the existing parking lot would no longer access the project site and would relocate to other nearby parking facilities. The project is expected to generate approximately 299 p.m. peak hour and 3,355 daily person trips. Of these person trips, the proposed project is expected to generate approximately 55 p.m. peak hour and 628 daily vehicle trips, including trips made by taxis and transportation network companies, and 83 p.m. peak hour and 929 daily transit trips. The existing parking facility serves 43 p.m. peak hour entering/exiting vehicle trips, so the traffic volumes generated by the uses at the project site with and without the proposed project would be similar during the p.m. peak hour.

Estimated project vehicle trips were then assigned to the roadway network based on projected paths of travel. The existing conditions were adjusted to account for changes to the transportation network associated with the approved and funded Sixth Street Pedestrian Safety Improvement Project.[38] As a result, the baseline plus project analysis assumes that vehicles would not be allowed to turn left from Sixth Street onto Jessie Street or Stevenson Street during the peak hours to access the project site.

Under baseline plus project conditions, study intersections that would experience the largest increases to vehicle trips would be Sixth Street/Stevenson Street and Sixth Street/Jessie Street as they provide direct access to the project's parking garage and passenger loading zones. The largest increase to a single intersection movement would be 21 p.m. peak vehicle trips traveling northbound through the intersection of Sixth Street/Jessie Street, of which 19 of those vehicles trips

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[37] Trip credits refer to when the trips associated with the existing land use on a project site are considered in the estimation of net new trips associated with the proposed land use. For example, the number of estimated trips for a proposed project – existing observed trips = net new trips.

[38] San Francisco Municipal Transportation Agency, 6th Street Pedestrian Safety Project. https://www.sfmta.com/projects/6th-street-pedestrian-safety-project.

are then estimated to turn right (east) at the Sixth Street/Stevenson Street intersection. Vehicle trip assignment figures are shown in Appendix B.

TABLE 4: PROJECT TRIP GENERATION

Land Use		Person Trips by Mode					Vehicle Trips[2]			Transit Trips	
		Auto	Transit	Other[1]	Walk	Total	In	Out	Total	In	Out
Daily											
Retail[3]	4,000 sf	95	152	22	329	600	28	31	59	82	71
Residential	462 Dwelling Units (DU)	854	776	80	1,045	2,772	318	251	570	308	468
Total		**949**	**929**	**103**	**1,374**	**3,355**	**347**	**282**	**628**	**390**	**539**
PM Peak Hour											
Retail	4,000 sf	8	14	2	30	54	2	3	5	6	8
Residential	462 DU	76	69	7	93	245	39	11	50	50	19
Total		**84**	**83**	**9**	**123**	**299**	**41**	**15**	**55**	**56**	**27**

Notes:
General: Due to rounding, numbers may not add up to 100 percent
1. Other includes biking, skateboarding, etc.
2. Vehicle trips accounts for average vehicle occupancy of private auto trips and vehicles operating as Transportation Network Companies (TNCs) and taxis
3. Includes internal/linked trip reductions as appropriate

Source: SF Guidelines, Fehr & Peers, 2018

As shown in Table 5, the project is expected to generate up to 15 daily truck trips and up to one peak hour truck trip. Freight loading demand calculations are shown in Appendix B.

TABLE 5: FREIGHT LOADING DEMAND

Land Use	Truck Trip Generation (Daily)	Truck Trip Generation (peak hour of loading)	Truck Trip Generation (Average generation per hour)
Retail	0.9	0.05	0.04
Residential	13.8	0.80	0.64
Total	**14.7**	**0.85**	**0.68**

Source: SF Guidelines, Fehr & Peers, 2018

Project passenger loading demand during the p.m. peak hour is two passenger car equivalents, which equate to an approximate 40-foot long loading zone. Passenger loading demand is summarized in Table 6 and in Appendix B.

TABLE 6: PASSENGER LOADING DEMAND

Land Use	Passenger Loading %	PM Peak Hour Loading Instances	PM Peak Hour Spaces of Loading Demand[1]	Rounded PM Peak Hour Spaces of Loading Demand
Retail	5.5%	3	0.05	1
Residential	8.8%	22	0.36	1
Total	**-**	**25**	**0.41**	**2**

Notes:
[1] Peak hour loading demand is calculated using equations included in the SF Guidelines and an average stop duration of 1 minute.
Source: SF Guidelines, Fehr & Peers, 2018

The department uses significance criteria to facilitate the transportation analysis and address the Appendix G checklist questions. The department separates the significance criteria into construction and operation. The significance criteria are listed below.

Construction

Construction of the project would have a significant effect on the environment if it would require a substantially extended duration or intense activity; and the effects would create potentially hazardous conditions for people walking, bicycling, or driving, or public transit operations; or interfere with accessibility for people walking or bicycling or substantially delay public transit.

Operation

The operational impact analysis addresses the following five significance criteria. A project would have a significant effect if it would:

- Create potentially hazardous conditions for people walking, bicycling, or driving or public transit operations
- Interfere with accessibility of people walking or bicycling to and from the project site, and adjoining areas, or result in inadequate emergency access
- Substantially delay public transit
- Cause substantial additional VMT or substantially induce additional automobile travel by increasing physical roadway capacity in congested areas (i.e., by adding new mixed-flow travel lanes) or by adding new roadways to the network
- Result in a loading deficit and the secondary effects would create potentially hazardous conditions for people walking, bicycling, or driving or substantially delay public transit

NEAR-TERM BASELINE PLUS PROJECT IMPACT ASSESSMENT

Transportation impacts are described below for a near-term baseline with project scenario. Specific projects and plans included in the near-term baseline scenario are: 5M Project (Planning Department Case No. 2011.0409E), Sixth Street Pedestrian Improvement Project, signalization of the intersection at Mission Street and Mint Street (to accommodate a signalized pedestrian

crossing and other pedestrian safety improvements) as part of Vision Zero, and Central Subway. Existing conditions were adjusted to account for projects included in the near-term baseline scenario; these adjustments were made both quantitatively and qualitatively, depending on the nature of the specific project. For instance, project vehicle volumes generated by the 5M Project[39] were added to existing intersection volumes[40] to form baseline intersection volumes. Physical changes associated with improvement projects (Sixth Street, Vision Zero) were assumed to be built under the baseline scenario. Physical changes include signalization of Stevenson Street/Sixth Street, Jessie Street/Sixth Street, and Mission Street/Mint Street, along with other pedestrian safety improvements as described in more detail in subsequent sections. Transit improvements associated with Central Subway, including changes to other routes are assumed to be operational under this baseline scenario.

Impact TR-1: Construction of the proposed project would not require a substantially extended duration or intense activity and the secondary effects would not create potentially hazardous conditions for people walking, bicycling, or driving; or interfere with accessibility for people walking or bicycling; or substantially delay public transit. (*Less than Significant*)

The discussion of construction impacts is based on currently available information from the project sponsor, local and state regulations regarding use of the public right-of-way, and experience with typical construction practices in San Francisco.

Construction activities would be staged on-site and along the Stevenson Street and/or Jessie Street frontages of the project site. It is expected that some temporary partial sidewalk closures along the project frontage on Stevenson Street and Jessie Street would likely be required during the construction period. Periodic closure and use of Jessie Street may also occur for certain construction activities. It is not expected that the project would block Jessie Street for more than one week at a time. At times, staging would occur in both the street and the sidewalk. The street would require occasional closure to allow for project construction activities, such as installation of the tower crane, mat foundation construction or material deliveries. Jessie Street could be used for temporary staging of the tower crane. It is anticipated that construction activities would block 100 feet of Jessie Street for the width of the sidewalk and the driving aisle (primarily for the tower crane erection and dismantling).

During the construction period, there would be a flow of construction-related trucks to and from the project site, which could result in temporary lower capacities of local streets due to the slower movement and larger turning radii of trucks, with the largest disruption to traffic taking place on Stevenson Street and Jessie Street. Construction activities would also generate construction worker trips to and from the project site and temporary demand for vehicle parking and public transit. Project construction is expected to last 36 months (November 2020 to November 2023), and thus the schedule is not expected to require a substantially extended duration or intense activity.

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[39] San Francisco Planning Department. October 2014. 5M Transportation Impact Study. Case No. 2011.0409E.

[40] Existing volumes were adjusted to account for the 5M Project at all study intersections except intersection 3 (Stevenson Street/Resident Driveway) and intersection 4 (Jessie Street/Passenger Loading Zone)

Changes to the transportation circulation network in the project area related to construction activities would be temporary and of limited duration. Construction activities in San Francisco that have the potential to affect the transportation network are subject to the San Francisco Municipal Transportation Agency's Regulations for Working in San Francisco Streets, also known as the "blue book," as well as the public works code and public works department orders.[41] The authority for the blue book is derived from the San Francisco Transportation Code and primarily addresses construction activities affecting the public right-of-way. The blue book is a manual for city agencies (public works, San Francisco Municipal Transportation Agency [SFMTA], public utilities commission, the port, etc.), utility crews, private contractors, and others doing work in San Francisco's public right-of-way. The blue book establishes rules for working safely and causing the least possible interference with people walking, bicycling, taking transit and/or transit operations, as well as people driving.

Per blue book requirements, the project sponsor and their construction contractor(s) will prepare a construction management plan and coordinate with appropriate city staff to develop specific measures that would reduce impacts of construction-related traffic to people driving, people bicycling, people walking, and public transit circulation. The construction management plan will include construction staging locations; construction timing (including a provision to limit construction traffic to off-peak periods when possible); notification procedures for adjacent property owners; applicable detours for people walking, people bicycling, and people driving; construction routing; and coordination plans with other nearby projects under construction.

If project construction activities would not comply with the blue book, the contractor must apply for a special traffic permit from the SFMTA. SFMTA staff would specify conditions in the special traffic permit for safe travel in and around the project site. Examples of the types of work addressed through special traffic permits include sidewalk, alley, and street closures, temporary relocation of transit stops and/or routes, and closing or detouring a bicycle route. Additionally, all traffic control implemented as part of any special traffic permit conditions would be required to conform to the California Manual of Uniform Traffic Control Devices.[42] With respect to public works' policy, a safe and accessible path of travel must be provided for all people walking, including those with disabilities, around construction sites.[43] To that end, the public works code includes requirements related to excavation in the public right-of-way and may require the development and implementation of a contractor parking plan.

As stated above, it is expected that temporary partial sidewalk closures along the project frontage on Stevenson Street and Jessie Street may be required during the construction of the proposed

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41 San Francisco Municipal Transportation Agency, City and County of San Francisco Regulations for Working in San Francisco Streets, 8th Edition, January 2012, https://www.sfmta.com/sites/default/files/reports-and-documents/2018/09/blue_book_8th_edition_pdf.pdf, accessed November 15, 2018.

42 California Department of Transportation, 2014 California Manual of Uniform Traffic Control Devices Rev 3, March 2018, http://www.dot.ca.gov/trafficops/camutcd/, accessed November 15, 2018.

43 San Francisco Public Works, Guidelines for the Placement of Barricades at Construction Sites (ORDER NO. 167,840), 2008, http://sfpublicworks.org/sites/default/files/Guidelines_for_Placement_of_Barricades_0.pdf, accessed November 15, 2018.

project. These closures would not create potentially hazardous conditions for people walking, bicycling or driving, and would not interfere with accessibility because the project sponsor would be required to submit accessibility plans for approval by city agencies to ensure continued access for people walking and bicycling. During the construction period, there would be a flow of construction-related trucks to and from the project site, which could result in temporary lower capacities of local streets due to the slower movement and larger turning radii of trucks. However, the largest disruption to transportation modes would take place on Stevenson and Jessie streets where vehicle speeds, and pedestrian and bicycle volumes and speeds are low. People walking on Stevenson Street or Jessie Street may need to use sidewalks across the street from the project frontage during construction if sidewalks adjacent to the project frontage are temporarily closed. Although some additional trips may reroute to other streets with the disruption on Stevenson Street and Jessie Street, direct interference with accessibility for people walking or bicycling on other streets in the area would be minimal due to the low existing demand.

Project construction activities would not require lane closures. Construction vehicles accessing and leaving the project site might delay public transit, but those activities would be temporary. Further, public transit does not operate along Jessie or Stevenson streets, the streets that would result in greatest disruption to traffic during project construction. Therefore, project construction activities would not substantially delay public transit.

Based on the above, construction of the proposed project would not create potentially hazardous conditions for people walking, bicycling, or driving; or substantially interference with accessibility for people walking or bicycling; or substantially delay public transit.

This impact would be less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact TR-2: Operation of the proposed project would not create potentially hazardous conditions for people walking, bicycling, driving or public transit operations. (*Less than Significant*)

The project proposes to convert an existing 176-space parking lot to a mixed-use residential development. The proposed project does not include any design features that would result in potentially hazardous conditions (e.g., a new sharp curve or dangerous intersections) or include any incompatible uses. The existing site currently has two driveway curb cuts – one on Stevenson Street and one on Jessie Street. With implementation of the proposed project, driveway curb cuts at the project site would be reduced to one on Stevenson Street. The lobby entrance and access point for bicycle parking would be on Jessie Street, which would be the primary access point for people walking or bicycling. Stevenson Street would be the primary access point for people who need to park in the garage, separating and reducing potential conflicts between people driving and those walking or bicycling to and from the project site.

Better Streets Plan standards require sidewalk widths for alleyways must be a minimum of 6 feet. Stevenson Street along the project frontage exceeds the minimum width with 7-foot sidewalks, while Jessie Street along the project frontage exceeds the minimum with 10-foot sidewalks. To inform the project analysis, site observations at 469 Stevenson Street were conducted on Wednesday, September 19, 2018 during the p.m. peak period (defined as 4-6 p.m.). The pedestrian

volume at the Stevenson Street parking lot driveway was observed to be 20 people per hour during the p.m. peak, while observations indicated that the driveway on Jessie Street has little to no foot traffic. The project is anticipated to add an additional 123 walking trips during the p.m. peak, primarily on Jessie Street. Based on site observations and counts, existing pedestrian volumes are low and there is sufficient capacity on adjacent sidewalks to handle both existing foot traffic and the anticipated project-generated walking activity. Because of this and the fact that sidewalks adjacent to the project meet Better Streets standards, the project would not create potentially hazardous conditions for people walking. The project site does not include any physical obstructions or slopes that would obstruct sightlines between a substantial amount of people walking and people driving or bicycling adjacent to the proposed project. In addition, public transit does not operate along Jessie or Stevenson streets. The project does not propose other changes to the roadway network that would create potentially hazardous conditions for people walking, bicycling, driving, or riding public transit.

The proposed project would generate walking and bicycling trips through the intersections along Sixth Street but would not substantially change the number of vehicles turning onto Jessie Street or Stevenson Street when compared to the existing parking lot. Vehicle trips associated with the existing parking lot may remain on the network but would not turn onto Stevenson Street or Jessie Street once the parking lot is removed. New vehicle trips to the proposed project represent an increase of only 12 trips in the p.m. peak hour compared to the existing parking lot, representing less than ten percent of all traffic on Stevenson Street and Jessie Street.

Project-generated vehicle traffic (632 daily and 49 p.m. peak hour vehicle trips) would be dispersed among multiple streets within the project vicinity. Because existing parking lot trips (43 p.m. peak hour vehicle trips) are not removed from the network, some would likely continue to travel through nearby intersections and roadways, resulting in a slight increase in traffic due to the proposed project. This includes Sixth Street at Market Street and Mission Street, Fifth Street at Market Street and Mission Street, and Mission Street and Mint Street (signalized by Vision Zero under baseline conditions). However, the net increase of 49 vehicle trips during the p.m. peak hour (less than one additional vehicle per minute) is minimal compared to existing vehicle volumes in the project vicinity (e.g., over 2,000 vehicles at Sixth and Mission street intersection during the p.m. peak hour). This net increase would not be considered a potentially hazardous condition to other people driving, walking, bicycling, or taking transit at these locations.

Most streets in the study area include signals and pedestrian facilities, except for the side street stop-controlled intersection of Stevenson Street and Fifth Street, which does not have a designated pedestrian crossing across Fifth Street. The proposed project would add 28 vehicle trips to this intersection. The proposed project would not generate a substantial demand for pedestrian crossings at the unmarked crossing at Fifth Street and Stevenson Street.

The proposed off-street loading dock is located within the project garage and is accessed by a shared driveway with the garage. The project is estimated to generate approximately 15 daily truck trips. It is anticipated that those truck trips would use the existing on-street freight loading spaces and the proposed off-street loading dock. The project's garage attendant would serve as a "flagger" and assist trucks entering and exiting to reduce conflicts with people walking, bicycling, and driving on Stevenson Street. If a person driving is waiting to enter the garage while a truck is maneuvering into the loading dock, there is approximately 100 feet available (enough space for

approximately five vehicles) to queue between the driveway and Sixth Street. Therefore, it is not expected that loading activities would result in queuing that would impact transportation operations along Sixth Street. Given this distance and the limited number (49) of p.m. peak hour project vehicles trips, blocking of Sixth Street, including the crosswalk across Stevenson Street, are not expected. No transit currently operates on Sixth Street from Market Street to Mission Street, and no transit is planned for this corridor, so loading operations would not create potentially hazardous conditions for transit operations.

Based on the above, the proposed project would not create potentially hazardous conditions for people walking, bicycling, driving, or riding public transit and impacts are less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact TR-3: Operation of the project would not interfere with accessibility of people walking or bicycling to and from the project site, and adjoining areas, or result in inadequate emergency access. (*Less than Significant*)

The proposed project is expected to generate 1,396 daily and 124 p.m. peak hour walking trips. Walking trips generated by the proposed project would include trips to and from transit stops and other nearby land uses. The proposed project would not change the existing sidewalk widths, which are seven feet wide on Stevenson Street and ten feet wide on Jessie Street along the project frontage (meeting Better Streets Plan minimum widths for alleyways). While the project would not widen any sidewalks, the project would make any necessary repairs following construction. People are anticipated to travel across Jessie Street toward the middle of the block, across from the main residential lobby, to reach the passenger loading zone on the south side of Jessie Street. Jessie Street is a narrow alleyway and vehicle volumes and speeds on this alleyway are low. Adequate freight loading is provided off-street such that vehicles loading on-site are not expected to block people walking (refer to Impact TR-6). As a result, impacts related to accessibility for people walking would be less than significant.

The proposed project is expected to generate 104 daily and 9 p.m. peak hour other trips (other includes biking, etc.). To serve people bicycling, the proposed project would include 192 secure class 1 bicycle parking spaces in a designated bicycle storage room located at garage level 1 and accessible via the main lobby on Jessie Street. In addition to class 1 bicycle parking spaces, the proposed project includes 25 class 2 bicycle parking spaces on Stevenson Street and Jessie Street. People riding bicycles to and from the proposed project would use nearby bicycle facilities such as Market Street, Howard Street, Folsom Street, Fifth Street, and Seventh Street to reach Sixth Street or Fifth Street, where they could either ride or walk their bikes to Stevenson Street or Jessie Street to reach the project site. Implementation of the proposed project would not alter the existing street grid or result in other physical changes that would affect these bicycle routes and lanes. While the proposed project would increase the amount of vehicle traffic in the project vicinity, the expected magnitude of this increase on any one street would not be substantial enough to interfere with accessibility of people bicycling. Therefore, impacts related to accessibility for people bicycling would be less than significant.

Emergency vehicle access is currently provided along both Stevenson Street and Jessie Street adjacent to the project site frontages. Emergency access to the site would remain unchanged from existing conditions with the proposed project. The project does not include any design features

that would affect emergency access, such as changes to overhead wires or physical barriers that restrict access. There are no emergency service operator facilities in the immediate vicinity of the project site that rely exclusively on either Stevenson or Jessie streets. Project-generated vehicle traffic would be dispersed among multiple streets within the project vicinity and therefore, would not be expected to result in substantial delay to emergency vehicles in the project vicinity.

The project proposes to include a gate at the garage ramp to meter entering vehicles. A queuing analysis for the p.m. peak period shows that there would be no queue at the garage ramp a majority of the time, and a 2-vehicle queue at the garage ramp up to two percent of the time, or for no more than two minutes during the p.m. peak.[44] Queues from project vehicle trips can be accommodated on the driveway ramp by placing the gate metering inbound traffic at the base of the driveway. Even if the gate is located at the top of the garage ramp, there would be enough space for one car to queue on the ramp with approximately 100 feet of space (enough space for approximately five vehicles to queue) on Stevenson between the garage driveway and Sixth Street for vehicles to queue. Therefore, project vehicle trips at the garage ramp are not expected to create queues that could hinder emergency vehicle access to the site. Additionally, non-emergency vehicles must yield right-of-way to emergency vehicles per the California Vehicle Code. Finally, the proposed project would not close off any existing streets or entrances to public uses or otherwise interfere with emergency access. Therefore, the proposed project would have a less-than-significant impact on emergency access.

Based on the information above, the proposed project's operations would not interfere with accessibility of people walking or bicycling to and from the project site, and adjoining areas, or result in inadequate emergency access and impacts are less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact TR-4: Operation of the proposed project would not substantially delay public transit. (*Less than Significant*)

The project site is located Downtown near many major local and regional transit routes. There are numerous public transit options available on Market Street, approximately 300 feet north of the project site. The Powell Street BART and Muni Metro Station is located approximately 700 feet northeast of the project site. The proposed project would generate 929 daily transit trips, including 83 during the p.m. peak hour. These transit trips would be distributed among the multiple transit lines serving the project vicinity.

The proposed project would generate 55 vehicle trips during the p.m. peak hour. The department's screening criteria for a quantitative analysis of transit delay is 300 inbound peak hour project-generated vehicle trips. As the proposed project is estimated to result in fewer than 300 inbound project vehicle trips during the peak hour, a quantitative transit delay analysis is not

[44] Driveway queuing analysis is shown in Appendix B.

required.[45] The majority of project-generated vehicle trips will access the garage on Stevenson Street or the passenger loading zone on Jessie Street via Sixth Street. As described under Impact TR-3, vehicle queues can be accommodated in the project driveway. In the event that vehicles must queue outside the project driveway while waiting for a truck to maneuver in or out of the loading dock, there is 100 feet (enough space for approximately five vehicles) available between the driveway and Sixth Street. Therefore, loading operations would not impact transit operations.

No transit currently operates on Sixth Street from Market Street to Mission Street, and no transit is planned for this corridor. Given the locations of the passenger loading zones on Jessie Street and the garage entrance on Stevenson Street and that vehicle trips generated by the proposed project would be distributed to other roadways, relatively few project trips would be added to streets with transit (Market Street, Mission Street, and Fifth Street) and substantial queuing due to the project is not expected on those streets. The proposed project would not add a substantial amount of vehicle trips crossing a transit line or transit facilities. The proposed project would not relocate any existing transit amenities or service. Therefore, the proposed project's traffic would not substantially delay public transit.

In summary, the proposed project would not generate a substantial number of new daily person trips or vehicle trips to roadways with transit service. Thus, the proposed project's impact on transit service delay would be less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact TR-5: Operation of the proposed project would not cause substantial additional VMT. *(Less than Significant)*

Vehicle miles traveled per person (or per capita) is a measurement of the amount and distance that a resident, an employee, or a visitor drives, accounting for the number of passengers within a vehicle. In general, higher VMT areas are associated with more air pollution, including greenhouse gas emissions and energy use, than lower VMT areas. Many interdependent factors affect the amount and distance a person might drive. In particular, the built environment affects how many places a person can access within a given distance, time, and cost, using different ways of travels (e.g., private vehicle, public transit, bicycling, walking, etc.). Typically, low-density development located at great distances from other land uses and in areas with few options for ways of travel provides less access than a location with high density, mix of land uses, and numerous ways of travel. Therefore, low-density development typically generates more VMT compared to a similarly sized development located in urban areas, such as the project site.

Given these travel behavior factors, on average, persons living or working in San Francisco result in lower amounts of VMT per person than persons living or working elsewhere in the nine-county San Francisco Bay Area region. In addition, on average, persons living or working in some areas of San Francisco result in lower amounts of VMT per person than persons living or working

[45] SF Planning Department, Transportation Impact Analysis (TIA) Guidelines. Available at: http://default.sfplanning.org/publications_reports/TIA_Guidelines.pdf. Appendix I of the TIA Guidelines describes the transit delay screening criteria.

elsewhere in San Francisco. The city displays different amounts of VMT per capita geographically through transportation analysis zones (TAZs).

The San Francisco County Transportation Authority uses the San Francisco chained activity modeling process to estimate VMT by private automobiles and taxis for different TAZs. The transportation authority calibrates travel behavior in the model based on observed behavior from the California Household Travel Survey 2010-2012, census data regarding automobile ownership rates and county-to-county worker flows, and observed vehicle counts and transit boardings The model uses a synthetic population, which is a set of individual actors that represents the Bay Area's actual population, who make simulated travel decisions for a complete day.

The model estimates daily VMT for residential, office, and retail land use types. For residential and office uses, the transportation authority uses tour-based analysis. A tour-based analysis examines the entire chain of trips over the course of a day, not just trips to and from a site. For retail uses, the transportation authority uses trip-based analysis. A trip-based analysis counts VMT from individual trips to and from a site (as opposed to entire chain of trips). A trip-based approach, as opposed to a tour-based approach, is necessary for retail sites because a tour is likely to consist of trips stopping in multiple locations, and the summarizing of tour VMT to each location would over-estimate VMT.

The department uses existing plus project-level thresholds of significance based on levels at which the department does not anticipate new projects to conflict with state and regional long-term greenhouse gas emission reduction targets and statewide VMT per capita reduction targets. Therefore, the department uses a map-based screening criterion to identify types and locations of land use projects that would not exceed the same quantitative thresholds of significance described under existing plus project conditions.

Table 7 presents the existing average daily VMT per capita for residents and employees for the nine-county San Francisco Bay Area and for TAZ 667, the zone in which the project site is located. TAZ 667 is bounded by Market Street and Mission Street to the north and south and Sixth Street and Fifth Street to the east and west, with the exception of the Old US Mint Building parcel. The existing average daily VMT per capita for the various land uses proposed by the project and present in TAZ 667 is far less than the regional Bay Area averages.

TABLE 7: EXISTING VEHICLE MILES TRAVELED

Land Use	Bay Area Regional Average	Bay Area Regional Average Minus 15% (Threshold)	TAZ 667
Households (Residential)	17.2	14.6	1.9
Employment (Retail)	14.8	12.6	7.3
Notes: Source: SF Planning Department; Fehr & Peers, 2019			

The planning department uses the following quantitative thresholds of significance to determine whether the project would generate substantial additional VMT:

- For residential projects, if it exceeds the regional household VMT per capita minus 15 percent.
- For retail projects, if it exceeds the regional VMT per retail employee minus 15 percent.
- For mixed-use projects, evaluate each land use independently, per the thresholds of significance described above.

Since the proposed project includes residential land use with some retail land use, the mixed-use criteria would apply. As shown in Table 7, the existing average daily residential VMT per capita is 1.9 for TAZ 667, which is 89 percent below the existing regional average daily residential VMT per capita of 17.2. The existing average daily VMT per retail employee is 7.3 for TAZ 667, which is 51 percent below the regional average VMT per retail employee of 14.8. Given that the project site is located in an area where existing residential and retail VMT is more than 15 percent below the existing regional average, the proposed project would not cause substantial additional VMT. Impacts would be less than significant and mitigation measures are not required. This topic will not be discussed in the EIR.

In addition, as described in Section A, Project Description, the project would be subject to San Francisco Planning Code section 169, Transportation Demand Management program and would implement a number of measures designed to encourage the use of non-vehicle travel modes.

Impact TR-6: Operation of the proposed project would not result in a loading deficit. *(Less than Significant)*

COMMERCIAL LOADING

The estimated average and peak hour commercial vehicle loading demand for the proposed project is one space.[46] The project proposes to provide one off-street commercial loading space at street level in the garage and two service vehicle spaces in the basement. In addition to the proposed off-street loading zones, there is currently approximately 230 feet of on-street freight/delivery loading zone (yellow curb) along Stevenson Street and Jessie Street between Sixth Street and Fifth Street, with approximately 70 feet immediately adjacent to the proposed project's frontage. The 132 feet of yellow curb on Stevenson Street can accommodate up to 6 commercial loading vehicles. The 101 feet of yellow curb on Jessie Street can accommodate up to 4 commercial loading vehicles. With the proposed project, approximately 15 feet of the existing yellow loading zone would be converted to white passenger loading space or shifted slightly west. However, with the proposed project, on-street loading on Stevenson and Jessie streets would still total over 200 linear feet with approximately 50 feet immediately adjacent to the project's frontage. Existing and proposed curb designations are shown in Appendix B.

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[46] Commercial vehicle loading encompasses freight and delivery service vehicles. Delivery service typically refers to pick-up trucks, light trucks or vans such as box trucks, moving trucks, etc. The larger end of the light truck vehicle type may occupy approximately 30-40 linear feet, which includes the space for loading and maneuvering. Large freight trucks refers to heavy trucks with a wheelbase length of 40 feet or more, whose total length may approach 65 feet, 14 feet in height and 8.5 feet in width.

In addition to there being sufficient on-street loading space, the proposed project would provide a centralized delivery room. A delivery room eliminates delays that might occur when couriers need to coordinate directly with residents and would reduce missed deliveries, which would help increase the efficiency of deliveries and reduce the duration of dwell times at the curb. Delivery vehicles may use either the provided off-street loading zone or on-street loading zones on either Stevenson Street or Jessie Street to access the building and the centralized delivery room.

Since the proposed project's off-street loading zones is expected to accommodate the peak hour loading demand and there are additional convenient on-street loading zones, the proposed project is not expected to create a loading deficit. Therefore, project-related impacts on freight loading would be less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

PASSENGER LOADING

The estimated average and peak hour passenger loading demand is 40 linear feet of white curb or two spaces. The project proposes to provide approximately 90 linear feet of non-continuous (an existing 11-foot driveway breaks up segments of 52 feet and 39 feet) white curb on the south side of Jessie Street immediately adjacent to the project frontage and 22 linear feet of white curb on the south side of Stevenson Street immediately adjacent to the project frontage. Additionally, there is approximately 95 linear feet of existing white curb on the south side of Jessie Street approximately 200 feet east of the project frontage currently used primarily for hotel drop-off and pick-up, which may be used as passenger loading for the proposed project.

In order to accommodate passenger loading on the south side of Jessie Street, the existing commercial loading zone (yellow curb) would need to be relocated west of the proposed project and existing parking would need to be converted to white curb passenger loading. Passengers would have to cross Jessie Street in order to access the project's residential lobby; however, due to the narrow alleyway width, clear sightlines, low vehicle volumes (104 during the p.m. peak hour under baseline plus project conditions), and low vehicle speeds on Jessie Street, it is anticipated this space would be convenient. In order to accommodate passenger loading on Stevenson Street, some existing parking would need to be converted to white curb. Passenger loading on Stevenson Street is proposed to be located near a pedestrian entrance to the proposed project and passengers using the white curb loading zone would not have to cross the street to access the site.

Since the proposed project's designated passenger loading zones are expected to accommodate the peak hour passenger loading demand and there is additional convenient on-street passenger loading zones, the proposed project is not expected to create a passenger loading deficit. Therefore, project-related impacts on passenger loading would be less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

2040 CUMULATIVE IMPACT ASSESSMENT

Transportation impacts are described below for a long-term cumulative (year 2040) with project scenario. The cumulative scenario includes relevant nearby plans and projects in addition to those included in the near-term baseline scenario. Specific projects and plans included in the cumulative scenario include: the Central SoMa Plan, the Eastern Neighborhoods Rezoning and Area Plans, the Hub and Civic Center Public Realm Plan, Muni Forward, and the Better Market Street Project.

Construction of the proposed project could overlap with construction of nearby cumulative development and transportation projects. For the purposes of the transportation analysis, the cumulative setting includes the development and streetscape or public realm improvement projects as listed above and in section B.2, Cumulative Project Setting.

Impact C-TR-1: The project, in combination with reasonably foreseeable future projects, would result in significant cumulative construction-related transportation impacts, but the project would not contribute considerably to those impacts. (*Less than Significant*)

Construction of the proposed project would occur over a period of approximately 36 months, from November 2020 to November 2023. Construction of the proposed project may overlap with the construction of other nearby projects, including 5M, the Sixth Street Pedestrian Safety Improvement Project, 950-974 Market Street, 1066 Market Street, Better Market Street, and/or, subsequent development projects proposed under the Central SoMa Plan Area.

The construction timeline of the Sixth Street Pedestrian Safety Improvement Project is approximately April 2020 through October 2021 (with paint and signage improvements beginning in September 2019), which if completed on schedule would not overlap with project construction. However, for purposes of this analysis, it is assumed that construction of the proposed project could potentially overlap with some Sixth Street Pedestrian Safety Improvement Project construction. The first phase of the 5M development is currently under construction and is anticipated to be complete by the end of 2021. Subsequent phase(s) will begin shortly afterwards with the project expected to be complete by the end of 2027. Therefore, there is potential for the construction of both the Sixth Street Pedestrian Safety Improvement Project and the 5M development to overlap with construction of the proposed project, but the construction staging for the 5M development and the 469 Stevenson Street Project would be in different areas. Coordination with these nearby projects, as required in the construction management plan, would limit disruptions to the project vicinity.

Both the Better Market Street EIR and the Central SoMa Plan EIR identified project-specific significant and unavoidable construction-related transportation impacts:

- The Better Market Street EIR identified significant and unavoidable construction-related impacts on emergency access, people bicycling, and transit routes on Market Street, cross streets, and nearby parallel streets.

- The Central SoMa Plan EIR identified significant and unavoidable with mitigation construction-related impacts on transportation, primarily due to concurrent construction of projects in close proximity to each other.

It is anticipated that the proposed project's primary construction-related impacts would be on Jessie Street and Stevenson Street. The project's construction is not expected to require a substantially extended duration or intense activity. None of the projects included in the cumulative scenario would include overlapping construction on Jessie Street or Stevenson Street. Given the scale and location of the proposed project in relation to other nearby projects, there is a potential for project construction to combine with construction of other projects and result in a temporary increase in traffic from on-road construction vehicles traveling on the same streets

(Sixth Street, Fifth Street, and Mission Street). This is considered a significant cumulative construction-related transportation impact.

The proposed project would be required to work with various city departments to develop detailed and coordinated construction logistics and contractor parking plans to address issues related to construction vehicle routing, traffic control, transit vehicles, and accessibility plans for people walking and biking adjacent to the construction area. While some construction activities require staging in the sidewalk or parking lane, most construction would be contained to the project site. The extent and duration of construction spillover, as well as the number of construction workers at the site, will be defined in the project's construction management plan.

Because the proposed project's construction would not overlap spatially with other cumulative projects' construction, and construction activities would be temporary and phased, would not involve a substantially intense activity, and conducted in accordance with city requirements, the proposed project, would not contribute considerably to cumulative construction-related transportation impacts. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact C-TR-2: The project, in combination with reasonably foreseeable future projects, would not create potentially hazardous conditions for people walking, bicycling, driving or public transit operations. (*Less than Significant*)

The future land use developments and proposed transportation network changes anticipated under cumulative conditions are not anticipated to result in substantial changes to traffic circulation that could lead to hazards for people walking, bicycling, driving, or riding transit. Under cumulative conditions, citywide growth would contribute to increased traffic volumes on streets surrounding the project site. Citywide changes to traffic volumes would not create new hazards by themselves. Plans such as the Central SoMa Plan and Better Market Street project would implement roadway changes near the proposed project that would reduce potentially hazardous conditions to people walking, bicycling, or driving, or public transit vehicles and no such impact were identified in those projects' EIRs. Therefore, the proposed project in combination with cumulative projects, would result in less than significant cumulative potentially hazardous conditions. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact C-TR-3: The project, in combination with reasonably foreseeable future projects, would not significantly interfere with accessibility. (*Less than Significant)*

Citywide growth would contribute to increasing the number of people walking, bicycling, driving, or riding transit on streets surrounding the project site under cumulative conditions. Cumulative transportation projects such as the streetscape improvement projects proposed under the Central SoMa Plan, Better Market Street Project, Fifth Street Improvement Project, and Vision Zero would improve accessibility for people walking and bicycling within a block of the project site. These projects would increase sidewalk widths, install new curb bulb-outs, and expand bicycle facilities. While the Central SoMa Plan EIR identified a significant impact on pedestrian crowding within crosswalks, the locations identified (Third/Mission, Fourth/Mission, Fourth/Townsend, Fourth/King) are all more than a block away and in the opposite direction of key walking

destinations from the proposed project site like Market Street and MUNI/BART stations. Residents of the proposed project may access services, such as retail stores located near the Fourth/Mission intersection. However, the proposed project's walking trips are unlikely to combine with walking trips generated by subsequent development projects under the Central SoMa Plan EIR. This is because while walking trips associated with the proposed residential uses on the project site are anticipated to primarily occur during the p.m. peak period, the Central SoMa Plan EIR found significant pedestrian overcrowding during the midday peak period. Thus, the proposed project would not combine with the Central SoMa Plan EIR to result in a significant accessibility impact on people walking.

The Central SoMa Plan EIR also identified a less than significant with mitigation impact on emergency vehicle access due to proposed street network changes and increases in vehicle traffic generated by development under the Central SoMa Plan. The proposed project would not involve changes to the street network or significant increases in vehicle traffic that would prevent the mitigation measure (consultation with emergency service providers and modification of street network design) from reducing any potential delays emergency vehicle access. The Better Streets Plan EIR did not identify a significant impact on emergency access. Thus, the proposed project would not combine with cumulative projects to result in a significant impact on emergency access.

Therefore, the proposed project, in combination with cumulative projects, would result in less than significant cumulative impacts to accessibility for people walking and people bicycling or inadequate emergency access. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact C-TR-4: The project, in combination with reasonably foreseeable future projects, would substantially delay public transit, but the project would not contribute considerably to this impact. (*Less than Significant)*

LOCAL TRANSIT

In general, transit service on Market Street and Mission Street are anticipated to improve under cumulative conditions with the addition of transit only lanes proposed by the Better Market Street project and Muni Forward improvements to Mission Street. However, both the Central SoMa Plan EIR and Better Market Street EIR identified significant impacts to local transit. The Better Market Street EIR identifies a significant cumulative transit delay impact to the 27 Bryant on Fifth Street (approximately 500 feet from the project site). Although Better Market Street Project would not generate any net new vehicle trips to the transportation network, some trips would be shifted to new routes, resulting in approximately 300 additional vehicles on southbound Fifth Street during the peak hour.

Unlike the Better Market Project, the Central SoMa Plan EIR is a program-level analysis focused on the indirect impacts on the physical environment resulting from subsequent development enabled by the Central SoMa Plan and the direct impacts associated with proposed street network changes. The Central SoMa Plan EIR does not analyze the specific environmental impacts of the subsequent development projects that could be enabled by the Plan as these subsequent projects are required to undergo their own environmental evaluation. The Central SoMa Plan EIR identifies that subsequent development enabled under the Central SoMa Plan could result in a

significant and unavoidable with mitigation transit delay impact to local routes with the plan area, specifically to Muni lines 8/8AX/8BX Bayshore, 10 Townsend, 14/14R Mission, 27 Bryant, 30 Stockton, 45 Union-Stockton, and 47 Van Ness. Of these, the 8/8AX/8BX Bayshore, 27 Bryant, 30 Stockton, and 45 Union-Stockton travel on Fifth Street. Given the reasonably foreseeable projects in the area and the analysis conducted for the Central SoMa Plan EIR, there is a significant cumulative public transit impact.

Although the Better Market Street and Central SoMa Plan EIRs identify impacts to transit, the 469 Stevenson Street Project is not anticipated to contribute considerably to any cumulative transit impact in the area for the following reasons:

- The project would add 28 additional vehicle trips to Fifth Street during the p.m. peak hour, representing less than 10 percent of vehicle volumes added to Fifth Street by changes stemming from the Better Market Street Project and would add fewer than one additional vehicle per minute to Fifth Street.

- The project would add 23 additional vehicle trips to Mission Street during the p.m. peak hour, approximately one percent of all vehicle traffic on Mission Street in the cumulative scenario. The additional level of traffic due to the proposed project would not be expected to contribute substantially to worsened traffic on these streets that have transit or substantially delay public transit.

- The majority of subsequent development associated with the Central SoMa Plan is concentrated south of Interstate-80, more than one half mile from the project sites. The vehicle trips associated with the 469 Stevenson Street Project are not anticipated to combine with other Central SoMa Plan projects in such a manner that would substantially affect transit operations. Therefore, the proposed project would not contribute considerably to the significant cumulative local transit delay impacts identified in the Central SoMa Plan EIR.

The proposed project would not contribute considerably to significant cumulative local transit impacts. No mitigation measures are required. This topic will not be discussed in the EIR.

REGIONAL TRANSIT

The Better Market Street EIR did not identify a significant and unavoidable cumulative regional transit impact; however, the Central SoMa Plan EIR identifies a significant and unavoidable with mitigation impact on transit delays to regional routes, specifically to Golden Gate Transit and SamTrans routes that run on Mission Street, Howard Street, Folsom Street, and Harrison Street. With the exception of Mission Street, these streets are more than a block away from the proposed project, and project-generated vehicle trips would not contribute considerably to regional transit delays. As described above, the vehicle trips associated with the proposed project are approximately one percent of cumulative volumes on Mission Street. The additional level of traffic due to the proposed project would not be expected to contribute substantially to worsened traffic

on these streets that have regional transit or substantially delay regional public transit. Therefore, the proposed project would not contribute considerably to the significant cumulative regional transit delay impact identified in the Central SoMa Plan EIR.[47]

The proposed project would not contribute considerably to significant cumulative regional transit impacts. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact C-TR-5: The project, in combination with reasonably foreseeable future projects, would not cause substantial additional VMT or substantially induce automobile travel. (*Less than Significant*)

VMT by its nature is largely a cumulative impact. The number and distance of vehicle trips associated with cumulative projects might contribute to the secondary physical environmental impacts associated with VMT. It is likely that no single project by itself would be sufficient in size to prevent the region or state in meeting its VMT reduction goals. Instead, a project's individual VMT contributes to cumulative VMT impacts.

The department uses existing plus project-level thresholds of significance based on levels at which the department does not anticipate new projects to conflict with state and regional long-term greenhouse gas emission reduction targets and statewide VMT per capita reduction targets.

Therefore, the department uses a map-based screening criterion to identify types and locations of land use projects that would not exceed the same quantitative thresholds of significance described under existing plus project conditions. However, under cumulative conditions, the analysis uses modeling for the year 2040 to present VMT for residential, office, and retail uses in San Francisco and the region. The department uses that data and associated maps to determine whether a project site's location is below the aforementioned VMT quantitative screening criteria.

The proposed project would not exceed the cumulative-level projected 2040 screen criteria for VMT. As shown in Table 8, projected 2040 average daily residential VMT per capita for TAZ 667 (the TAZ where the proposed project is located) is 1.6, which is approximately 90 percent below the projected 2040 regional average daily VMT per capita of 16.1. The projected 2040 average daily VMT per retail employee is 7.1, which is approximately 51 percent below the projected 2040 regional average daily VMT per capita of 14.6. Therefore, the proposed project's residential and retail uses would not combine with cumulative development projects to create or contribute to any substantial cumulative increase in VMT, and impacts would be less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

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[47] While impacts on transit capacity utilization are no longer being considered under the updated transportation guidelines, the Central SoMa Plan EIR also identifies a significant and unavoidable with mitigation impact on regional transit capacity utilization on the East Bay regional screenline (BART). As previously described, the proposed project would contribute 85 total transit trips during the p.m. peak hour, less than 5 percent of the 1,910 regional transit trips generated by the Central SoMa Plan.

TABLE 8: CUMULATIVE 2040 VEHICLE MILES TRAVELED

Land Use	Bay Area Regional Average	Bay Area Regional Average Minus 15% (Threshold)	TAZ 667
Households (Residential)	16.1	13.7	1.6
Employment (Retail)	14.6	12.4	7.1
Notes: Source: SF Planning Department; Fehr & Peers, 2019			

Impact C-TR-6: The project, in combination with reasonably foreseeable future projects, would result in significant cumulative impacts to loading, but the project would not contribute considerably to this impact. (*Less than Significant*)

Under cumulative conditions, the Better Market Street project would change loading conditions on Market Street and add additional loading on some streets crossing Market Street. This would not affect the commercial or passenger loading for the proposed project, which would occur off-street within the designated freight loading zone or service vehicle loading spaces, directly adjacent to the project site on Stevenson Street in the designated passenger loading zone, or in the yellow curb or white curb loading zones on the south side of Jessie Street across from the project site.

The Central SoMa Plan EIR identifies a significant cumulative impact to loading because providing replacement passenger loading/unloading zones of similar length to that of existing conditions cannot be assured. Although the project is adjacent to the Central SoMa Plan Area, it is possible, although unlikely, that subsequent development projects in the Central SoMa Plan could combine with this project to result in localized loading impacts near the project site. The project site is adjacent to a portion of the Central SoMa Plan Area that was rezoned from a Neighborhood Commercial Transit (NCT) district to a SoMa Neighborhood Commercial Transit (SoMa NCT) district. This is considered a significant cumulative loading impact. However, the project meets its anticipated commercial and passenger loading needs, and therefore, would not contribute considerably to this significant cumulative impact. No mitigation measures are required. This topic will not be discussed in the EIR.

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E.6 Noise

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

The project site is not located in the vicinity of or within an area covered by an airport land use plan, within two miles of a public airport or a public use airport, or in the vicinity of a private airstrip. Therefore, topic E.5(c) is not applicable to the proposed project.

NOISE

Noise is generally defined as unwanted sound that annoys or disturbs people and potentially causes an adverse psychological or physiological effect on human health. Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches, hotels, and residences are considered to be more sensitive to noise intrusion than are commercial or industrial activities. Because noise is an environmental pollutant that can interfere with human activities, evaluation of noise is necessary when considering the environmental impacts of a proposed project.

Sound is mechanical energy (vibration) transmitted by pressure waves over a medium such as air or water. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level is the most common descriptor used to characterize the loudness of an ambient (existing) sound level. Although the decibel (dB) scale, a logarithmic scale, is used to quantify sound intensity, it does not accurately describe how sound intensity is perceived by human hearing. The perceived loudness of sound is dependent upon many factors, including sound pressure level and frequency content. The human ear is not equally sensitive to all frequencies in the entire spectrum, so noise measurements are weighted more heavily for frequencies to which humans are sensitive in a process called A-weighting, written as dB(A) and referred to as A-weighted decibels. There is a strong correlation between A-weighted sound levels and community response to noise. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment.

With respect to how humans perceive and react to changes in noise levels, a 1dBA increase is imperceptible, a 3 dB(A) increase is barely perceptible, a 5 dB(A) increase is clearly noticeable, and a 10 dB(A) increase is subjectively perceived as approximately twice as loud.[48] These subjective reactions to changes in noise levels were developed on the basis of test subjects' reactions to changes in the levels of steady-state pure tones or broadband noise and to changes in levels of a given noise source. These statistical indicators are thought to be most applicable to noise levels in the range of 50 to 70 dB(A), as this is the usual range of voice and interior noise levels.

Because decibels are logarithmic units, sound pressure levels cannot be added or subtracted through ordinary arithmetic. On the dB scale, a doubling of sound energy corresponds to a 3 dB increase. In other words, when two identical sources are each producing sound of the same loudness, their combined sound level at a given distance would be 3 dB higher than one source under the same conditions. For example, if one source produces a sound pressure level of 70 dB(A), two identical sources would combine to produce 73 dB(A). The combined sound level of any number of sources can be determined using decibel addition.

NOISE-SENSITIVE RECEPTORS

Noise-sensitive receptors around the project site include The Wilson apartments at 973 Market Street, the Hampton Inn San Francisco Downtown at the corner of Mint Street and Mission Street, and various hotels and residential buildings near the corner of Sixth Street and Stevenson Street, including the Desmond Hotel at 42 Sixth Street, the Seneca Hotel at 34 Sixth Street, the Haveli Hotel at 37 Sixth Street, the Whitaker Hotel at 45 Sixth Street, the Hillsdale at 51 Sixth Street, the Oak Tree Hotel at 45 Sixth Street, the Winsor Hotel at 20 Sixth Street, and various residential spaces above 87-99 Sixth Street. The noise-sensitive receptors within 300 feet of the 469 Stevenson project site are shown in Figure 21.

VIBRATION

Vibration is like noise such that noise involves a source, a transmission path, and a receptor. While related to noise, vibration differs in that noise is generally considered to be pressure waves transmitted through air, whereas vibration usually consists of the excitation of a structure or surface. As with noise, vibration consists of an amplitude and frequency. A person's perception to vibration depends on their individual sensitivity to vibration, as well as the amplitude and frequency of the source and the response of the system that is vibrating.

Vibration can be measured in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration measures in terms of peak particle velocities in inches per second. Standards pertaining to perception as well as damage to structures have been developed for vibration levels defined in terms of PPV.

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[48] Egan, David M. 2007. Architectural Acoustics. J. Ross Pub., Pub 2007.

1. The Wilson Apartments at 973 Market Street
2. Hampton Inn San Francisco Downtown
3. Desmond Hotel
4. Seneca Hotel
5. Haveli Hotel
6. The Whitaker Hotel
7. The Hillside Hotel
8. Oak Tree Hotel
9. Winsor Hotel
10. Residential Above 87-89 Sixth Street
11.460 Jessie Street
12. 65-83 Sixth Street
13. 986 Mission Street/481 Jessie Street
14. 980-984 Mission Street/479 Jessie Street
15. 972- 976 Mission Street
16. 968 Mission Street
17. 471 Jessie Street
18. 956-960 Mission Street
19. 955 Market Street/ 1 Sixth Street
20. 979-989 Market Street

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

469 Stevenson Street Project

Case No. 2017-014833ENV.

Figure 21: Noise- and Vibration-Sensitive Receptors within 300 feet of Project Site

\\fs1304-f02\workgroup\1857\active\185704245\03. data\gis\mxd\fig. 20 noise receptors.mxd Revised: 2019-09-30 By: kaeijohnson

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VIBRATION-SENSITIVE RECEPTORS

Historic buildings are more susceptible to vibration as compared to buildings with modern construction. Historic buildings adjacent to the project site are shown in Table 3, Contributors and Non-Contributors within Historic/Conservation Districts adjacent to the Project Site of this initial study. All vibration-sensitive buildings within 300 feet of the project site are shown in Figure 21 and distinguished from noise sensitive receptors, as shown in the legend.

AMBIENT NOISE LEVELS

Areas which are not urbanized are relatively quiet, while areas which are more urbanized are noisier as a result of roadway traffic, industrial activities, and other human activities. Ambient noise levels can also affect the perceived desirability or livability of a development.

A noise survey was conducted between Thursday, March 14 and Sunday, March 17, 2019 to establish the existing baseline noise conditions near the project site. The existing ambient noise levels in the area ranged between 67.0 to 70.5 dB(A) Ldn[49] at the measurement location on the roof of the adjacent 989 Market Building (about 95 feet above the local ground) and between 64.5 to 68.0 dB(A) Ldn at ground level along Jessie Street. The maximum one-hour Leq[50] noise level measured during the anticipated hours of operation of the proposed retail uses was 65.9 dB(A).

The main source of noise at the site is the steam generation plant on the adjacent Clearway Energy property. The noise from the steam generation plant is a constant, tonal noise produced from the mechanical equipment outside the building and the operation of the facility. Other sources of noise at the site include traffic on Sixth Street, very sparse traffic on Stevenson Street and Jessie Street, sidewalk activity, parking lot activity, aircraft fly overs, activity from businesses (back-up beepers, etc.), and noise from distant construction sites. The traffic in the area is comprised of vehicles, medium and large trucks, motorcycles, Muni buses and streetcars, construction vehicles, and emergency vehicles. The project site is well-shielded from traffic noise along Market Street and Fifth Street.

This neighborhood of the city contains several entertainment facilities which are in operation for weekly scheduled events or for special events. Noise generated by the operation of the facilities are part of the existing ambient noise environment. Noise-generating uses around the project include places used for scheduled events, such as The Warfield, Piano Fight, Pandora Karaoke & Bar, OMG Bar and Nightclub, Mezzanine, Exit Stage Left, and the SHN Golden Gate Theater, and spaces uses for special events, such as Club Six, and the SF Mint.

The dates of the noise survey included the Hello Dolly show at the SHN Golden Gate Theater (March 16 and March 17), The Nils Frahm concert (March 15) and the Graveyard and Uncle Acid & The Deadbeats concert (March 16) at the Warfield, The Dirtybird Quarterly event at Mezzanine

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49 Ldn: The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.

50 The equivalent steady state sound level that in a stated period of time would contain the same acoustical energy.

(March 15), and typical weekend activity at OMG Bar & Nightclub. Ambient noise levels measured during the early morning hours, or during the anticipated operational hours of the noise-generating entertainment uses ranged between 70.2-73.4 dB(C).[51]

ANALYTIC METHODOLOGY

In accordance with the requirements of CEQA, the noise analysis evaluates the project's noise sources to determine the impact of the proposed project on the existing ambient noise environment. This analysis does not analyze the impact of the existing ambient noise environment on the proposed project's residents. However, as discussed in the Noise Technical Memorandum[52] prepared for the proposed project, existing building code regulations are in place to ensure adequate interior noise levels are achieved for a proposed project. The Noise Technical Memorandum is provided in Appendix A of this initial study.

Results from the long-term site measurements were used to provide baseline noise conditions at nearby sensitive receptors and within the project site vicinity. For the purpose of this analysis, potential sensitive receptors were determined by reviewing current aerial photography and by walking the project site.

Construction Noise

Article 29 of the San Francisco Police Code regulates noise. Section 2907 of article 29 provides the following limitations for construction equipment:

> "(a) Except as provided for in Subsections (b), (c), and (d) hereof, it shall be unlawful for any person to operate any powered construction equipment if the operation of such equipment emits noise at a level in excess of 80 dBA when measured at a distance of 100 feet from such equipment, or an equivalent sound level at some other convenient distance."

However, the police code does not specify quantitative noise limits for impact equipment or combined noise impacts from the simultaneous operation of multiple pieces of construction equipment. Therefore, the quantitative evaluation of daytime construction noise effects is based on criteria in the Federal Transit Administration (FTA) guidelines for residential land uses which is 90 dBA Leq.[53] The planning department also evaluates whether construction noise would result in an increase of 10 dBA over existing noise levels ("Ambient + 10 dBA") at sensitive receptors, which generally represents a perceived doubling of loudness. The quantitative analysis typically evaluates the noise levels from the simultaneous operation of multiple pieces of construction

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[51] dB(C): The sound pressure level in decibels as measured using the C- weighting filter network. The C-weighting is very close to an unweighted or flat response. C-weighting is only used in special cases when low-frequency noise is of particular importance. A comparison of measured A- and C-weighted level gives an indication of low frequency content.

[52] "Noise Technical Memorandum for the 469 Stevenson Street Project, Stantec, August 2, 2019.

[53] Federal Transit Administration (FTA).2018. Transit Noise and Vibration Impact Assessment Manual. https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. Accessed August 29, 2019.

equipment. The quantitative criteria above are only part of the evaluation of construction noise. The evaluation also considers the duration and intensity of any quantitative noise exceedance. In addition, nighttime construction noise is assessed to determine whether sleep disturbance would occur (if construction noise would exceed 45 dBA at residential interiors, assuming windows closed, for prolonged periods of time). The nighttime construction noise analysis also considers the frequency and duration of nighttime construction activities. All of the above factors are evaluated to determine whether a significant construction noise impact would occur.

The Federal Highway Administration Roadway Construction Noise Model (RCNM) was used to determine noise generated from construction activities. The RCNM is used as the Federal Highway Administration's national standard for predicting construction noise. The RCNM analysis includes the calculation of noise levels (Lmax[54] and Leq) at incremental distances for a variety of construction equipment. The spreadsheet inputs include acoustical use factors, Lmax values, and Leq values at various distances depending on the ambient noise measurement location. Construction noise levels were calculated for each phase of construction based on the equipment list provided by the project sponsor. Given the limited extent and duration of nighttime construction activities, the potential for nighttime construction noise to result in sleep disturbance is analyzed qualitatively.

Construction Vibration

Vibration from construction equipment is analyzed at the surrounding buildings and compared to the applicable Caltrans building damage criteria to determine whether construction activities would generate vibration at levels that could result in building damage. Given the limited extent and duration of nighttime construction activities, the potential for vibration effects to result in sleep disturbance are analyzed qualitatively.

Operational Noise

Project-generated traffic would result in a significant noise impact if the proposed project increases the ambient noise levels by 5 dBA Ldn where noise levels are within the city's "Satisfactory" category per the general plan's land use compatibility chart for community noise, which is 60 dBA Ldn. If existing or resulting with project noise levels are above the "Satisfactory" category, project-generated traffic noise that results in an increase of 3 dBA Ldn would be considered significant. Because the ambient noise levels near the project site exceed 60 dBA Ldn, the significance threshold used to analyze project-generated traffic noise for this project is 3 dBA.

Anticipated noise increases from future project-related traffic were estimated using predicted vehicle traffic generated from the 469 Stevenson project as detailed in the traffic analysis prepared by Fehr & Peers.

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[54] The maximum sound level measured during the measurement period.

In addition, the proposed project would require one diesel emergency backup generator, required by the building code to ensure life safety requirements are met. Given the limited operation, noise from the generator is analyzed qualitatively for the potential to increase ambient noise levels.

Noise from the proposed project's mechanical and HVAC systems would operate regularly and are therefore analyzed for compliance with sections 2909(a) and (d) of the noise ordinance. Section 2909 "Noise Limits" states the following:

"(a) Residential Property Noise Limits.

(1) No person shall produce or allow to be produced by any machine, or device, music or entertainment or any combination of same, on residential property over which the person has ownership or control, a noise level more than five dBA above the ambient at any point outside of the property plane.

(d) Fixed Residential Interior Noise Limits. In order to prevent sleep disturbance, protect public health and prevent the acoustical environment from progressive deterioration due to the increasing use and influence of mechanical equipment, no fixed noise source may cause the noise level measured inside any sleeping or living room in any dwelling unit located on residential property to exceed 45 dBA between the hours of 10:00 p.m. to 7:00 a.m. or 55 dBA between the hours of 7:00 a.m. to 10:00p.m. with windows open except where building ventilation is achieved through mechanical systems that allow windows to remain closed."

The proposed project would not include sources of vibration during operations. Therefore, no operational vibration assessment is required.

IMPACT ANALYSIS

The following impact analysis is based on information provided in the Noise Technical Memorandum[55] (included in Appendix A) prepared for the proposed project.

CONSTRUCTION

Impact NO-1: Construction of the proposed project would result in a temporary or periodic increase in ambient noise levels. (*Less than Significant with Mitigation*)

Daytime Construction Noise

Construction activities associated with the proposed project would include site preparation and demolition, excavation and shoring, foundation and below grade work, building construction, exterior finishing, and sitework/paving. Each construction stage has its own mix of equipment and, consequently, its own noise characteristics. These various construction operations would

[55] "Noise Technical Memorandum for the 469 Stevenson Street Project, Stantec, August 2, 2019.

change the character of the noise generated at the project site and, therefore, the ambient noise level as construction progresses. The loudest phases of construction include excavation and shoring and building construction, as the noisiest construction equipment is earthmoving and grading equipment and concrete/industrial saws. Table 9 lists types of construction equipment that may be used throughout construction and the maximum and average noise level as measured at 20 feet from the operating equipment. The 20-foot distance represents the approximate distance between the project property line and the closest noise-sensitive receptors at 35 Sixth Street, 39-41 Sixth Street, 43-45 Sixth Street, and 47 Sixth Street, which are hotels and residential over retail buildings. The 20-foot distance represents a worst-case assessment of noise impacts on nearby receptors because it assumes the equipment operates at the property line closest to the sensitive receptor. The project site is approximately 170 feet wide along its Jesse and Stevenson street frontages and therefore equipment will often be operating at distances greater than 20-feet from the closest sensitive receptors.

TABLE 9: SUMMARY OF CONSTRUCTION EQUIPMENT NOISE LEVELS AT THE NEAREST NOISE-SENSITIVE RECEPTOR

Equipment	Distance to Nearest Noise-Sensitive Receptor	Sound Level at Nearest Noise-Sensitive Receptor		
		Lmax, dB(A)	Acoustical Use Factor (%)	Leq, dB(A)
Backhoe	20 feet	85.5	40	81.5
Crane	20 feet	88.5	16	80.6
Concrete Mixer Truck	20 feet	86.8	40	82.8
Concrete Saw	20 feet	97.5	20	90.5
Compressor (air)[1]	20 feet	85.6	40	81.6
Excavator	20 feet	88.7	40	84.7
Front End Loader[2]	20 feet	87.1	40	83.1
Flat Bed Truck	20 feet	82.2	40	78.2
Grader	20 feet	93.0	40	89.0
Paver	20 feet	85.2	50	82.2
Welder / Torch	20 feet	82.0	40	78.0
Tractor[3]	20 feet	92.0	40	88.0
Man Lift[4]	20 feet	82.7	20	75.7
Drill Rig	20 feet	87.1	20	80.1
Dump Truck	20 feet	84.4	40	80.4

Equipment	Distance to Nearest Noise-Sensitive Receptor	Sound Level at Nearest Noise-Sensitive Receptor		
		Lmax, dB(A)	Acoustical Use Factor (%)	Leq, dB(A)
Pumps	20 feet	88.9	50	85.9

Source: Stantec 2019, Federal Highway Administration Roadway Construction Noise Model Version 1.1, 2008

Notes:

1. Used to approximate noise from a pressure washer for this project.
2. Used to approximate noise from the skid steer loader for this project.
3. Used to approximate noise from the forklift and rough-terrain forklift for this project.
4. Used to approximate noise from the aerial lift and scissor lift for this project.

Construction of the entire project would be conducted in sequential phases and each phase would use different pieces of construction equipment. The noise-producing equipment for each construction phase as defined by the project sponsor are shown in Table 10.

TABLE 10: CONSTRUCTION PHASES AND EQUIPMENT

Construction Phase	Equipment
Site Preparation / Demolition	Dump Truck (2) Excavator (1)
Excavation and Shoring	Bore / Drill Rigs (1) Dumper / Tenders (1) Excavators (1) Skid Steer Loaders (1) Tractors / Loaders / Backhoes (1) Aerial Lift (1) Dump Truck (2)
Foundation and Below Grade Construction	Concrete Pump (1) Manlift (1) Dump Truck (1)
Building Construction	Aerial Lifts (1) Cranes (1) Forklift (1) Rough Terrain Forklifts (1) Electric-Powered Welders (1) Concrete / Industrial Saws (2) Dump Truck (1) Manlift (1) Scissor Lifts (3) Welders (1)

Construction Phase	Equipment
Exterior Finishing	Air Compressors (1) Forklifts (1) Manlift (1) Welders (1)
Sitework / Paving	Cement and Mortar Mixers (1) Pavers (1) Paving Equipment (1) Pressure Washer (1)

A worst-case condition for construction activity would assume all noise-generating equipment for each construction phase were operating at the same time and at the same distance away from the closest noise-sensitive receptor. Using this assumption, the RCNM program was used to calculate the following combined Leq and Lmax noise levels from each construction phase as shown in Table 11.

TABLE 11: CALCULATED NOISE LEVEL FROM EACH CONSTRUCTION PHASE

Construction Stage	Distance to Nearest Noise-Sensitive Receptor	Sound Level at Nearest Noise-Sensitive Receptor	
		Lmax, dB(A)	Leq, dB(A)
Site Preparation / Demolition	20 feet	91.1 dB(A)	87.1 dB(A)
Excavation and Shoring	20 feet	95.0 dB(A)	90.5 dB(A)
Foundation and Below Grade Construction	20 feet	91.2 dB(A)	85.0 dB(A)
Building Construction	20 feet	102.2 dB(A)	96.1 dB(A)
Exterior Finishing	20 feet	93.6 dB(A)	89.4 dB(A)
Sitework / Paving	20 feet	91.8 dB(A)	88.2 dB(A)

Construction noise during the excavation and shoring phase and the building construction phase are expected to exceed the FTA 90 dB(A) Leq guideline at the closest noise-sensitive receptors. The excavation and shoring phase is expected to take approximately two months to complete. The building construction phase is expected to take a total of about 29 months to complete. The loudest part of the building construction phase is anticipated to be during the beginning of the phase when the concrete/industrial saws would be used. The building construction phase, the exterior finishing phase, and the sitework/paving phase will all run concurrently.

Because the ambient daytime noise level in the project vicinity is approximately 70 dBA, noise levels from all phases of construction are expected to be at least 10 dB(A) above the ambient noise level at the closest sensitive receptors. As discussed previously, a 10 dBA increase in noise level is perceived as a doubling of loudness.

The entire construction process is expected to take approximately 36 months to complete. Therefore, noise sensitive receptors would be potentially exposed to noise levels at least 10 dBA above the ambient for the entire duration of construction. However, noise levels would fluctuate throughout the day depending upon the specific equipment being used at any one time. While the construction activity will extend over 36 months, the use of the most noise producing equipment, such as bulldozers, graders, and concrete/industrial saws would be limited to the excavation/shoring phase and the first part of the building construction phase. Given that construction activities would increase ambient noise levels by at least 10 dBA for the entire duration of construction and would be approximately 20 dBA above ambient noise levels for 36 months, construction noise impacts would be considered significant.

Nighttime Construction Noise

Most construction would occur during daytime hours, but some nighttime construction may occur. During the total 36-month construction phase, nighttime construction work may be required on up to five (5) nights and would include the following activities:

1. Erection and dismantling of the tower crane;
2. Miscellaneous utility work;
3. Fire alarm testing; and
4. Concrete pour for the mat slab foundation

This required nighttime work would occur at different times throughout the 36-month construction period and not for five (5) sequential nights. Therefore, given the duration of nighttime work and that nighttime work would not occur sequentially, it is not expected that nighttime construction work would result in sleep disturbance for a substantial period of time and nighttime construction impacts would be considered less than significant.

Mitigation Measure M-NO-1: Construction Noise has been identified to minimize construction-related noise effects due to daytime construction activities.

MITIGATION MEASURE

Mitigation Measure M-NO-1: Construction Noise

The project sponsor shall develop site-specific noise attenuation measures under the supervision of a qualified acoustical consultant. At the end of the design phase of this project and prior to commencing construction, the project sponsor shall submit a noise attenuation plan to the San Francisco Planning Department and Department of Building Inspection to ensure maximum feasible noise attenuation will be achieved. The noise attenuation plan shall reduce construction noise to the degree feasible with a goal of reducing construction noise levels at adjacent noise sensitive receptors (e.g., residential, hotel, hospital, convalescent home, school, and church uses) so that noise levels do not exceed 90 dBA and 10 dBA above ambient daytime noise levels. The project sponsor shall include noise attenuation measures in

specifications provided to the general contractor and any sub-contractors. Noise attenuation measures shall, at minimum, include the following:

- Require the general contractor to ensure that equipment and trucks used for project construction utilize the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures and acoustically attenuating shields or shrouds), wherever feasible.

- Require the general contractor to perform all work in a manner that minimizes noise to the extent feasible; use equipment with effective mufflers; undertake the noisiest activities during times of least disturbance to surrounding residents and occupants.

- Require the general contractor to use impact tools (e.g., jack hammers, pavement breakers, and rock drills) that are hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. Where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used, along with external noise jackets on the tools, which could reduce noise levels by as much as 10 dBA.

- Require the general contractor to erect temporary plywood noise barriers (at least 0.5-inch-thick) around stationary noise sources and/or the construction site, particularly where a noise source or the site adjoins noise-sensitive uses. The barriers shall be high enough to block the line of sight from the dominant construction noise source to the closest noise-sensitive receptors. Depending on factors such as barrier height, barrier extent, and distance between the barrier and the noise-producing equipment or activity, such barriers may reduce construction noise by 3–15 dBA at the locations of nearby noise-sensitive receptors.

- Require the general contractor to use noise control blankets on a building structure as the building is erected to reduce noise emission from the site.

- Require the general contractor to line or cover hoppers, storage bins, and chutes with sound-deadening material (e.g., apply wood or rubber liners to metal bin impact surfaces).

- Unless safety provisions require otherwise, require the general contractor to adjust audible backup alarms downward in sound level while still maintaining an adequate signal-to-noise ratio for alarm effectiveness. Consider signal persons, strobe lights, or alternative safety equipment and/or processes as allowed to reduce reliance on high-amplitude sonic alarms/beeps.

- Require the general contractor to place stationary noise sources, such as generators and air compressors, on the power station side of the project site, as far away from nearby noise-sensitive receptors as possible. To further reduce noise, the contractor shall locate stationary equipment in pit areas or excavated areas, if feasible.

- Require the general contractor to place non-noise-producing mobile equipment, such as trailers, in the direct sound pathways between suspected major noise-producing sources and noise-sensitive receptors.

- Under the supervision of a qualified acoustical consultant, the project sponsor shall monitor the effectiveness of noise attenuation measures by taking noise measurements as needed.

- Prior to the issuance of a building permit, along with the submission of construction documents, the project sponsor shall submit to the planning department and building department a list of measures that shall be implemented and that shall respond to and track complaints pertaining to construction noise. These measures shall include:

    1. post signs onsite pertaining to permitted construction days and hours;

    2. a procedure and phone numbers for notifying the building department and the San Francisco Police Department (during regular construction hours and off-hours). This telephone number shall be maintained until the proposed project is ready for occupancy;

    3. a sign posted onsite describing noise complaint procedures and a complaint hotline number that shall be answered at all times during construction;

    4. designation of an onsite construction complaint and enforcement manager for the project who shall document, investigate, evaluate, and attempt to resolve all project-related noise complaints.

    5. notification of neighboring residents and non-residential building managers within 300 feet of the project construction area at least 30 days in advance of extreme noise generating activities (defined as activities generating anticipated noise levels of 90 dBA or greater) about the estimated duration of the activity.

Significance after Mitigation: Mitigation Measure M-NO-1 would reduce the daytime construction noise levels at nearby noise sensitive receptors. A reduction in construction noise levels would be achieved by locating stationary noise-producing equipment as far away from the noise-sensitive receptors on Sixth Street as possible. In addition, Mitigation Measure M-NO-1 would require the project sponsor and their construction contractors to use noise attenuation barriers and/or blankets and utilize blockades from construction trailers as much as possible, and all equipment would be attenuated with mufflers as much as possible. Although construction noise may at times exceed 10 dBA above the ambient or 90 dBA at sensitive receptor locations even with mitigation, this mitigation measure would substantially reduce the intensity of construction noise and the duration of construction noise that exceed 10 dBA above the ambient noise levels or 90 dBA at noise sensitive receptors. Furthermore, construction noise levels would be temporary and would not persist upon completion of construction activities. Individual pieces of construction equipment (apart from impact equipment) would also be required to comply with the noise limits in article 29 of the police code. Thus, with implementation of Mitigation Measure M-NO-1, construction noise impacts would be less than significant, and this topic will not be discussed in the EIR.

Impact NO-2: Construction of the proposed project would not generate excessive ground-borne vibration or ground-borne noise. (*Less than Significant*)

Operation of heavy construction equipment, particularly pile driving and other impact devices such as pavement breakers, create seismic waves that radiate along the surface of the earth and downward into the earth. These surface waves can be felt as ground vibration. Vibration from operation of this equipment can result in effects ranging from annoyance of people to damage of structures. Varying geology and distance will result in different vibration levels containing different frequencies and displacements. In all cases, vibration amplitudes will decrease with increasing distance.

Perceptible groundborne vibration is generally limited to areas within a few hundred feet of construction activities. As seismic waves travel outward from a vibration source, they excite the particles of rock and soil through which they pass and cause them to oscillate. The actual distance that these particles move is usually only a few ten-thousandths to a few thousandths of an inch. The rate or velocity (in inches per second) at which these particles move is the commonly accepted descriptor of the vibration amplitude, referred to as the PPV.

This impact analysis evaluates the potential for construction activities that generate vibration to result in sleep disturbance or damage to adjacent buildings or structures.

Sleep Disturbance from Vibration

As discussed above in Impact NO-1, nighttime construction work would be limited to five (5) total nights over the entire 36-month construction period. It is not anticipated that nighttime construction work would require vibration generating equipment. Therefore, construction activities are not expected to result in vibration during nighttime hours that would be perceptible and thereby result in sleep disturbance.

Building Damage Assessment

Table 12 summarizes typical vibration levels generated by construction equipment that would be used by the proposed project.

TABLE 12: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	Reference PPV at 25 Feet	Estimated PPV at 50 Feet
Large bulldozer[1]	0.089	0.031
Caisson drilling[2]	0.089	0.031
Loaded trucks	0.076	0.027
Small bulldozer	0.003	0.001

Source: Federal Transit Administration 2018
Notes:
1. Used to approximate vibration from a large tractor, backhoe, and loader for this project

Equipment	Reference PPV at 25 Feet	Estimated PPV at 50 Feet
2. Used to approximate vibration from a drill rig for this project.		

Vibration amplitude attenuates over distance and is a complex function of how energy is imparted into the ground and the soil conditions through which the vibration is traveling. The following equation can be used to estimate the vibration level at a given distance for typical soil conditions.[56] PPVref is the reference PPV from Table 12.

$$PPV = PPVref \times (25/Distance)^{1.5}$$

Table 13 summarizes the vibration damage criteria suggested by Caltrans.[57]

TABLE 13: CALTRANS VIBRATION DAMAGE CRITERIA

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structure	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5
Notes: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment. Source: California Department of Transportation 2004		

During construction of the proposed project, vibration-generating equipment may be used as close as 20 feet from the nearest vibration-sensitive buildings along Sixth Street. Also, older and historic buildings can be damaged by excessive vibration associated with construction activities.

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56 Federal Transit Administration (FTA).2018. Transit Noise and Vibration Impact Assessment Manual. https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. Accessed August 29, 2019.

57 California Department of Transportation.2004. Transportation-and Construction-Induced Vibration Guidance Manual. 2004. http://www.dot.ca.gov/hq/env/noise/pub/vibrationmanFINAL.pdf.

The properties nearest to the project site that are most susceptible to vibration their distance to the project site, date of construction and construction type, and the applicable Caltrans damage criteria for each building are presented in Table 14. The proposed construction equipment that would generate vibration was analyzed using the vibration equation referenced above to determine construction vibration levels at nearby buildings. The results of this analysis are also provided in Table 14 along with an indication of whether construction activities would result in vibration at levels that exceed the Caltrans building damage criteria.

TABLE 14: VIBRATION-SENSITIVE BUILDINGS, EXPECTED CONSTRUCTION VIBRATION LEVELS AT NEARBY PROPERTIES, AND CALTRANS BUILDING DAMAGE CRITERIA

Vibration-Sensitive Buildings	Date of Construction / Caltrans Construction Type	Caltrans Building Damage Criteria	Distance between Vibration Sensitive Building and Project Site	Calculated Maximum PPV at Property	Exceeds Criteria?
35-37 Sixth Street	1908 - Historic and Some Old Buildings	0.25	20 feet	0.12	No
39-41 Sixth Street	1906 - Historic and Some Old Buildings	0.25	20 feet	0.12	No
43-45 Sixth Street	1907 - Historic and Some Old Buildings	0.25	20 feet	0.12	No
47-55 Sixth Street	1912 - Historic and Some Old Buildings	0.25	20 feet	0.12	No
65-83 Sixth Street	1913 - Historic and Some Old Buildings	0.25	52 feet	0.03	No
Clearway Energy Thermal Power Station (460 Jessie Street)	Unknown - Historic and Some Old Buildings	0.25	40 feet	0.04	No
986 Mission Street / 481 Jessie Street	1922 - Historic and Some Old Buildings	0.25	42 feet	0.04	No
972-976 Mission Street	1925 - Historic and Some Old Buildings	0.25	42 feet	0.04	No
968 Mission Street	1930 - Historic and Some Old Buildings	0.25	42 feet	0.04	No
471 Jessie Street	1912 - Historic and Some Old Buildings	0.25	42 feet	0.04	No
956-960 Mission Street	1910 - Historic and Some Old Buildings	0.25	51 feet	0.03	No

Vibration-Sensitive Buildings	Date of Construction / Caltrans Construction Type	Caltrans Building Damage Criteria	Distance between Vibration Sensitive Building and Project Site	Calculated Maximum PPV at Property	Exceeds Criteria?
995 Market Street / 1 Sixth Street	1908 - Historic and Some Old Buildings	0.25	38 feet	0.05	No
979-989 Market Street	1907 - Historic and Some Old Buildings	0.25	22 feet	0.11	No
973 Market Street	1904 - Historic and Some Old Buildings	0.25	22 feet	0.11	No
980-984 Mission Street/ 479 Jessie Street	1922 - Historic and Some Old Buildings	0.25	42 feet	0.04	No

As shown in Table 14, construction equipment would not generate vibration levels that exceed the building damage criteria. Impacts from construction vibration to adjacent buildings would be less than significant. No mitigation is required. This topic will not be discussed in the EIR.

OPERATIONS

The proposed project would not include sources of vibration during operations. Therefore, no operational vibration assessment is required.

Impact NO-2: The proposed project would generate noise levels in excess of standards established in the local general plan or noise ordinance and could result in a substantial permanent increase in ambient noise levels in the project vicinity. (*Less than Significant with Mitigation*)

Traffic Noise

To estimate future noise levels due to traffic added from the project, peak hour traffic volumes (with and without the project) were used to determine the percent increase of traffic on the roads adjacent to the project site. The project is expected to minimally increase traffic volumes along Sixth Street (approximately 1 percent increase), and Fifth Street (approximately 2 percent increase). Project-generated traffic would increase noise on these streets by less than 1 dB(A). The proposed project is not expected to increase traffic volume along Market Street. Peak traffic volumes are expected to increase approximately 41 percent along Stevenson Street between Fifth and Sixth streets with implementation of the project. Traffic increases of 41 percent only raise noise levels approximately 1.6 dB(A), which is imperceptible. As stated above, traffic noise increases of less than 3 dBA are barely perceptible to people, while a 5 dBA increase is readily noticeable. In areas where the existing or existing plus project noise environmental is conditionally acceptable or normally unacceptable per the general plan land use compatibility chart, any noise increase greater than 3 dBA is considered a significant noise impact. As project-generated traffic

would increase noise on adjacent roadways by a maximum of 1 dBA, permanent noise increases due to project-related traffic would be less than significant.

Project Fixed Noise Source Impacts

HVAC and Mechanical Systems Exterior Noise

Per San Francisco Police Code section 2909(a) residential properties may not produce a noise level more than 5 dB(A) above the ambient noise level at any point outside of the property plane. Typical residential and commercial building construction would involve new rooftop mechanical equipment, such as air handling units, condensing units, make-up air units, and exhaust fans. This equipment would generate noise that would radiate to neighboring properties.

Noise from HVAC equipment can vary greatly, depending on the size of the equipment and the type of equipment used. The project sponsor has verified that water-source heat pumps are planned for the residential units and the main pieces of mechanical equipment would be located on the roof.[58] While the project sponsor has not selected the exact mechanical equipment to be installed on the project site, the following assumptions were used in the exterior analysis of the mechanical equipment based on HVAC equipment similar to standard package units installed on buildings similar to the proposed project:

- A standard HVAC unit would produce sound pressure levels in the range of 70 to 75 dBA at 50 feet.[59]
- The mechanical equipment was assumed to be centrally located in the mechanical area on the roof.
- The mechanical area is visually blocked from the surrounding buildings by a 9-foot, 3 inch tall screen. Even though there is a screen, effects of the screen were not considered in the analysis to meet the requirements of the San Francisco Police Code section 2909(a) because this code requirement is a "property plane" requirement. This means the noise level requirements listed in the code must be met at an infinite vertical plane as defined by the subject project's property line. Therefore, this analysis is conducted just above the screen during nighttime hours to simulate a worst-case scenario.

Using the sound pressure levels and the analysis assumptions listed above, the results of the noise level from exterior mechanical systems at the property plane are as follows:

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[58] Lehman, Victoria. 2019 Personal Communication email. August 19.

[59] Hoover and Keith, Noise Control for Buildings, Manufacturing Plants, Equipment, and Products, 2000, Houston, TX.

TABLE 15: CALCULATED ROOFTOP MECHANICAL EQUIPMENT NOISE LEVELS AT THE PROJECT PROPERTY PLANES

Property Plane	Nighttime Ambient Noise Level	2909(a) Noise Limit (Ambient + 5 dB(A))	Distance between Mechanical Area and Property Plane	Estimated Noise Level at Property Plane	Exceeds 2909(a) Noise Limit?
Stevenson Street	57.5 dB(A)	62.5 dB(A)	77′-0″	74.2 dB(A)	Yes
Jessie Street	55.0 dB(A)	60.0 dB(A)	37′-0″	80.5 dB(A)	Yes
Western property plane (near Sixth Street)	55.0 dB(A)	60.0 dB(A)	57′-10″	76.7 dB(A)	Yes
Eastern property plane (near Fifth Street)	57.5 dB(A)	62.5 dB(A)	66′-1″	75.0 dB(A)	Yes

As shown in Table 15, the proposed project's rooftop HVAC and mechanical equipment would exceed the property plane noise requirements in section 2909(a) of the police code and would therefore result in a substantial increase in ambient noise levels in excess of standard established in the noise ordinance. This would be a significant impact.

MITIGATION MEASURE

Mitigation Measure M-NO-2: HVAC and Mechanical Equipment Exterior Noise

A minimum of 20.5 dB(A) noise reduction is required from the rooftop equipment to achieve the requirements of the San Francisco Police Code. The project sponsor shall implement the following mitigation measure to reduce noise levels from the source equipment and achieve compliance with the police code:

- Enclose as much of the proposed project's rooftop equipment as possible within a mechanical room with small louvered openings to the exterior. The mechanical room and louvered openings can be treated with acoustic absorption and sound attenuators to reduce noise at the property planes.
- If the equipment remains open to the roof, select rooftop equipment with a maximum sound pressure level of 54.4 dB(A) at 50 feet from the equipment.
- Attach sound attenuators to the outside air and exhaust air openings/fans of the rooftop equipment to minimize environmental noise.

During the design phase, once the project sponsor has selected the specific HVAC and mechanical equipment for the proposed project, a qualified acoustical consultant shall conduct a property plane noise analysis. The property plane analysis report shall evaluate whether the proposed HVAC and mechanical equipment complies with the noise limits in the San Francisco Police Code. The report shall be submitted to the San Francisco Planning

Department for review and approval prior to issuance of a building permit or building permit addendum that would permit the HVAC and mechanical equipment.

Significance after Mitigation: Mitigation Measure M-NO-2 would require the project sponsor to implement measures to reduce the noise generated from the Project's mechanical equipment to achieve the operational noise levels mandated by the City and County of San Francisco police code. In addition, the project sponsor will, through a qualified acoustical consultant, prepare a property plane analysis to confirm the HVAC and mechanical equipment package selected for the proposed project complies with the operational noise limits in the police code. Thus, with implementation of M-NO-2 noise impacts from the exterior mechanical system would be less than significant and this topic will not be discussed in the EIR.

HVAC and Mechanical Systems Interior Noise

Per San Francisco Police Code section 2909(d), fixed noise sources cannot intrude into a sleeping or living room in any dwelling unit located on residential property to produce interior noise levels that exceed 45 dB(A) between the hours of 10:00 p.m. to 7:00 a.m. or 55 dB(A) between the hours of 7:00 a.m. to 10:00 p.m. The tallest closest residential receptors to the 469 Stevenson Project are at 47-Sixth Street (approximately 20 feet from the project site) with a building height of 85 feet and 973 Market Street (approximately 22 feet from the project site) with a building height of 101 feet. These residential buildings are the tallest buildings located directly adjacent to the 469 Stevenson building and therefore, the residential units in these buildings will be the closest to the rooftop mechanical equipment on 469 Stevenson Street.

Noise from the projected project's rooftop equipment to these residential properties was calculated to verify compliance with section 2909(d) of the San Francisco Police Code. Because the section 2909(d) analysis is a point calculation to the closest residential units and not a property plane analysis, the effects of the 9-foot, 3 inch tall screen shielding the rooftop mechanical equipment was included in the analysis of interior noise for the mechanical systems. The interior noise analysis also accounts for a 15 dB(A) reduction in noise from the building façade. This is a typical noise reduction factor that assumes windows are open. The results of the interior noise analysis are shown in Table 16 below.

TABLE 16: CALCULATED ROOFTOP MECHANICAL EQUIPMENT NOISE LEVELS AT THE NEAREST INTERIOR RESIDENTIAL RECEPTORS

Receptor Location	Estimated Rooftop Equipment Noise Level at Residence	Façade Noise Reduction[60]	Calculated Interior Noise Level	Criterion	Exceeds Criterion?
47 Sixth Street	41.5 dB(A)	15 dB(A)	26.5 dB(A)	45 dB(A)	No
973 Market Street	42.7 dB(A)	15 dB(A)	27.7 dB(A)	45 dB(A)	No

60 Facade noise reduction is typically 15 dBA with windows open. See http://researchrepository.napier.ac.uk/2040/1/TWFrepNANR_116.pdf

Therefore, interior noise impacts from exterior mechanical noise generated by the proposed project would be less than significant and this topic will not be discussed in the EIR.

Emergency Generators

One emergency generator is planned for the proposed project. The generator is planned to be located within the main electrical room on the ground floor in the southwest portion of the property. The exact discharge, intake, and exhaust pipe paths for the generator are not yet known. The generator would be tested regularly, typically once per month. However, the generator will require a permit to operate from the Bay Area Air Quality Management District, which typically permits emergency generators to operate for testing purposes up to 50 hours per year. The generator would typically be tested during the weekday, daytime hours. Given the generator would be located in an enclosed room and operate at most 1 hour per week during daytime hours, noise from the generator is not anticipated to substantially increase daytime ambient noise levels. Therefore, noise impacts from the emergency generator would be less than significant. No mitigation measures are required, and this topic will not be discussed in the EIR.

Impact C-NO-1: Construction of the proposed project, in combination with reasonably foreseeable projects, would result in a significant cumulative impact related to noise and the project's contribution would be cumulatively considerable. (*Less than Significant with Mitigation*)

There are currently 17 cumulative projects in proximity to the proposed project. One of these projects are transportation network projects (Better Market Street Project) and the rest are development projects. Thirteen of these cumulative projects are within 0.25 mile (1,320 feet) to the 469 Stevenson project site such that their construction and operational noise would have the potential to combine with the project's construction and operational noise at the nearest sensitive receptor locations. These projects include the following:

- 1025 Howard Street (Howard and Sixth streets)
- 1055 Market Street (Between Sixth and Seventh streets)
- 1082 Howard Street (Between Sixth and Seventh streets)
- 1088 Howard Street (Howard and Seventh streets)
- 1125 Market Street (Between Seventh and Eighth streets)
- 457-475 Minna Street (Between Fifth and Sixth streets)
- 481-483 Tehama Street (Tehama and Sixth streets)
- 527 Stevenson Street (Stevenson and Sixth streets)
- 57 Taylor Street (Taylor and Market streets)
- 921 Howard Street (Between Fifth and Sixth streets)

- 984 Folsom Street (Folsom and Sixth streets)
- 996 Mission Street (Between Fifth and Sixth streets)
- Better Market Street (Market Street, between Octavia Boulevard to Steuart Street)
- In addition, it is possible that construction of this project could overlap with construction of the Sixth Street Pedestrian Safety Improvement Project and it is anticipated that construction of the proposed project would overlap with construction of the 5M project.

Of these projects, the closest to the 469 Stevenson Street Project are the 996 Mission Street project, the Better Market Street project, and the 527 Stevenson Street project, being about, 145 feet, 246 feet, and 425 feet away from the project site, respectively. All other project sites are separated from the proposed project by an extended distance. All cumulative projects would have multiple existing buildings between them and the 469 Stevenson Street project site that would provide shielding of their construction to limit the noise which combines with the project construction noise, if they were to be constructed simultaneously. Also, construction at all the cumulative project sites would be subject to the same noise regulations as the proposed project, such as limiting construction hours and equipment noise levels. However, given the large number of cumulative projects nearby and the potential for numerous projects to be under construction simultaneously as the proposed project, cumulative construction noise could be substantial by both increasing the intensity of noise levels in the area and the duration that sensitive receptors experience construction noise Therefore, the proposed project in combination with cumulative projects would result in a significant construction noise impact. The proposed project would result in construction noise levels that are at least 10 dBA above ambient noise levels for the entire construction duration, and at times the project's construction noise would be approximately 20 dBA above the ambient. However, construction noise levels would fluctuate throughout the day depending upon the specific equipment being used at any one time. Therefore, the proposed project would contribute considerably to this cumulative impact.

MITIGATION MEASURES

Implement ***Mitigation Measure M-NO-1: Construction Noise.*** Please refer to the mitigation measure stated previously in this section.

Significance after Mitigation: As discussed in Impact NOI-1, Mitigation Measure M-NO-1 would reduce the daytime construction noise levels at nearby noise sensitive receptors. Although construction noise may at times exceed 10 dBA above the ambient or 90 dBA at sensitive receptor locations, this mitigation measure would substantially reduce the intensity of construction noise and the duration of construction noise that exceed 10 dBA above the ambient noise levels or 90 dBA at noise sensitive receptors. Furthermore, construction noise levels would be temporary and would not persist upon completion of construction activities. Individual pieces of construction equipment (apart from impact equipment) would also be required to comply with the noise limits in article 29 of the police code. Thus, with implementation of Mitigation Measure M-NO-1, the proposed project's contribution to cumulative construction noise impacts would be less than significant. This topic will not be addressed in the EIR.

Impact C-NO-2: Construction of the proposed project, in combination with reasonably foreseeable projects, would not result in a significant cumulative impact related to vibration. ***(Less than Significant)***

Vibration effects are highly localized, and vibration attenuates rapidly from the source. Therefore, vibration impacts attributable to construction activities generally would be limited to buildings and structures adjacent to the project site. Since the proposed project would not result in vibration-related damage to adjacent structures during construction activities and vibration effects are localized and attenuate rapidly with distance from the source, vibration-generating equipment from the proposed project would not combine with that of even the closest cumulative projects (996 Mission Street, Better Market Street, and 527 Stevenson Street projects) to result in cumulative vibration effects that would damage nearby buildings. Therefore, cumulative vibration effects to the nearby buildings would be less than significant. This topic will not be addressed in the EIR.

Impact C-NO-3: Operation of the proposed project, in combination with reasonably foreseeable projects, would result in a significant cumulative impact related to noise. The proposed project's contribution to this cumulative impact would be less than cumulatively considerable. ***(Less than Significant)***

With respect to operational noise, the proposed project would include new fixed noise sources, such as mechanical equipment and HVAC systems that would produce operational noise on the project site. Similar new fixed noise sources would be required for the cumulative projects near the project site, such as the 996 Mission Street and 527 Stevenson Street projects. The proposed project's mechanical equipment and mechanical equipment from cumulative projects would be fairly localized, would attenuate with distance, and would be required to comply with the noise limits in the San Francisco Police Code. Therefore, mechanical and HVAC noise from the proposed project combined with that from cumulative projects would not combine to cause a significant cumulative noise impact.

Cumulative projects would also result in operational noise from vehicular traffic. To estimate future cumulative noise levels due to traffic, peak hour cumulative plus project traffic volumes were used to determine the percent increase of traffic on the roads adjacent to the project site. Due to expected changes in traffic patterns and vehicle restrictions from the Better Market Street project along Market Street and Sixth Street, the project plus cumulative projects would actually reduce future peak hour traffic volume and associated traffic noise along Market Street and Sixth Street. Table 17 shows the existing and cumulative future peak hour traffic volume on the local roadway network. The last two columns in the table show the overall percent change and the estimated difference in peak hour noise level.

TABLE 17: CUMULATIVE TRAFFIC NOISE LEVELS

Roadway	Existing Peak Hour Traffic	Cumulative Peak Hour Traffic Volume with Project	Percent Change	Estimated dB(A) Change
Market Street	580	400	-31%	-1.2 dB(A)

Roadway	Existing Peak Hour Traffic	Cumulative Peak Hour Traffic Volume with Project	Percent Change	Estimated dB(A) Change
Sixth Street	1,844	1,561	-15%	-0.6 dB(A)
Stevenson Street	108	244	126%	Less than 1 dB(A)
Fifth Street	1,402	2,448	75%	3 dB(A)

Peak traffic volume is expected to increase approximately 126 percent along Stevenson Street between Fifth Street and Sixth Street with the cumulative projects plus the proposed project. Even though the traffic on Stevenson Street is expected to increase by 126 percent, the overall peak hour traffic volume is still very low. Cumulative plus project peak hour traffic on Stevenson Street is only expected to be 244 cars. Traffic volumes this low are not expected to generate a great deal of noise and ambient noise levels at the site would still be dominated by the existing noise levels. The change in ambient noise levels along Stevenson Street is estimated to be below 1 dB(A).

Cumulative plus project peak traffic volume along Fifth Street between Stevenson Street and Market Street is expected to increase by 75 percent. Traffic increases of 75 percent only increase noise levels approximately 3 dB(A). However, because the existing noise levels are above 60 dBA Ldn, a 3 dBA increase in traffic noise would be considered significant. Therefore, a significant cumulative traffic noise impact would occur along Fifth Street. However, the project would contribute 28 vehicle trips to Fifth Street under cumulative conditions. The project-related contribution to traffic noise under cumulative conditions would not be considerable because it would represent a minor proportion of the overall traffic volume in the site vicinity and traffic noise from the project would not be perceptible. As such, the proposed project would not contribute considerably to a cumulatively significant impact related to noise from traffic. The proposed project's contribution to significant cumulative traffic noise impacts would be less than significant.

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E.7 Air Quality

Topics:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Not Applicable
7. AIR QUALITY. Would the project:					
a) Conflict with or obstruct implementation of the applicable air quality plan?	☒	☐	☐	☐	☐
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal, state, or regional ambient air quality standard?	☒	☐	☐	☐	☐
c) Expose sensitive receptors to substantial pollutant concentrations?	☒	☐	☐	☐	☐
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☒	☐	☐

The proposed project would result in air pollutant emissions during construction and operation that could be potentially significant. The proposed project's air pollutant emissions will be analyzed in the EIR. The proposed project's potential to result in other emissions, such as odors, are addressed below and will not be analyzed in the EIR.

Impact AQ-1: The proposed project would not result in odors that would affect a substantial number of people. (*Less than Significant*)

The proposed project is a mixed-use residential project and does not include any land uses that are known to generate substantial odors, such as wastewater treatment plants, sanitary landfills, transfer stations, composting facilities, petroleum refineries, asphalt batch plants, chemical manufacturing facilities, fiberglass manufacturing facilities, auto body shops, rendering plants, or coffee roasting facilities. Operation of the proposed residential and commercial retail uses, which are typical urban land uses, are not anticipated to create significant sources of new odors. During construction, diesel exhaust from construction equipment would generate odors. However, construction-related odors would be temporary and would not persist upon project completion. Therefore, odor impacts would be less than significant. No mitigation is required, and this topic will not be addressed in the EIR.

Impact C-AQ-1: The proposed project in combination with other reasonably foreseeable cumulative projects would not result in significant cumulative odor impacts. (*Less than Significant*)

As discussed in Impact AQ-1, the proposed residential and commercial retail uses are not uses that would generate odors affecting a substantial number of people. The cumulative projects identified in Table 2 include similar residential and commercial uses that also would not generate odors affecting a substantial number of people. However, as with the proposed project, construction activities required for all the cumulative projects in Table 2 would require the use of

diesel equipment, which would generate odors. Construction related odors would be temporary, disperse with distance from the construction activity, and would not persist upon project completion. Therefore, cumulative odor impacts would be less than significant. No mitigation is required. This topic will not be addressed in the EIR.

E.8 Greenhouse Gas Emissions

Topics:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Not Applicable
8. GREENHOUSE GAS EMISSIONS. Would the project:					
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐	☐
b) Conflict with any applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐	☐

Greenhouse gas (GHG) emissions and global climate change represent cumulative impacts. GHG emissions cumulatively contribute to the significant adverse environmental impacts of global climate change. No single project could generate enough GHG emissions to noticeably change the global average temperature; instead, the combination of GHG emissions from cumulative projects have contributed and will continue to contribute to global climate change and its associated environmental impacts.

The air district has prepared guidelines and methodologies for analyzing GHGs. These guidelines are consistent with CEQA Guidelines sections 15064.4 and 15183.5 which address the analysis and determination of significant impacts from a proposed project's GHG emissions. CEQA Guidelines section 15064.4 allows lead agencies to rely on a qualitative analysis to describe GHG emissions resulting from a project. CEQA Guidelines section 15183.5 allows for public agencies to analyze and mitigate GHG emissions as part of a larger plan for the reduction of GHGs and describes the required contents of such a plan. Accordingly, San Francisco has prepared *Strategies to Address Greenhouse Gas Emissions,* which presents a comprehensive assessment of policies, programs, and ordinances that collectively represent San Francisco's qualified GHG reduction strategy in compliance with CEQA guidelines.[61] These GHG reduction actions have resulted in a 36 percent reduction in GHG emissions in 2016 compared to 1990 levels,[62] exceeding the 2020 reduction goals outlined in the air district's 2017 clean air plan, Executive Order S-3-05, and Assembly Bill 32 (also known as the Global Warming Solutions Act).[63]

Given that the city has met the state and region's 2020 GHG reduction targets and San Francisco's GHG reduction goals are consistent with, or more aggressive than, the long-term goals established

61 San Francisco Planning Department, 2017, Strategies to Address Greenhouse Gas Emissions in San Francisco, 2017. Available at http://sf-planning.org/strategies-address-greenhouse-gas-emissions.

62 San Francisco Department of the Environment, San Francisco's Carbon Footprint, https://sfenvironment.org/carbon-footprint, accessed May10, 2019.

63 Executive Order S-3-05, Assembly Bill 32, and the air district's 2017 Clean Air Plan (continuing the trajectory set in the 2010 Clean Air Plan) set a target of reducing GHG emissions to below 1990 levels by 2020.

under Executive Orders S-3-05,[64] B-30-15,[65,66] and Senate Bill 32, the city's GHG reduction goals are consistent with orders S-3-05, B-30-15, Assembly Bill 32, Senate Bill 32[67,68] and the 2017 clean air plan. Therefore, proposed projects that are consistent with the city's GHG reduction strategy would be consistent with the aforementioned GHG reduction goals, would not conflict with these plans or result in significant GHG emissions, and would therefore not exceed San Francisco's applicable GHG threshold of significance.

The following analysis of the proposed project's impact on climate change focuses on the project's contribution to cumulatively significant GHG emissions. Because no individual project could emit GHGs at a level that could result in a significant impact on the global climate, this analysis is in a cumulative context, and this section does not include an individual project-specific impact statement.

Impact C-GG-1: The proposed project would generate greenhouse gas emissions, but not at levels that would result in a significant impact on the environment or conflict with any policy, plan, or regulation adopted for the purpose of reducing greenhouse gas emissions. (*Less than Significant*)

Individual projects contribute to the cumulative effects of climate change by directly or indirectly emitting GHGs during construction and operational phases. Direct operational emissions include GHG emissions from new vehicle trips and area sources (natural gas combustion). Indirect emissions include emissions from electricity providers; energy required to pump, treat, and convey water; and emissions associated with waste removal, disposal, and landfill operations.

The proposed project would generate GHGs during construction and operation. Construction activities that are likely to emit GHGs include demolition of the existing surface parking lot, site preparation and grading, excavation, shoring, building construction, architectural coating, paving, and site finishing work. Throughout the construction process there would also be daily

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64 Executive Order S-3-05 sets forth a series of target dates by which statewide emissions of GHGs need to be progressively reduced, as follows: by 2010, reduce GHG emissions to 2000 levels (approximately 457 million metric tons of carbon dioxide equivalents (MTCO2E)); by 2020, reduce emissions to 1990 levels (approximately 427 million MTCO2E); and by 2050 reduce emissions to 80 percent below 1990 levels (approximately 85 million MTCO2E). Because of the differential heat absorption potential of various GHGs, GHG emissions are frequently measured in "carbon dioxide-equivalents," which present a weighted average based on each gas's heat absorption (or "global warming") potential.

65 Executive Order B-30-15, issued on April 29, 2015, sets forth a target of reducing GHG emissions to 40 percent below 1990 levels by 2030 (estimated at 2.9 million MTCO2E).

66 San Francisco's GHG reduction goals are codified in Section 902 of the Environment Code and include: (i) by 2008, determine City GHG emissions for year 1990; (ii) by 2017, reduce GHG emissions by 25 percent below 1990 levels; (iii) by 2025, reduce GHG emissions by 40 percent below 1990 levels; and by 2050, reduce GHG emissions by 80 percent below 1990 levels.

67 Senate Bill 32 amends California Health and Safety Code Division 25.5 (also known as the California Global Warming Solutions Act of 2006) by adding Section 38566, which directs that statewide greenhouse gas emissions to be reduced by 40 percent below 1990 levels by 2030.

68 Senate Bill 32 was paired with Assembly Bill 197, which would modify the structure of the State Air Resources Board; institute requirements for the disclosure of greenhouse gas emissions criteria pollutants, and toxic air contaminants; and establish requirements for the review and adoption of rules, regulations, and measures for the reduction of greenhouse gas emissions.

transportation of materials. Equipment used for the above activities would be fueled by diesel, propane, and gasoline, which would contribute to emissions of nitrogen oxides, particulate matter, sulfur dioxide, carbon monoxide, methane, and carbon dioxide.

The proposed project would generate operational GHG emissions from a variety of sources, including area sources (consumer products, architectural coatings, and landscape equipment), mobile sources (daily automobile and truck trips), and energy sources (natural gas combustion in boilers/heaters and stoves). The proposed project also requires one emergency diesel backup generator. The generator is planned to be located within the main electrical room on the ground floor in the southwest portion of the property. The exact discharge, intake, and exhaust pipe paths for the generator are not yet known. The generator would be tested regularly, typically once per month. However, the generator will require a permit to operate from the Bay Area Air Quality Management District, which typically permits emergency generators to operate for testing purposes up to 50 hours per year. The generator would result in emissions during testing and emergency operation.

The proposed project would be subject to the regulations summarized in the city's GHG Reduction Strategy.[69] As discussed below, compliance with the applicable regulations would reduce the project's GHG emissions related to transportation, energy efficiency, water conservation, and waste disposal.

Compliance with the city's Commuter Benefits Program, Transportation Demand Management Programs, Transportation Sustainability Fee, bicycle parking requirements, low emission car parking requirements, and car sharing requirements would reduce the proposed project's transportation-related emissions. These regulations reduce GHG emissions from single-occupancy vehicles by promoting the use of alternative transportation modes with zero or lower GHG emissions on a per capita basis. Furthermore, the proposed project would include the following features that would increase the walkability of the site and the surrounding area: enhanced sidewalk and entry paving, new light fixtures, new street trees, and on-street bicycle racks.

The proposed project would be required to comply with the energy efficiency requirements of the city's Green Building Code; alternative water sources for non-potable applications; Stormwater Management Ordinance; Water Use Reduction, Water Conservation, and Efficient Irrigation ordinances; and Energy Conservation Ordinance, which would promote energy and water efficiency, thereby reducing the proposed project's energy-related GHG emissions.[70]

The proposed project's waste-related emissions would be reduced through compliance with the city's Recycling and Composting Ordinance, Construction and Demolition Debris Recovery Ordinance, and Green Building Code requirements. These regulations reduce the amount of materials sent to a landfill, reducing GHGs emitted by landfill operations. These regulations also

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69 San Francisco Planning Department. 2017. 2017 Greenhouse Gas Reduction Strategy Update. Available https://sfplanning.org/project/greenhouse-gas-reduction-strategies. Accessed February 20, 2019.

70 Compliance with water conservation measures reduce the energy (and GHG emissions) required to convey, pump and treat water required for the project

promote reuse of materials, conserving their embodied energy and reducing the energy required to produce new materials. [71]

The proposed project would plant approximately eight new trees in accordance with the city's street tree planting requirements along Jessie Street, which would serve to increase carbon sequestration. The proposed project would not include wood burning fireplaces and therefore would comply with the air district's Wood-Burning Devices Regulation. The proposed project would also comply with section 4.504 of the CALGreen requirements and use low-emitting coatings, paints, adhesives, and finishes to reduce volatile organic compounds (VOCs).[72] As such, the proposed project was determined to be consistent with San Francisco's GHG reduction strategy.[73]

The project sponsor is required to comply with these regulations, which have proven effective as San Francisco's GHG emissions have measurably decreased when compared to 1990 emissions levels, demonstrating that the city has met and exceeded Executive Order S-3-05, Assembly Bill 32, and the 2017 Clean Air Plan GHG reduction goals for the year 2020. Furthermore, because San Francisco has reduced its GHG emissions, as of 2016, to 30 percent below 1990 levels, the city has met its goal of reducing GHG emissions to 25 percent below 1990 levels by 2017. Other existing regulations, such as those implemented through Assembly Bill 32, will continue to reduce a proposed project's contribution to climate change. In addition, San Francisco's local GHG reduction targets are consistent with the long-term GHG reduction goals of Executive Order S-3-05, Executive Order B-30-15, Assembly Bill 32, Senate Bill 32, and the 2017 Clean Air Plan. Therefore, because the proposed project is consistent with the city's GHG reduction strategy, it is also consistent with the GHG reduction goals of Executive Order S-3-05, Executive Order B-30-15, Assembly Bill 32, Senate Bill 32, and the 2017 Clean Air Plan, would not conflict with these plans, and would therefore not exceed San Francisco's applicable GHG threshold of significance. As such, the proposed project's contribution to cumulative GHG impacts would be less than cumulatively considerable, and no mitigation measures are required. This topic will not be addressed in the EIR.

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71 Embodied energy is the total energy required for the extraction, processing, manufacture and delivery of building materials to the building site.

72 While not a GHG, VOCs are precursor pollutants that form ground level ozone. Increased ground level ozone is an anticipated effect of future global warming that would result in added health effects locally. Reducing VOC emissions would reduce the anticipated local effects of global warming.

73 San Francisco Planning Department, Greenhouse Gas Analysis: Compliance Checklist for 469 Stevenson Street. September 11, 2019.

E.9 Wind

Topics:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Not Applicable
9. WIND. Would the project:					
a) Create wind hazards in publicly accessible areas of substantial pedestrian use?	☒	☐	☐	☐	☐

Wind is analyzed as part of CEQA review in the city with respect to potential pedestrian hazards, based on the criteria in planning code section 148, Reduction of Ground-Level Wind Currents in C-3 Use Districts. For wind hazards, section 148 requires that buildings do not cause an equivalent wind speed of 26 mph as averaged for a single full hour of the year.[74,75] This hazard criterion of section 148 is used by the planning department as a CEQA significance threshold for the determination of whether a project would create wind hazards in publicly accessible areas of substantial pedestrian use.

The proposed project would involve the construction of a 27-story building approximately 274 feet tall (with an additional 10 feet for rooftop mechanical equipment). The proposed project could result in increased ground-level wind speeds on the project site and on adjacent sidewalks that could exceed pedestrian comfort limits and hazard criteria set forth in the planning code. Therefore, wind impacts will be evaluated further in the EIR.

74 The wind ordinance comfort criteria are defined in terms of equivalent wind speed, which is an average wind speed (mean velocity), adjusted to include the level of gustiness and turbulence. Equivalent wind speed is defined as the mean wind velocity, multiplied by the quantity (one plus three times the turbulence intensity) divided by 1.45. This calculation magnifies the reported wind speed when turbulence intensity is greater than 15 percent. Unless otherwise stated, use of the term "wind speed" in connection with the wind-tunnel tests refers to equivalent wind speeds that are exceeded 10 percent of the time.

75 The wind hazard criterion is derived from the 26 mph hourly average wind speed that would generate a 3-second gust of wind at 20 meters per second, a commonly used guideline for wind safety. Because the original federal building wind data was collected at 1-minute averages, the 26 mph hourly average is converted to a 1-minute average of 36 mph, which is used to determine compliance with the 26 mph 1-hour hazard criterion in the planning code (Arens, E., et al. 1989. "Developing the San Francisco Wind Ordinance and its Guidelines for Compliance," Building and Environment, Vol. 24, No. 4, p. 297–303).

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E.10 Shadow

Topics:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Not Applicable
10. SHADOW. Would the project:					
a) Create new shadow that substantially and adversely affects the use and enjoyment of publicly accessible open spaces?	☒	☐	☐	☐	☐

San Francisco Planning Code section 295 regulates new structures above 40 feet in height that would cast additional shadows on open space that is under the jurisdiction of the San Francisco Recreation and Park Commission between one hour after sunrise and one hour before sunset, at any time of the year. A project that adds new shadow to sidewalks or a public open space on a section 295 park does not necessarily result in a significant impact under CEQA; the city's significance criteria used in CEQA review asks whether a project would "create new shadow that substantially and adversely affects the use and enjoyment of publicly accessible open spaces."

The proposed project would construct a 27-story building, approximately 274 feet tall. A refined shadow fan analysis was prepared by a shadow consultant that takes into account the shadow cast by existing buildings and the proposed project to determine which public open spaces the proposed project could cast net new shadow upon. The refined shadow fan analysis indicates the proposed project could potentially shade UN Plaza and Mint Plaza.[76]

The EIR will evaluate the net new shadow cast by the proposed project on the above public open spaces to determine whether the proposed project could create new shadow that substantially affects the use and enjoyment of those public open spaces.

[76] PreVision Design, 469 Stevenson Street Full Year Net New Shadow Fan Diagram Factoring in the Presence of Existing Shadows. August 22, 2019.

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E.11 Recreation

Topics:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Not Applicable
11. RECREATION. Would the project:					
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facilities would occur or be accelerated?	☐	☐	☒	☐	☐
b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☐	☐	☒	☐	☐

Impact RE-1: The proposed project would not increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facilities would occur or be accelerated or the construction of new facilities would be required. (*Less than Significant*)

As described in Section E.2, Population and Housing, implementation of the proposed project would add approximately 1,086 residents and 11 employees to the project site. This would represent an approximately 13 percent increase over the existing population of 8,432 in census tract 176.01.

In accordance with the San Francisco Planning Code, the proposed project would provide a total of approximately 14,000 square feet of common open space available to residents of the proposed project in the form of a lounge solarium, fitness solarium, first floor courtyard, and roof lounge. In addition, the proposed project would provide approximately 11,000 square feet of private residential open space, which would consist of private balconies for 15 dwelling units. New employees and residents generated by the project may use open spaces provided by the project and other parks and recreational facilities in the vicinity of the project site.

The new residents of the proposed project would be served by the RPD, which administers more than 220 parks, playgrounds, and open spaces throughout the city, as well as recreational facilities including recreation centers, swimming pools, golf courses, and athletic fields, tennis courts, and basketball courts.[77] Table 18 lists the recreational resources within 0.5 mile of the project site.

[77] San Francisco Recreation and Parks Department. Available online at: sfrecpark.org. Accessed April 15, 2019.

TABLE 18: RECREATIONAL RESOURCES WITHIN ONE-HALF MILE OF PROJECT SITE

Name	Size (acres)	Distance from Project Site (miles)	2017 Park Maintenance Score	Amenities
Father Alfred E. Boeddeker Park	0.97	0.3	95.7%	Basketball half-court, swings, slide and play structures.
Gene Friend Recreation Center Park	1.02	0.3	83.2%	Full indoor gymnasium, activity room, weight room, auditorium, outdoor basketball court, playground, badminton and volleyball courts, and ping pong tables.
Turk-Hyde Mini Park	0.11	0.4	75.9%	Play structures and a 4-foot high train with two cars.
Tenderloin Recreation Center	0.61	0.4	87.1%	Recreation center, playground, street soccer court, ball diamond, and child-sized gym.
Victoria Manalo Draves Park	2.52	0.5	88.3%	Softball field, basketball court, dual-level playground, picnic area, community garden and large, grassy field.
Joseph L. Alioto Performing Arts Piazza	5.38	0.5	85.6%	Two play areas.
Total	10.61	--	85.9% (average)	--

Source: San Francisco Park Evaluation Program. 2017. Available online at: http://sfparkscores.weebly.com/map.html. Accessed: June 18, 2019. San Francisco Recreation and Parks. 2019. Park Destination Map. Available online at: https://sfrecpark.org/destinationtype/park/. Accessed: June 18, 2019.

In 2003, voters passed Proposition C, which mandated the evaluation of park maintenance at city parks. The maintenance score for each park is based on criteria that reflect the different facilities at each park.[78] These scores reflect the park's performance in categories such as play areas, greenspace, hardscape, lawns, restrooms, seating areas, and others. Table 19 shows the maintenance score for parks within 0.5 mile of the project site. The average score of all parks within 0.5 mile is 85.9 percent.

While the proposed project would introduce a new permanent population living at the site, as discussed in Section C.1, San Francisco Planning Code, the proposed project would provide

78 City and County of San Francisco. 2018. Park Maintenance Standards Annual Report. Available: https://sfrecpark.org/wp-content/uploads/Annual-Park-Maintenance-Standards-Report-FY18.pdf. Accessed: July 31, 2019.

approximately 11,000 square feet of private open space and 14,000 square feet of common usable open space. Residents are also expected to use the six recreational facilities within 0.5 mile of the project site as well as regional open space attractions offered in the city, including Golden Gate Park, the Presidio, Lake Merced, McLaren Park, etc. Therefore, it is unlikely that the proposed project would substantially increase the demand for or use of either neighborhood parks and recreational facilities or city-wide facilities to the extent that physical deterioration would occur or require the construction or expansion of recreational facilities that could result in significant physical environmental impacts. As such, the proposed project would have a less-than-significant impact on parks and recreational facilities. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact C-RE-1: The proposed project, in combination with other reasonably foreseeable projects would not result in a significant cumulative impact related to recreation. (*Less than Significant*)

As discussed in Section E.2, Population and Housing, San Francisco has a population of approximately 883,305.[79] According to ABAG's Projections 2013, San Francisco's population will increase by approximately 74,700, from 959,405 in 2020 to 1,034,175 in 2030.[80] Therefore, the 1,086 new residents generated by the proposed project would account for approximately 0.10 percent of the residential growth expected in the city by 2030.

Although the proposed project would represent only a small portion of the projected growth for the city, overall citywide growth would generate demand for recreational resources as the population increases. The city has accounted for such growth as part of the recreation and open space element of the San Francisco General Plan. In addition, San Francisco voters passed two bond measures, in 2008 and 2012, to fund the acquisition, planning, and renovation of the city's network of recreational resources to meet increased demand.

The geographic context for analysis of cumulative impacts to recreational resources consists of the South of Market neighborhood and the recreational facilities within it. Cumulative development identified within 0.25 mile of the project site is expected to increase the residential population of the area. Therefore, the proposed project, in combination with the reasonably foreseeable future projects, would increase demand for recreational facilities and resources. Although the proposed project, in combination with the reasonably foreseeable projects, would increase the use of parks and recreational facilities, as shown in Table 19 there are six well maintained parks within a 0.5 mile of the project site, as well as regional open space attractions offered in the city. The increase in demand for recreational facilities would be disbursed among these parks, which would minimize

79 U.S. Census Bureau, San Francisco County, California, Families and Living Arrangements, Persons per households, 2013-2017. Available online at: https://www.census.gov/quickfacts/sanfranciscocountycalifornia. Accessed June 12, 2019.

80 Metropolitan Transportation Commission and Association of Bay Area Government, 2019. San Francisco Total Population Projections 2040. Available online at: http://projections.planbayarea.org/data. Accessed: June 18, 2019.

impacts on any single park. Further, as mentioned above, the city has bond funding and a capital improvement plan in place to fund necessary repairs and upgrades at existing parks.

In addition, the proposed project would be required to include a total of approximately 25,000 square feet of common and private open space for use by residents, which would partially offset the use of city parks and open spaces. The reasonably foreseeable projects would also be required to comply with the applicable open space requirements of the planning code, thereby also partially offsetting their demand on parks of open spaces. Therefore, because there are a number of well-maintained parks and open spaces in the project vicinity, and because the proposed project and reasonably foreseeable projects would be required to provide open space for project residents in accordance with planning code requirements, and the city has accounted for the effects of increased growth on its facilities as part of the recreation and open space element and bond measures, the proposed project, in combination with reasonably foreseeable future projects, would have less-than-significant cumulative recreation impacts, and no mitigation measures are required. This topic will not be discussed in the EIR.

E.12 Utilities and Service Systems

Topics:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Not Applicable
12. UTILITIES AND SERVICE SYSTEMS. Would the project:					
a) Require or result in the relocation or construction of new or expanded, water, wastewater treatment, or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☒	☐	☐
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years?	☐	☐	☒	☐	☐
c) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☒	☐	☐
d) Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☒	☐	☐
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☒	☐	☐

The project site is located within an urban area that is served by water storage, treatment, and distribution facilities; combined wastewater and stormwater collection, storage, treatment, and disposal facilities; electric power, natural gas, and telecommunication facilities; and solid waste collection and disposal service systems.

Impact UT-1: The proposed project would not require or result in the relocation or construction of new or expanded, water, wastewater treatment, or stormwater drainage, electric power, natural gas, or telecommunications facilities, nor would it result in a determination by the wastewater treatment provider that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments. ***(Less than Significant)***

The project site is served by San Francisco's combined sewer system, which collects and treats most of the wastewater and stormwater at one of the three SFPUC treatment facilities. Wastewater and stormwater generated by the project would be treated at the Southeast Water Pollution

Control Plant, which currently treats 60 million gallons of wastewater per day (mgd) and has the capacity to treat up to 250 mgd during a rainstorm.[81]

As described in Impact PH-1 in Section E.2, Population and Housing, the project would add approximately 1,086 residents to the project site. Based on the sewer calculations provided by BKF Engineers, the proposed project is estimated to produce approximately 45,405 gallons of wastewater per day (45,000 gallons per day [gpd] for residential use and 405 gpd for the retail use). The sewer calculations were based on a 95 percent return on water use.[82] The estimated amount of wastewater generated by the proposed project would represent 0.01 percent of the 60 mgd of wastewater treated at the Southeast Water Pollution Control Plant. The proposed project would also incorporate water-efficient fixtures, as required by Title 24 of the California Code of Regulations and the city's Green Building Ordinance. Compliance with these regulations would reduce wastewater flows generated by the project. In addition, separate from the proposed project, the SFPUC is upgrading the existing infrastructure at the Southeast Water Pollution Control Plant as part of its Sewer System Improvement Program to ensure reliability and performance of the city's sewer system.[83] Therefore, the proposed project's wastewater would be accommodated by the existing wastewater system.

With regards to stormwater drainage, the project site is currently a surface parking lot and completely covered with impervious surfaces. The proposed project would not expand any existing impervious surfaces; therefore, the proposed project would not result in an increase in stormwater runoff. The proposed project would be required to comply with the city's Stormwater Management Ordinance (as codified in section 147 of the San Francisco Public Works Code) and the 2016 Stormwater Management Requirements and Design Guidelines, which requires projects replacing more than 5,000 square feet of impervious surface to decrease the existing stormwater runoff flow rate and volume at the site by 25 percent for a two-year 24-hour design storm.[84] As discussed in the Project Description, the proposed project would install low impact design measures such as vegetated sidewalk planting areas, permeable pavement, steel planter areas, and a rainwater cistern to meet the requirements of the Stormwater Management Requirements and Design Guidelines. Installation of these site design measures would manage stormwater onsite and limit demand on the city's stormwater collection system and facilities. The proposed project would also be required to implement a stormwater control plan as approved by the SFPUC. The stormwater control plan would include a maintenance agreement signed by the project sponsor to ensure proper care of the stormwater controls.

The project would install new connections to the surrounding PG&E electric grid and natural gas system to provide service to the proposed building. The project would also provide

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81 SFPUC. 2014. SFPUC Sewer System Improvement Program. Available online at: https://sfwater.org/modules/showdocument.aspx?documentid=5801. Accessed: February 10, 2019.

82 Personal Communication BKF Engineers on August 2, 2019.

83 SFPUC. 2014. SFPUC Sewer System Improvement Program. Available online at: https://sfwater.org/modules/showdocument.aspx?documentid=5801. Accessed: February 10, 2019.

84 SFPUC. 2016. Stormwater Management Requirements and Design Guidelines. Available online at: https://sfwater.org/Modules/ShowDocument.aspx?documentID=9026. Accessed: February 10, 2019.

connections to communication lines along adjacent roadways. These improvements are part of the project description, and the environmental impacts associated with their construction are evaluated throughout this initial study and in the EIR. Other than localized connections to the existing systems, the project would not result in the construction or relocation of new or expanded stormwater, wastewater, electric, natural gas, or telecommunications facilities (e.g., electric substations, telecommunication towers). Therefore, this impact would be less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact UT-2: Adequate water supplies are available to serve the proposed project and reasonably foreseeable future development in normal, dry, and multiple dry years, unless the Bay Delta Plan Amendment is implemented; in that event, the SFPUC may develop new or expanded water supply facilities to address shortfalls in single and multiple dry years, but this would occur with or without the proposed project. Impacts related to new or expanded water supply facilities cannot be identified at this time or implemented in the near term; instead, the SFPUC would address supply shortfalls through increased rationing, which could result in significant cumulative effects, but the project would not make a considerable contribution to impacts from increased rationing. ***(Less than Significant)***

In 2016, the SFPUC adopted its 2015 Urban Water Management Plan,[85] which estimates that current and projected water supplies will meet future retail demand[86] through 2035 under normal-year, single-dry-year and multiple-dry-year conditions. However, if a multiple-dry-year event occurs, the SFPUC will implement water use and supply reductions through its retail water shortage allocation plan.

In December 2018, the State Water Resources Control Board adopted amendments to the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary, establishing water quality objectives to maintain the health of our rivers and the Bay-Delta ecosystem (the Bay-Delta Plan Amendment).[87] The state water board has stated that it intends to implement the Bay-Delta Plan Amendment by 2022, assuming all required approvals are obtained by that time. Implementation of the Bay-Delta Plan Amendment will result in a substantial reduction in SFPUC's water supplies from the Tuolumne River watershed during dry years, requiring rationing in San Francisco to a degree greater than that previously anticipated to address supply shortages that were not accounted for in the 2015 Urban Water Management Plan.

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85 San Francisco Public Utilities Commission, 2015 Urban Water Management Plan for the City and County of San Francisco, June 2016. Available online at: https://sfwater.org/index.aspx?page=75. Accessed: June 4, 2019.

86 "Retail" demand represents water the SFPUC provides to individual customers within San Francisco and several individual customers outside of San Francisco. "Wholesale" demand represents water the SFPUC provides to water agencies that supply other jurisdictions.

87 State Water Resources Control Board, Resolution No. 2018-0059, Adoption of Amendments to the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary and Final Substitute Environmental Document, December 12, 2018. Available online at: https://www.waterboards.ca.gov/plans_policies/docs/2018wqcp.pdf.

The SFPUC has prepared a memorandum to consider future water supply scenarios with adoption of the Bay-Delta Plan Amendment.[88] As discussed in the SFPUC memorandum, implementation of the plan amendment is uncertain for several reasons. Whether the Bay-Delta Plan Amendment will be implemented, when it will be implemented, and the form that implementation will take, as well as how the amendment will affect SFPUC's water supply, are currently unknown. The SFPUC memorandum estimates total shortfalls in water supply (e.g., total retail demand minus total retail supply) to retail customers through 2040 under three increasingly supply-limited scenarios:

1. Without implementation of the Bay-Delta Plan Amendment, wherein the water supply and demand assumptions contained in the 2015 Urban Water Management Plan and the 2009 Water Supply Agreement, as amended, would remain applicable.

2. With implementation of a voluntary agreement between the SFPUC and the State Water Resources Control Board, including a combination of flow and non-flow measures that would be designed to benefit fisheries at a lower water cost, particularly during multiple dry years, than that under the Bay-Delta Plan Amendment.

3. With implementation of the Bay-Delta Plan Amendment as adopted.

As estimated in the SFPUC memorandum, water supply shortfalls during dry years would be lowest without implementation of the Bay-Delta Plan Amendment and highest with implementation of the plan amendment. The range of shortfalls under the proposed voluntary agreement would be between those with and without implementation of the Bay-Delta Plan Amendment.[89]

Under the three scenarios, the SFPUC would have adequate water to meet total retail demands through 2040 in normal years.[90] For single dry years and multiple dry years (years 1, 2, and 3) of an extended drought, the SFPUC memorandum estimates that shortfalls in water supplies relative to demand would occur both with and without implementation of the Bay-Delta Plan Amendment. Without implementation of the plan amendment, shortfalls would range from approximately 3.6 to 6.1 mgd, or 5 to 6.8 percent, during dry years through 2040. With

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88 Memorandum from Steven R. Ritchie, SFPUC, to Lisa Gibson, Environmental Review Officer, San Francisco Planning Department, Environmental Planning Division, May 31, 2019.

89 On March 26, 2019, the SFPUC adopted Resolution No. 19-0057 to support its participation in the voluntary agreement negotiation process. To date, those negotiations are ongoing with the California Natural Resources Agency. The SFPUC submitted a proposed project description to the state water board on March 1, 2019, that could be the basis for a voluntary agreement. Because the proposed voluntary agreement has yet to be accepted by the state water board as an alternative to the Bay-Delta Plan Amendment, the shortages that would occur with its implementation are not known with certainty; however, if accepted, the voluntary agreement would result in dry-year shortfalls of a lesser magnitude than those under the Bay-Delta Plan Amendment.

90 Based on historic records of hydrology and reservoir inflow from 1920 to 2017 and current delivery and flow obligations, with the fully implemented infrastructure from the 2018 Phased Water System Improvement Program Variant, normal or wet years occurred during 85 out of 97 years. This translates into roughly nine normal or wet years out of every 10. Conversely, system-wide rationing is required roughly one out of every 10 years. This frequency is expected to increase as climate change intensifies.

implementation of the Bay-Delta Plan Amendment, shortfalls would range from 12.3 mgd (15.6 percent) in a single dry year to 36.1 mgd (45.7 percent) in years seven and eight of the 8.5-year design drought, based on 2025 demand levels, and from 21 mgd (23.4 percent) in a single dry year to 44.8 mgd (49.8 percent) in years seven and eight of the 8.5-year design drought, based on 2040 demand.

The proposed project does not require a water supply assessment under the California Water Code. Under sections 10910 through 10915 of the California Water Code, urban water suppliers, such as the SFPUC, must prepare water supply assessments for certain "large water demand" projects, as defined in CEQA Guidelines section 15155.[91] The proposed project would result in 462 new dwelling units and approximately 4,000 square feet of commercial retail. as such, it does not qualify as a "large water demand" project, as defined by CEQA Guidelines section 15155(a)(1). A water supply assessment is not required and has not been prepared for the project.

Although a water supply assessment is not required, the following discussion provides an estimate of the project's maximum water demand in relation to the three supply scenarios. No single development project alone in San Francisco would require the development of new or expanded water supply facilities or require the SFPUC to take other actions, such as imposing a higher level of rationing across the city in the event of a supply shortage in dry years. Therefore, a separate project-only analysis is not provided for this topic. The following analysis instead considers whether the proposed project, in combination with both existing development and projected growth through 2040, would require new or expanded water supply facilities, the construction or relocation of which could have significant cumulative impacts on the environment. It also considers whether a high level of rationing would be required that could have significant cumulative impacts. It is only under this cumulative context that development in San Francisco could have the potential to require new or expanded water supply facilities, or require the SFPUC to take other actions, which, in turn, could result in significant physical environmental impacts related to water supply. If significant cumulative impacts could result, then the analysis considers whether the project would make a considerable contribution to the cumulative impact.

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91 Pursuant to CEQA Guidelines section 15155,

a. The following definitions are applicable to this section.
1. A "water-demand project" means:
A. A residential development of more than 500 dwelling units.
B. A shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.
C. A commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor area.
D. A hotel or motel, or both, having more than 500 rooms. (
E. An industrial, manufacturing, or processing plant or industrial park for more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.
F. A mixed-use project that includes one or more of the projects specified in subdivisions (a)(1)(A), (a)(1)(B), (a)(1)(C), (a)(1)(D), (a)(1)(E), and (a)(1)(G) of this section.
G. A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a project with 500 dwelling units.

Based on guidance from the California Department of Water Resources and a citywide demand analysis, the SFPUC established 50,000 gpd as the equivalent project demand for projects that do not meet the definitions provided in CEQA Guidelines section 15155(a)(1).[92] The new development proposed by the project would represent 98 percent of the 500-unit limit provided in section 15155(1)(A) and 0.8 percent of the 500,000 square foot limit for a shopping center or business establishment provided in section 15155(1)(C). In addition, the proposed project would incorporate water-efficient fixtures, as required by Title 24 of the California Code of Regulations and the city's Green Building Ordinance. It is therefore reasonable to assume that the proposed project would result in an average daily water demand of less than 50,000 gallons.

The SFPUC has prepared estimates of total retail demand in five-year intervals from 2020 through 2040.[93] Assuming that the project would demand no more than 50,000 gallons of water per day (or 0.05 mgd), Table 19 compares this maximum with total retail demand from 2020 through 2040. At most, the proposed project's water demand would represent a small fraction of total projected retail water demand, ranging from 0.07 to 0.06 percent between 2020 and 2040. As such, the project's water demand is not substantial enough to require or result in the relocation or construction of new or expanded water facilities, the construction or relocation of which could cause significant environmental effects.

TABLE 19: PROPOSED PROJECT WATER DEMAND RELATIVE TO TOTAL RETAIL WATER DEMAND (MGD)

	2020	2025	2030	2035	2040
Total Retail Demand	72.1	79	82.3	85.9	89.9
Total Demand of Proposed Project	0.05	0.05	0.05	0.05	0.05
Total Demand of Proposed Project as Percentage of Total Retail Demand	0.07%	0.06%	0.06%	0.06%	0.06%

Adequate water supplies are available to serve the proposed project and reasonably foreseeable future development in normal, dry, and multiple dry years, unless the Bay-Delta Plan Amendment is implemented. As indicated above, the proposed project's maximum demand would represent less than 0.06 percent of the total retail demand in 2040, when implementation of the Bay-Delta Plan Amendment would result in a retail supply shortfall of up to 49.8 percent in a multiple-year drought. The SFPUC has indicated that it is accelerating its efforts to develop additional water supplies and explore other projects that would increase overall water supply resilience in case the Bay-Delta Plan Amendment is implemented. The SFPUC has identified possible projects that it will study, but it has not determined the feasibility of the projects and has not made any decision to pursue any particular water supply project. The SFPUC has determined

[92] Memorandum from Steven R. Ritchie, assistant general manager, Water Enterprise, San Francisco Public Utilities Commission, to Lisa Gibson, Environmental Review Officer, San Francisco Planning Department- Environmental Planning, May 31, 2019.

93 San Francisco Public Utilities Commission, 2015 Urban Water Management Plan for the City and County of San Francisco, June 2016. Available online at: https://sfwater.org/index.aspx?page=75. Accessed: June 4, 2019.

that the identified potential projects would take anywhere from 10 to 30 years, or more, to implement. The potential impacts that could result from construction and/or operation of any such water supply facility project cannot be identified at this time. In any event, under a worst-case scenario, demand for the SFPUC to develop new or expanded dry-year water supplies will exist, regardless of whether the proposed project is constructed.

In the event that the Bay-Delta Plan Amendment were to take effect sometime after 2022 and result in a dry-year shortfall, the expected action of the SFPUC for the next 10 to 30 years (or more) would be limited to requiring increased rationing, given the long lead times associated with developing additional water supplies. As discussed in the SFPUC memorandum, the SFPUC has established a process through its Retail Water Shortage Allocation Plan for actions it would take under circumstances that would require rationing. The level of rationing that would be required of the proposed project is unknown at this time. Both direct and indirect environmental impacts could result from high levels of rationing. However, the small increase in potable water demand attributable to the project, compared with citywide demand, would not substantially affect the levels of dry-year rationing that would otherwise be required throughout the city. Therefore, the proposed project would not make a considerable contribution to a cumulative environmental impact caused by implementation of the Bay-Delta Plan Amendment, and no mitigation measures are required. This topic will not be discussed in the EIR.

Impact UT-3: The proposed project would not generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals. ***(Less than Significant)***

In September 2015, the city entered into a landfill disposal agreement with Recology, Inc. for disposal of all solid waste collected in San Francisco, at the Recology Hay Road Landfill in Solano County for nine years or until 3.4 million tons have been disposed, whichever occurs first. The city would have an option to renew the agreement for a period of six years or until an additional 1.6 million tons have been disposed, whichever occurs first.[94] The Recology Hay Road Landfill is permitted to accept up to 2,400 tons per day of solid waste. At that maximum rate the landfill would have capacity to accommodate solid waste until approximately 2034. Currently, the Hay Road Landfill receives an average of 1,850 tons per day, including 1,200 tons per day from San Francisco; at this rate landfill closure would occur in 2041.[95] The city's contract with the Recology Hay Road Landfill is set to terminate in 2031 or when 5 million tons have been disposed, whichever occurs first. At that point, the city will either further extend the Recology Hay Road Landfill contract or find and entitle another landfill site. Although the proposed project would incrementally increase total waste generation from the city, the solid waste generated by the proposed project's construction and operation would not result in the landfill exceeding its permitted capacity.

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94 San Francisco Planning Department. 2015. Agreement for Disposal of San Francisco Municipal Solid Waste at Recology Hay Road Landfill in Solano County Final Negative Declaration, Planning Department Case No. 2014.0653. Available http://sfmea.sfplanning.org/2014.0653E_Revised_FND.pdf. Accessed February 10, 2019.

95 Ibid.

Therefore, the proposed project would be served by landfills with sufficient permitted capacity to accommodate its solid waste disposal needs and impacts would be less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact UT-4: Construction and operation of the proposed project would comply with all applicable statutes and regulations related to solid waste. (*Less than Significant*)

The California Integrated Waste Management Act of 1989 (Assembly Bill 939) requires municipalities to adopt an Integrated Waste Management Plan to establish objectives, policies, and programs relative to waste disposal, management, source reduction, and recycling.

San Francisco Ordinance No. 27-06 requires a minimum of 65 percent of construction and demolition debris to be recycled and diverted from landfills. Additionally, San Francisco Ordinance 100-09, Mandatory Recycling and Composting Ordinance, requires everyone in the city to separate their refuse into recyclables, compostables, and trash. Furthermore, the Recology Hay Road landfill is required to meet federal, state, and local solid waste regulations. The proposed project would be required to comply with the solid waste disposal regulations identified above and impacts related to compliance with solid waste regulations would be less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact C-UT-1: The proposed project, in combination with reasonably foreseeable projects, would not result in a significant cumulative impact related to utilities and service systems. (*Less than Significant*)

WASTEWATER AND STORMWATER

The geographic context for cumulative wastewater and stormwater impacts is the Southeast Water Pollution Control Plant drainage basin. The city's combined sewer system and treatment facilities are designed to accept both wastewater and stormwater flows. As with the proposed project, all reasonably foreseeable projects in the drainage basin would be required to comply with San Francisco regulations regarding wastewater and stormwater generation. Although reasonably foreseeable projects would likely result in increased wastewater flows, regulations require that, for projects replacing 5,000 square feet or more of impervious surface, stormwater flows be reduced by 25 percent over existing conditions. The 25 percent reduction in stormwater flows would result in an overall reduction in combined flows during peak wet-weather flow events. Therefore, the proposed project, in combination with reasonably foreseeable future projects, would have a less-than-significant cumulative impact on the combined sewer collection and treatment system.

WATER

As discussed in Impact UT-2, no single development project alone in San Francisco would require the development of new or expanded water supply facilities. The analysis provided in Impact UT-2 considers whether the proposed project, in combination with both existing development and projected growth through 2040, would require new or expanded water supply facilities, the construction or relocation of which could have significant cumulative impacts on the environment. Therefore, no separate cumulative analysis is required.

SOLID WASTE

The geographic context for cumulative solid waste impacts is the city. Long-range growth forecasts are considered in planning for future landfill capacity. In addition, the city currently exceeds statewide goals for reducing solid waste and is therefore expected to reduce solid waste volumes in the future. All projects are required to comply with San Francisco's construction and demolition debris recovery and recycling and composting ordinances. As with the proposed project, compliance with these ordinances would reduce the solid waste generation from construction and operation of reasonably foreseeable development projects.

Although reasonably foreseeable development projects could incrementally increase total waste generation from the city by increasing the number of residents and excavation, demolition, and remodeling activities associated with growth, the increasing rate of landfill diversion citywide through recycling, composting, and other methods would result in a decrease of total waste that requires deposition into the landfill. Given the city's progress to date on diversion and waste reduction and given the future long-term capacity available at the Recology Hay Road Landfill and other area landfills, reasonably foreseeable development projects would be served by a landfill with sufficient permitted capacity to accommodate their solid waste disposal needs. For these reasons, the proposed project, in combination with reasonably foreseeable future projects, would have less-than-significant cumulative impacts related to solid waste.

CONCLUSION

Based on the above, the proposed project would not combine with reasonably foreseeable projects to create a significant cumulative impact on utilities and service systems, and this impact would be less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

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E.13 Public Services

Topics:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Not Applicable
13. PUBLIC SERVICES. Would the Project:					
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services such as fire protection, police protection, schools, parks, or other public facilities?	☐	☐	☒	☐	☐

The project's impacts to parks are discussed in Section E.11, Recreation. Impacts to other public services are discussed below.

Impact PS-1: The proposed project would increase demand for police protection, fire protection, and other government services, but not to an extent that would require new or physically altered governmental facilities, the construction of which could cause significant environmental impacts. (*Less than Significant*)

FIRE PROTECTION AND MEDICAL EMERGENCY SERVICE

The San Francisco Fire Department provides fire suppression and emergency medical services in the city, including the project site. In addition, several privately-operated ambulance companies are authorized to provide advanced life support services. The fire department responds to non-life-threatening fire and medical emergencies (Code 2) as well as life-threatening fire and medical emergencies (Code 3). Response times are measured from the time a unit is dispatched to the time the unit arrives at the scene. According to San Francisco's Emergency Medical Services Agency policy, the target response time for a life-threatening emergency medical incident should be within 10 minutes 90 percent of the time.[96] In fiscal year 2017–2018, 93 percent of ambulances arrived on scene within 10 minutes. The fire department is on track to meet its target in fiscal year 2018–2019 as well.[97]

96 City and County of San Francisco, Mayor's 2017-2018 and 2018-2019 Proposed Budget, Fire Department, Available online at: https://sfmayor.org/sites/default/files/CSF_Budget_Book_2017_Final_CMYK_LowRes.pdf. Accessed: June 17, 2019.

97 City and County of San Francisco, Ambulance Response to Life-Threatening Emergencies, 2018, Available online at: https://sfgov.org/scorecards/public-safety/ambulance-response-life-treatening-emergencies Accessed: June 17, 2019.

The fire department consists of three divisions, which are subdivided into 10 battalions and 45 active stations throughout the city. The project site would be served by Station 1, located at 935 Folsom Street, approximately 0.3 mile southeast of the project site.[98] As discussed in Section E.2, Population and Housing, the proposed project would add approximately 1,086 residents and 11 employees on the project site. The increased population resulting from the proposed project would be expected to increase demand for fire protection and emergency medical services. However, this increase in demand would not be substantial given the overall demand for such services on a citywide basis. Furthermore, the fire department conducts ongoing assessments of its service capacity and response times to maintain acceptable service levels, given the demand resulting from changes in population.

The proposed project would comply with the applicable requirements of the California Fire Code, which includes requirements pertaining to fire protection systems, provision of state-mandated fire alarms, fire extinguishers, appropriate building access and egress, and emergency response notification systems. In addition, the proposed project would be required to comply with the California Fire Code requirements pertaining to high rise structures as well as approved water supply capable of supplying the required flow for fire protection. Moreover, the proximity of the project site to Fire Station No. 1 would help minimize fire department response times should incidents occur at the project site. As such, the proposed project would not require the construction of new, or alteration of existing fire protection facilities. This impact would be less than significant, and no mitigation would be required. This topic will not be discussed in the EIR.

POLICE PROTECTION SERVICES

The San Francisco Police Department, headquartered at 850 Bryant Street in the Hall of Justice (approximately 0.70 mile southeast of the project site), provides police protection services for the city. San Francisco Police Department's Tenderloin Station, at 301 Eddy Street, is the nearest police station located approximately 0.25-mile northwest of the project site.[99] As discussed in Section E.2, Population and Housing, the proposed project would add approximately 1,086 residents and 11 employees on the project site. This increased population resulting from the proposed project would be expected to increase demand for police protection services. The police department conducts ongoing assessments of its staffing and facility needs as part of the city's annual operating and capital budget process. This increase in demand would not be substantial given the overall demand for such services on a citywide basis. As such, the proposed project would not require the construction of new, or alteration of existing police protection facilities. This impact would be less than significant, and no mitigation would be required. This topic will not be discussed in the EIR.

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98 San Francisco Fire Department, Fire Station Locations, https://sf-fire.org/sites/default/files/FileCenter/Documents/1975-Station%20Location%20Map%20-%20w%20FS51.pdf, accessed February 7, 2019.

99 San Francisco Police Department, Police District Maps, http://sanfranciscopolice.org/police-district-maps, accessed February 7, 2019.

SCHOOLS

The San Francisco Unified School District operates San Francisco's public schools. During the 2017–2018 academic year, the school district managed 117 schools (75 elementary schools, 16 middle schools, 18 high schools, five alternative schools, and two continuation schools), with a total enrollment of 60,263 students.[100] The project site is within the boundary of Webster Elementary School, that feeds into Lick Middle School.[101] Under the current system, school district students are not automatically assigned to a particular school but, rather, entered into a diversity index lottery system in which families can request to be enrolled in schools anywhere in the district. The system assigns students to schools according to several factors, including parental choice, school capacity, and special program needs.[102]

To analyze the demand on schools resulting from implementation of the proposed project, estimates are made regarding the number of students that would be generated by the proposed project. In 2018, Lapkoff & Gobalet Demographic Research, Inc. conducted a study to evaluate variations in student generation rates between different San Francisco developments.[103] The study noted that, overall, student generation rates are affected by several factors, including the size of the unit, cost of housing (including market-rate vs. affordable units), unit occupancy type (rental vs. ownership), housing type (e.g. high-rise, townhouse, garden-style housing), and the neighborhood type. According to the study, there are very few students in the large apartment and condominium complexes, even when the buildings contain some below-market-rate units.[104]

Based on a student generation rate employed by the SFUSD of 0.203 students per dwelling unit, the proposed project could generate up to approximately 94 K–12 students,[105] or approximately 0.15 percent increase to the 2017-2018 SFUSD student enrollment. However, some of the students generated by the project might already attend schools operated by SFUSD, while others might attend private schools.

It is anticipated that SFUSD would be able to accommodate the additional 94 students generated by the proposed project. In addition, the Leroy F. Greene School Facilities Act of 1998, or Senate

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100 California Department of Education, Educational Demographics Office, Fiscal, Demographic, and Performance Data on California's K–12 Schools, 2018. Available online at: https://www.ed-data.org/district/San-Francisco/San-Francisco-Unified. Accessed: June 19, 2019.

101 San Francisco Unified School District, 2016-2017 School Year Location Map. Available online at: http://www.sfusd.edu/en/assets/sfusd-staff/enroll/files/2016-17/2016-17_schools_map.pdf. Accessed: February 7, 2019.

102 San Francisco Unified School District, History of the Student Assignment in the San Francisco Unified School District, 2011. Available online at: http://www.sfusd.edu/zh/assets/sfusd-staff/enroll/files/SFUSD-Presentation-Handouts-1-2016-09-21.pdf. Accessed: June 19, 2019.

103 Lapkoff & Gobalet Demographic Research, Inc., Demographic Analyses and Enrollment Forecasts for the San Francisco Unified School District, February 16, 2018, p. 2, http://www.sfusd.edu/en/assets/sfusd-staff/about-SFUSD/files/demographic-analyses-enrollment-forecast.pdf. Accessed February 7, 2019.

104 Lapkoff & Gobalet Demographic Research, Inc., Demographic Analyses and Enrollment Forecasts for the San Francisco Unified School District, February 16, 2018, p. 2, http://www.sfusd.edu/en/assets/sfusd-staff/about-SFUSD/files/demographic-analyses-enrollment-forecast.pdf. Accessed February 7, 2019.

105 City and County of San Francisco, Central SoMa Plan, Case No. 2011.1356E, Certified December 17, 2018. Available online at: https://sf-planning.org/area-plan-eirs. Accessed: February 7, 2019.

Bill 50, authorizes school districts to levy developer fees to finance the construction or reconstruction of school facilities. These fees are intended to address increased educational demands on the school district resulting from new development. For these reasons, implementation of the proposed project would not result in a substantial unmet demand for school facilities. Thus, the proposed project would not require the construction of new, or alteration of existing school facilities and this impact would be less-than-significant. No mitigation measures are required. This topic will not be discussed in the EIR.

OTHER PUBLIC SERVICES

The proposed project would also incrementally increase the demand for other governmental services and facilities, such as libraries. The San Francisco Public Library operates 27 branches throughout San Francisco, with the closest library (the Main Library branch) located approximately 0.5 miles southwest of the project site. As discussed in Section E.2, Population and Housing, the proposed project would add approximately 1,086 residents and 11 employees on the project site. The increased population resulting from the proposed project would be expected to increase demand on library services. However, in the context of overall citywide demand for library services, the population increase resulting from the proposed project would not be substantial. Therefore, implementation of the proposed project would not require the construction of new, or alteration of existing public facilities, including library facilities. This impact would be less than significant, and no mitigation would be required. This topic will not be discussed in the EIR.

Impact C-PS-1: The proposed project, combined with reasonably foreseeable future projects in the vicinity, would not result in a significant cumulative impact related to public services. (*Less than Significant)*

The geographic contexts for cumulative fire, police, and library impacts are the police, fire, and library service areas, while the geographic context for cumulative school impacts is the school district service area. The reasonably foreseeable future projects within 0.25 mile of the project site or, in the case of schools, within the school district, in combination with the proposed project, would increase the population in the area, leading to an increase in demand for public services, including fire and police protection, school services, and library services. These essential city service providers continually assess demand, based on anticipated growth and service needs. By analyzing their service metrics, these agencies and services are able to adjust staffing, capacity, response times, and other measures of performance. As a result, the proposed project in combination with cumulative projects would not result in any service gap in fire, police, schools, or library services. Cumulative projects would also be required to contribute school fees, which would provide needed improvements in school services. Therefore, the proposed project would not combine with reasonably foreseeable future projects in the project vicinity to result in need for the construction of new, or alteration of existing public services facilities, and thus result in a significant cumulative impact related to public services. Cumulative impacts would be less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

E.14 Biological Resources

Topics:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Not Applicable
14. BIOLOGICAL RESOURCES. Would the project:					
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	☒	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	☐	☐	☒
c) Have a substantial adverse effect on federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☐	☒
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☒	☐	☐
f) Conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☐	☒

The project site is currently a surface parking lot and completely covered by impervious surfaces. The project site does not contain federally protected wetlands as defined by section 404 of the Clean Water Act, riparian habitat, or other sensitive natural communities. In addition, the project site is not located within an adopted habitat conservation plan, a natural community conservation plan, or other approved local, regional, or state habitat conservation plan areas. Therefore, topics E.14(b), E.14(c), and E.14(f) are not applicable to the proposed project.

Impact BI-1: The proposed project would not have a substantial adverse effect, either directly or indirectly through habitat modifications, on any special-status species and would not interfere with the movement of native resident or wildlife species or with established native resident or migratory wildlife corridors. (*Less than Significant*)

The project site is covered entirely by impervious surfaces. While there is no vegetation onsite, five trees are located adjacent northeast of the project site along the property line at 460 Jessie Street. Due to the developed nature of the project site and the surrounding area, the project site does not provide suitable habitat for any rare or endangered plant or wildlife species. The existing trees adjacent to the project site to the northeast at 460 Jessie Street could support habitat for migratory nesting birds protected under the California Fish and Game Code or the Migratory Bird Treaty Act (MBTA). However, these trees would not be removed as a result of the proposed project and the project would not directly affect habitat for migratory nesting birds.

Structures in an urban setting may present risks for birds as they traverse their migratory paths due to building location and/or features. The city has adopted guidelines to address this issue and provided regulations for bird-safe design within the city.[106] Section 139, Standards for Bird-Safe Buildings, of the planning code establishes building design standards to reduce avian mortality rates associated with bird strikes. The building standards are based on two types of hazards: 1) location-related hazards which pertain to new buildings within 300 feet of an urban bird refuge, and 2) feature-related hazards such as free-standing glass walls, wind barriers, skywalks, balconies, and greenhouses on rooftops that have unbroken glazed segments 24 square feet or larger in size. Any project that contains building-feature hazards must apply bird-safe glazing treatments on 100 percent of the feature in compliance with section 139.

The project site is not located within 300 feet of an Urban Bird Refuge; therefore, the standards for location-related hazards would not apply.[107] The proposed project would be required to comply with the building feature-related hazard standards of section 139 by using bird-safe glazing treatments on 100 percent of any building feature-related hazards such as free-standing glass walls, wind barriers, and balconies. Compliance with the city's bird-safe building standards would ensure the proposed project does not interfere with the movement of a native resident or wildlife species, or with an established native resident or migratory wildlife corridor.

For the reasons stated above, the proposed project would result in less-than-significant impacts to special-status species and native resident, wildlife species, or migratory birds. No mitigation measures are required. This topic will not be discussed in the EIR.

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106 San Francisco Planning Department. Standards for Bird-Safe Buildings. Available http://default.sfplanning.org/publications_reports/bird_safe_bldgs/Standards%20for%20Bird%20Safe%20Buildings%20-%2011-30-11.pdf. Accessed February 10, 2019.

107 San Francisco Planning Department. 2014. Urban Bird Refuge Map. Available http://maps.sfplanning.org/Urban_Bird_Refuge_Poster.pdf. Accessed February 10, 2019.

Impact BI-2: The proposed project would not conflict with the City's local tree ordinance. (*Less than Significant*)

The city's Urban Forestry Ordinance, Public Works Code sections 801 et seq., requires a permit from Public Works to remove any protected trees.[108] Protected trees include landmark trees, significant trees, or street trees located on private or public property anywhere within the territorial limits of the City of San Francisco.

The proposed project does not involve the removal of an existing tree. The proposed project would retain the existing five trees northeast of the project site at 460 Jessie Street and add eight new street trees along the frontage of Jessie Street in compliance with the city's Urban Forestry Ordinance. The project sponsor would be required to obtain a specific Tree Protection Plan from an International Society of Arboriculture certified arborist to protect the five adjacent trees during construction.[109] Therefore, the proposed project would not conflict with the city's local tree ordinance and this impact would be less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact C-BI-1: The proposed project, in combination with reasonably foreseeable projects, would not result in a significant cumulative impact related to biological resources. (*Less than Significant*)

The project site and the surrounding area do not currently support any candidate, sensitive, or special-status species, wetlands as defined by section 404 of the Clean Water Act, riparian habitat, or any other sensitive natural community identified in local or regional plans, policies, or regulations. Cumulative development projects identified in Table 2 would also be subject to the requirements of the MBTA, California Fish and Game Code, and the city's bird-safe building standards and Urban Forestry Ordinance. Therefore, the proposed project would not combine with cumulative development projects to result in a cumulative impact related to biological resources and cumulative impacts would be less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

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108 San Francisco Public Works Code. 1995. Article 16: Urban Forestry Ordinance. Available https://sfenvironment.org/sites/default/files/agenda/attach/public_works_code_groves_explanatory_documents_consolidated.pdf. Accessed February 10, 2019.

109 San Francisco Department of Building Inspection. 2008. The Tree Protection Legislation. https://sfdbi.org/ftp/uploadedfiles/dbi/Key_Information/TreeProtectionLegislation.pdf. Accessed April 17, 2019.

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E.15 Geology and Soils

Topics:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Not Applicable
15. GEOLOGY AND SOILS. Would the project:					
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:					
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐	☐
ii) Strong seismic ground shaking?	☐	☐	☒	☐	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐	☐
iv) Landslides?	☐	☐	☒	☐	☐
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐	☐
c) Be located on geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☒	☐	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	☒	☐	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☐	☒
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐		☒	☐	☐

The proposed project would connect to the city's existing combined sewer system, which is the wastewater conveyance system for San Francisco, and would not use septic tanks or other onsite land disposal systems for sanitary sewage. Therefore, topic E.15(e) is not applicable to the proposed project.

The following discussions are based on the information and findings provided in the *preliminary geotechnical investigation* completed by Langan Engineering and Environmental Services, Inc on August 18, 2017.[110] The preliminary geotechnical investigation relied on available subsurface information in the site vicinity to develop preliminary conclusions and recommendations. Pursuant to the geotechnical report, the specific geologic units beneath the project site are as follows (from shallowest to deepest):

- *Sandy Fill:* Sandy fill depths across the project site range from approximately 5 to 10 feet thick and 35 to 40 feet bgs.
- *Native Sand:* Native sand under the project site is medium dense and is approximately 20 feet thick and 35 to 40 feet bgs.
- *Marsh Deposit:* Marsh deposits on the site range from 5 to 15 feet thick and 35 to 40 feet bgs.
- *Sand:* The dense to very dense sand below the marsh deposit is of the Colma formation and is approximately 40 feet thick and 80 feet bgs.
- *Old Bay Clay:* The old bay clay on the site consists of stiff to hard sandy clay and is approximately 5 to 15 feet thick. The top of the old bay clay layer is located at approximately 80 to 90 feet bgs.
- *Bedrock:* Bedrock is likely located at approximately 200 feet bgs.

According to the preliminary geotechnical report, the loose to medium dense sandy fill, native sand, and marsh deposit, that likely extend 35 to 40 feet bgs, are not suitable for supporting the proposed project. Therefore, the proposed building and three-level below-grade parking structure may be supported on a mat foundation provided the soil beneath the mat is improved to the top of the dense to very dense sand. Ground improvement may include soil-cement-columns or drilled displaced columns extending at least 10 feet into the dense sand below the marsh deposit. Alternatively, the structure may be supported on deep foundations gaining support in dense to very dense sand beneath the marsh deposit. A mat or a structurally supported slab can be used with deep foundations.[111] As such, to construct the three-level below-grade parking structure, and a 10-foot thick mat, it is anticipated a 55-foot excavation is required for the proposed project.

Impact GE-1: The proposed project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, seismic ground-shaking, liquefaction, lateral spreading, or landslides. (*Less than Significant*)

STATE REGULATIONS TO ADDRESS SEISMIC HAZARDS

The Alquist-Priolo Earthquake Fault Zoning Act of 1972 (Alquist-Priolo Act). The Alquist-Priolo Act (Public Resources Code section 2621 et seq.) is intended to reduce the risk to life and property

110 Langan Engineering and Environmental Services, Inc. 2017. Preliminary Geotechnical Study- 469 Stevenson Street. August 18, 2017.

111 Langan Engineering and Environmental Services, Inc. 2017. Preliminary Geotechnical Study- 469 Stevenson Street. August 18, 2017.

from surface fault rupture during earthquakes. The Alquist-Priolo Act prohibits the location and construction of most types of structures intended for human occupancy[112] over active fault traces and strictly regulates construction in the corridors along active faults (e.g., earthquake fault zones).

California Building Standards Code. The California Building Standards Code, or state building code, is codified in title 24 of the California Code of Regulations. The state building code provides standards that must be met to safeguard life or limb, health, property, and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, location, and maintenance of all buildings and structures within the state. The state building code generally applies to all occupancies in California, with modifications adopted in some instances by state agencies or local governing bodies. The current state building code incorporates, by adoption, the International Building Code of the International Code Council, with the California amendments. These amendments include building design and construction criteria that have been tailored for California earthquake conditions.

Chapter 16 of the state building code deals with structural design requirements governing seismically resistant construction (section 1604), including, but not limited to, factors and coefficients used to establish a seismic site class and seismic occupancy category appropriate for the soil/rock at the building location and the proposed building design (sections 1613.5 through 1613.7). Chapter 18 includes, but is not limited to, the requirements for foundation and soil investigations (section 1803); excavation, grading, and fill (section 1804); allowable load-bearing values of soils (section 1806); foundation and retaining walls (section 1807); and foundation support systems (sections 1808 through 1810). Chapter 33 includes, but is not limited to, requirements for safeguards at work sites to ensure stable excavations and cut-and-fill slopes (section 3304) as well as the protection of adjacent properties, including requirements for noticing (section 3307). Appendix J of the state building code includes, but is not limited to, grading requirements for the design of excavation and fill (sections J106 and J107), specifying maximum limits on the slope of cut-and-fill surfaces and other criteria, required setbacks and slope protection for cut-and-fill slopes (J108), and erosion control through the provision of drainage facilities and terracing (sections J109 and J110). San Francisco has adopted Appendix J of the state building code, with amendments to J103, J104, J106, and J109, as articulated in the local building code.

California Division of Occupational Safety and Health Regulations. Construction activities are subject to occupational safety standards for excavation, shoring, and trenching, as specified in California Division of Occupational Safety and Health regulations (Title 8).

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[112] With reference to the Alquist-Priolo Act, a structure for human occupancy is defined as one "used or intended for supporting or sheltering any use or occupancy that is expected to have a human occupancy rate of more than 2,000 person-hours per year" (California Code of Regulations, title 14, division 2, section 3601[e]).

LOCAL REGULATIONS TO ADDRESS SEISMIC HAZARDS

San Francisco Subdivision Code. Section 1358, Preliminary Soils Report, of the San Francisco Subdivision Code requires developers to file soil reports, indicating any soil characteristics that may create hazards and identifying measures to avoid soil hazards and prevent grading from creating unstable slopes. The ordinance requires a state-registered civil engineer to prepare the soils report.

As discussed below, to ensure that the potential for adverse geologic, soil, and seismic hazards is adequately addressed, San Francisco relies on the state and local regulatory review process as well as building permits approved pursuant to the California Building Standards Code (California Code of Regulations, Title 24); the San Francisco Building Code, which is the state building code plus local amendments that supplement the state code; the building department's implementing procedures, including administrative bulletins and information sheets; and the Seismic Mapping Hazards Act (Public Resources Code sections 2690 to 2699.6).

IMPACT ANALYSIS

Fault Rupture

There are no known active or potentially active faults crossing the project site and the project site is not within an Earthquake Fault Zone, as defined by the Alquist-Priolo Earthquake Fault Zoning Act. Therefore, the potential for fault rupture to occur at the project site is low and therefore the proposed project would not increase any risk associated with fault rupture. Thus, this impact would be less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

Seismic Ground Shaking

The project site is located within a 30-mile radius of several major active faults, including the San Andreas (7.5 miles), Hayward (10.6 miles), and San Gregorio (11.2 miles) faults. According to the U.S. Geologic Survey (USGS), the overall probability of a magnitude 6.7 or greater earthquake to occur in the San Francisco Bay Area in the next thirty years is 72 percent.[113] The Preliminary Geotechnical Report estimated strong to very strong shaking is expected to occur during the project's lifetime. The proposed project would be required to comply with the provisions of the San Francisco Building, California Building Code, and the recommendations of the design-level geotechnical study in accordance with section 1803 of the San Francisco Building Code to address impacts from seismic ground shaking.

In addition, new buildings taller than 240 feet are required to comply with the building department's *Interim Guidelines and Procedures for Structural, Geotechnical, and Seismic Hazard*

[113] Langan Engineering and Environmental Services, Inc. 2017. Preliminary Geotechnical Study- 469 Stevenson Street. August 18, 2017.

Engineering Design Review for New Tall Buildings (Information Sheet S-18).[114] The interim guidelines supplement and clarify the information in the city's *Guidelines and Procedures for Structural Design Review* (Administrative Bulletin-082),[115] as well as the city's *Requirements and Guidelines for the Seismic Design of New Tall Buildings using Non-Prescriptive Seismic-Design Procedures* (Administrative Bulletin-083).[116] The proposed project would construct a 274-foot-tall building (with an additional 10 feet for rooftop mechanical equipment) and therefore is subject to these guidelines. Compliance with these guidelines would require a peer review of the design-level geotechnical study by an engineering design review team to determine the adequacy of the building's foundation and structural design to support the proposed building.[117] The proposed project would also be required to implement a monitoring program to evaluate settlement at the project site during a 10-year period once the certificate of final completion and occupancy is issued.[118]

The building department would review the project's final structural and foundation plans (construction documents) to ensure the proposed project conforms with the measures recommended in the site-specific geotechnical reports and the recommendations made by the engineering design review team as required by Information Sheet S-18, Administrative Bulletin-082, and Administrative Bulletin-083. Therefore, the proposed project would not increase risks associated with ground shaking in the event of an earthquake, and impacts would be less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

Liquefaction and Lateral Spreading

Liquefaction and lateral spreading of soils can occur when ground shaking causes saturated soils to lose strength due to an increase in pore pressure. According to the California Geologic Survey seismic hazard zone map for the City and County of San Francisco, the project site is within a designated liquefaction hazard zone.[119] The preliminary geotechnical report determined the project site is underlain with loose to medium dense sand and the groundwater level is estimated

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114 City and County of San Francisco. 2017. Interim Guidelines and Procedures for Structural, Geotechnical, and Seismic Hazard Engineering Design Review for New Tall Buildings (Information Sheet [IS] S-18). Available https://sfdbi.org/sites/default/files/IS%20S-18.pdf. Accessed February 10, 2019.

115 San Francisco Building Code. 2008. Guidelines and Procedures for Structural Design Review (Administrative Bulletin-082). Available http://www.gsweventcenter.com/GSW_RTC_References/2008_0325_AB_082.pdf. Accessed February 10, 2019.

116 City and County of San Francisco. 2007. Requirements and Guidelines for the Seismic Design of New Tall Buildings using Non-Prescriptive Seismic-Design Procedures (Administrative Bulletin-083). Available https://sfdbi.org/ftp/uploadedfiles/dbi/meeting_information/structural/supporting/2008/AB_083_Draft8.pdf. Accessed February 10, 2019.

117 City and County of San Francisco. 2017. Interim Guidelines and Procedures for Structural, Geotechnical, and Seismic Hazard Engineering Design Review for New Tall Buildings (Information Sheet [IS] S-18). Available https://sfdbi.org/sites/default/files/IS%20S-18.pdf. Accessed February 10, 2019.

118 Ibid.

119 California Geologic Survey. Earthquake Zones of Required Investigation San Francisco North Quadrangle. Available http://gmw.conservation.ca.gov/SHP/EZRIM/Maps/SAN_FRANCISCO_NORTH_EZRIM.pdf. Accessed February 10, 2019.

at 15 to 20 feet bgs.[120] The loose to medium dense sand could be susceptible to liquefaction-induced ground settlement and strength loss during a major earthquake. Therefore, the preliminary geotechnical report determined that the potential for liquefaction to occur is high at the project site and up to 2 inches of settlement due to liquefaction could occur. The proposed project would be required to comply with the Seismic Hazards Mapping Act and the mandatory provisions of the California Building Code and San Francisco Building Code. Compliance with these mandatory provisions requires a design-level geotechnical report to evaluate and address the potential for liquefaction and failure-prone soils at the project site. The proposed project would be required to implement the recommendations of the design-level geotechnical report. The building department would review the project's structural and foundation plans to ensure they are in conformance with the measures recommended in the design-level geotechnical reports and recommendations made by the engineering design review team as required by Information Sheet S-18, Administrative Bulletin-082, and Administrative Bulletin-083. Therefore, the proposed project would not increase any risk associated with liquefaction and lateral spreading, and impacts would be less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

Landslides

The project site and the surrounding area are relatively flat. Based on the Community Safety Element of the San Francisco General Plan, the project site is not located within a mapped landslide zone.[121] Furthermore, the project site is not within a designated earthquake-induced landslide zone as shown on the California Geological Survey seismic hazard zone map for the area. Therefore, the proposed project would not increase any risk associated with earthquake-induced landslides, and impacts would be less than significant . No mitigation measures are required. This topic will not be discussed in the EIR.

Impact GE-2: The proposed project would not result in substantial soil erosion or loss of topsoil. (*Less than Significant*)

The project site is relatively flat and completely covered with impervious surfaces. The proposed project would excavate the project site approximately 55 feet bgs and remove approximately 55,850 cubic yards of soil from the project site to construct the three-level parking garage. Erosion could occur due to soil exposure during subgrade work.

The project sponsor and its contractor would be required to comply with section 146, Construction Site Runoff Control, of the Public Works Code which requires all construction sites to implement best management practices (BMPs) to minimize surface runoff erosion and sedimentation.[122]

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120 Langan Engineering and Environmental Services, Inc. 2017. Preliminary Geotechnical Study- 469 Stevenson Street. August 18, 2017.

121 San Francisco Planning Department. San Francisco General Plan, Community Safety Element. Available http://generalplan.sfplanning.org/Community_Safety_Element_2012.pdf. Accessed February 10, 2019.

122 SFPUC. 2018. San Francisco Construction Site Runoff Control Program. Available https://sfwater.org/index.aspx?page=235. Accessed February 10, 2019.

Pursuant section 146.7, if construction activities disturb 5,000 square feet or more of ground surface, the project sponsor must develop an erosion and sediment control plan. The erosion and sediment control plan must be submitted to SFPUC for review and approval prior to commencing construction related activities. The erosion and sediment control plan would identify BMPs to control discharge of sediment and other pollutants from entering the city's combined sewer system during construction. Compliance with section 146 of the Public Works Code would ensure that the proposed project would not result in substantial loss of topsoil or soil erosion. Therefore, impacts related to loss of topsoil or substantial soil erosion during construction would be less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact GE-3: The proposed project would not be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse. (*Less than Significant*)

According to the preliminary geotechnical study, the project site is underlain by loose to medium dense sandy fill, native sand, and marsh deposit, approximately 35 to 40 feet bgs, with dense to very dense sand extending below to a depth of at least 80 feet.[123] A 5 to 15 foot thick stiff to hard sand clay layer, locally referred to as old bay clay, may be present below the dense to very dense sand at depths of 80 to 90 feet bgs. Groundwater is anticipated within 15 to 20 feet bgs based on sites in the vicinity of the project site.

The project site would be excavated approximately 55 feet bgs and 55,850 cubic yards of soil would be removed from the project site for construction of the three-level parking garage. During excavation activities, the loose to medium dense sand could become unstable, potentially causing settlement of adjacent structures and streets. The preliminary geotechnical report recommends the use of shoring and underpinning during construction activities to support the sides of the excavation, adjacent buildings, and foundation of the building. Due to the shallow groundwater level, the preliminary geotechnical report also recommends implementation of a dewatering system to lower the groundwater at least 3 feet below the excavation level. The dewatering system would maintain the water level at the specified depth until the building can resist hydrostatic loads.[124] The project sponsor is required to implement the final shoring and dewatering systems in accordance with the recommendations of the design-level geotechnical report, and the requirements of the California Building Code and San Francisco Building Code. Prior to dewatering activities, the project sponsor is also required to notify the SFPUC and obtain a batch wastewater discharge permit.[125] Groundwater encountered during construction of the proposed project would be subject to the requirements of Public Works Code article 4.1 (Industrial Waste)

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123 Langan Engineering and Environmental Services, Inc. 2017. Preliminary Geotechnical Study- 469 Stevenson Street. August 18, 2017.

124 Langan Engineering and Environmental Services, Inc. 2017. Preliminary Geotechnical Study- 469 Stevenson Street. August 18, 2017.

125 SFPUC. 2018. Waste Water Discharge Permits. Available https://sfwater.org/index.aspx?page=498. Accessed February 10, 2019.

which requires groundwater meet specified water quality standards before it may be discharged into the sewer system.

Adherence to California and San Francisco Building Code requirements would address any potential impacts related to unstable soils as part of the design-level geotechnical investigation prepared for the proposed project. Furthermore, the building department would review background information, including geotechnical and structural engineering reports, to ensure the suitability of the soils on the project site for development of the proposed project. Therefore, potential impacts related to construction on unstable soils would be less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact GE-4: The proposed project could be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code, but would not create substantial risks to life or property. (*Less than Significant*)

Expansive soils expand and contract in response to changes in soil moisture, most notably when near surface soils change from saturated to a low-moisture content condition, and back again. The presence of expansive soils is typically based on site-specific data. As discussed in the preliminary geotechnical report, the project site is underlain by loose to medium dense sandy fill, native sand, and marsh deposit, approximately 35 to 40 feet bgs, with dense to very dense sand extending below to a depth of at least 80 feet.[126] A 5 to 15 foot thick stiff to hard sand clay layer, locally referred to as old bay clay, may be present below the dense to very dense sand at depths of 80 to 90 feet bgs. The old bay lay, where present, is likely underlain by dense to very dense sand extending to bedrock. The preliminary geotechnical report estimates bedrock is 200 feet bgs.[127] Anticipated excavation for the three-level parking garage and foundation is expected to remove the majority of existing loose to medium dense sandy fill, leaving mostly the underlying dense to very dense sand. However, as recommended by the preliminary geotechnical report, the presence of old bay clay at the project site should be confirmed by the design-level geotechnical investigation to determine the potential for expansive soils at the site. The project sponsor is required to complete a design-level geotechnical report and implement its recommendations to address impacts related to expansive soils at the project site in accordance with the San Francisco Building Code. Therefore, impacts related to expansive soils would be less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact GE-5: The proposed project would not directly or indirectly destroy a unique paleontological resource. (*Less than Significant*)

Paleontological resources, or fossils, are the remains, imprints, or traces of animals, plants, and invertebrates, from a previous geological period. Collecting localities and the geologic formations

126 Langan Engineering and Environmental Services, Inc. 2017. Preliminary Geotechnical Study- 469 Stevenson Street. August 18, 2017.

127 Langan Engineering and Environmental Services, Inc. 2017. Preliminary Geotechnical Study- 469 Stevenson Street. August 18, 2017.

containing those localities are also considered paleontological resources, representing a limited, nonrenewable resource. Once destroyed, they cannot be replaced.

The potential to affect fossils varies with the depth of disturbance and previous disturbance. The logistics of excavation also affect the possibility of recovering scientifically significant fossils because information regarding location, vertical elevation, geologic unit of origin, and other aspects of context is critical to the significance of any paleontological discovery.

To identify impacts on paleontological resources, the paleontological sensitivity of geologic units present within the project site were identified. Paleontological sensitivity is an indicator of the likelihood of a geologic unit to yield fossils.[128] The fossil-yielding potential of geologic units in a particular area depends on the geologic age and origin of the units, as well as on the processes they have undergone, both geologic and anthropogenic.[129] The potential for a project to affect paleontological resources is related to ground disturbance. Ground disturbance would take place during project construction; therefore, this impact analysis addresses construction impacts.

The native sand and marsh deposit, which underlies the project site, have a low paleontological sensitivity as these geologic units are unlikely to yield paleontological resources. The Colma formation and old bay clay are considered moderately sensitive for paleontological resources. The proposed project would excavate the site approximately 55 feet bgs and remove approximately 55,850 cubic yards of soil to construct the below-grade parking levels and foundation. Based on the depth of excavation of 55 feet bgs, the proposed project would not encounter the Colma formation or the old bay clay as those soil layers are located approximately 80 to 90 feet bgs. Therefore, it is unlikely the proposed project would disturb, destroy, or damage significant paleontological resources. This impact would be a less than significant impact, and no mitigation measures are required. This topic will not be discussed in the EIR.

Impact C-GE-1: The proposed project combined with reasonably foreseeable projects in the vicinity, would not result in a significant cumulative impact related to geology and soils. (*Less than Significant*)

The geographic context for cumulative analysis of impacts on geology and soils is generally site-specific and comprises the project site and immediately adjacent properties. Reasonably foreseeable cumulative projects could require various levels of excavation or cut-and-fill, which could affect local geologic conditions. The building code regulates construction in the City of San Francisco, and all development projects would be required to comply with its requirements to ensure maximum feasible seismic safety and minimize geologic impacts. Site-specific measures identified in project-specific geotechnical reports would be implemented as site conditions warrant to reduce any potential impacts from unstable soils, ground shaking, liquefaction, or lateral spreading.

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128 Society of Vertebrate Paleontology. 2010. Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. Available: http://vertpaleo.org/Membership/Member-Ethics/SVP_Impact_Mitigation_Guidelines.aspx. Accessed: April 18, 2019.

129 Anthropogenic means caused by human activity.

The project would entail excavation to a depth of approximately 55 feet bgs and remove approximately 55,850 cubic yards of soil from the project site to construct the three-level parking garage. The proposed project would require shoring and underpinning during construction activities to support the sides of the excavation, adjacent buildings, and foundation of the building. The proposed project would also require a dewatering system and obtain a batch wastewater discharge permit from SFPUC. The project sponsor would be required to implement the final shoring and dewatering systems in accordance with the recommendations of the design-level geotechnical report, and the requirements of the California Building Code and San Francisco Building Code. The development projects listed in Table 2 would all be subject to the same seismic safety standards and design review procedures applicable to the proposed project. Compliance with the seismic safety standards and the design review procedures would ensure that the effects from nearby cumulative projects would be reduced to less-than-significant levels. As such, cumulative impacts related to geology and soils would be less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

Like the proposed project, all reasonably foreseeable cumulative projects that would disturb more than 5,000 square feet of land are required to prepare and implement an erosion and sediment control plan pursuant to the Construction Site Run-off Ordinance. Therefore, cumulative impacts related to soil erosion would be less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

Paleontological impacts are generally site specific and highly localized. Therefore, the potential for the proposed project to combine with reasonably foreseeable cumulative projects to create a cumulative impact related to paleontological resources would be low. For these reasons, the proposed project, in combination with reasonably foreseeable future projects, would have less-than-significant cumulative paleontological resource impacts. This topic will not be discussed in the EIR.

E.16 Hydrology and Water Quality

Topics:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Not Applicable
16. HYDROLOGY AND WATER QUALITY. Would the project:					
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?	☐	☐	☒	☐	☐
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☒	☐	☐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would:	☐	☐	☒	☐	☐
i) result in substantial erosion or siltation onsite or offsite;	☐	☐	☒	☐	☐
ii) substantially increase the rate or amount of surface runoff in a manner that would result in flooding onsite or offsite;	☐	☐	☒	☐	☐
iii) create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	☐	☐	☒	☐	☐
iv) impede or redirect floodflows?	☐	☐	☒	☐	☐
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due a project inundation?	☐	☐	☐	☐	☒
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☒	☐	☐

According to SFPUC's 100-Year Storm Flood Risk Map, the project site is not located within a 100-year flood hazard area,[130] or an area identified as being subject to potential inundation in the event of a tsunami along the San Francisco coast or a dam or levee failure.[131] Therefore, the

130 San Francisco Floodplain Management Program. 2018. Northeast San Francisco Interim Floodplain Map. Available: https://sfgsa.org/sites/default/files/Document/SF_NE.pdf. Accessed February 5, 2019.

131 City and County of San Francisco, Community Safety Element of the San Francisco General Plan, 2012, Map 5 (Tsunami Hazard Zones San Francisco) and Map 6 (Potential Inundation Areas Due to Reservoir Failure), http://www.sf-planning.org/ftp/General_Plan/Community_Safety_Element_2012.pdf. Accessed April 18, 2019.

proposed project would not create a risk related to a release of pollutants due to inundation in a flood hazard, tsunami, or seiche zone and topic 14(d) is not applicable to the proposed project and is not discussed below.

Impact HY-1: The proposed project would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality, create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff, or conflict with or obstruct implementation of a water quality control plan. ***(Less than Significant)***

CONSTRUCTION DEWATERING AND STORMWATER RUNOFF

The proposed project would involve excavation to a maximum depth of 55 feet bgs for construction of the building foundation and below grade parking garage. As discussed in Section E.15, Geology and Soils, excavation activities would require dewatering, given that the depth of groundwater is estimated between 15 and 20 feet bgs. Any groundwater encountered during construction would be subject to the requirements of article 4.1 of the San Francisco Public Works Code (Industrial Waste Ordinance), requiring groundwater meet specified water quality standards before it is discharged into the sewer system. The SFPUC must be notified regarding projects that necessitate dewatering and obtain a Batch Wastewater Discharge Permit from the SFPUC Wastewater Enterprise Collection System Division prior to any dewatering activities. The SFPUC may require additional water analysis prior to permit approval.

During construction, the proposed project would be required to comply with article 4.2 of the San Francisco Public Works Code. Specifically, the proposed project would comply with section 146 by implementing an erosion and sediment control plan. The erosion and sediment control plan would identify the BMPs and erosion and sedimentation control measures to prevent sediment from entering the city's combined sewer system. The construction BMPs that would most likely be implemented as part of the proposed project would address inspection and maintenance, water conservation, spill prevention and control, street cleaning, and prevention of illicit connection and discharge. These BMPs would minimize disturbance to the project site, adjacent areas, and storm drains and would retain sediment. The SFPUC's Construction Runoff Control Program staff enforces this requirement through periodic and unplanned site inspections. In addition, prior to the commencement of any land-disturbing activities, the project sponsor would be required to obtain a construction site runoff control permit.

Construction stormwater discharged to the city's combined sewer system would be subject to the requirements of article 4.1, which incorporates the requirements of the city's National Pollutant Discharge Elimination System (NPDES) permit and the federal Combined Sewer Overflow Control Policy. Stormwater drainage during construction would flow to the city's combined sewer system, where it would receive treatment at the Southeast Plant and would be discharged through an existing outfall or overflow structure in compliance with the existing pollutant discharge permit. Therefore, the project's compliance with applicable permits and regulatory requirements would reduce water quality impacts during construction and dewatering activities.

OPERATIONAL WASTEWATER AND STORMWATER DISCHARGES

During operation, wastewater discharges would be related to the proposed residential and commercial uses. Stormwater discharges would include runoff from streets, sidewalks, and other impervious surfaces. Wastewater and stormwater generated at the project site would be directed to the city's combined sewer system and treated to the standards of the NPDES permit for the Southeast Water Pollution Control Plant prior to discharge to the Pacific Ocean.

The proposed project would be required to implement a stormwater control plan in accordance with the city's stormwater management ordinance. The project sponsor would be required to submit a stormwater control plan for approval by SFPUC that complies with the Stormwater Design Guidelines to ensure the proposed project meets performance measures set by SFPUC related to stormwater runoff rate and volume. To meet the SFPUC's requirements, low-impact development features are proposed and would include vegetated sidewalk planting areas, permeable pavement, steel planter areas, and a rainwater cistern. These features would be designed to reduce the stormwater peak flow and volume from a two-year, 24-hour storm event by at least 25 percent, as required, which would reduce peak flows entering the combined sewer system during wet-weather events and minimize the potential for downstream or localized flooding.[132] Compliance with San Francisco's Stormwater Design Guidelines would reduce the quantity and rate of stormwater runoff to the city's combined sewer system and improve the water quality of those discharges.

In summary, the proposed project's construction and operational activities would not result in significant water quality impacts or obstruct implementation of a water quality control plan. Furthermore, the proposed project would not violate water quality standards or release substantial additional sources of polluted runoff. This impact would be less than significant, and no mitigation measures are required. This topic will not be discussed in the EIR.

Impact HY-2: The proposed project would not substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin, nor would it conflict with a sustainable groundwater management plan. (*Less than Significant*)

The project site is located in the Downtown San Francisco Groundwater Basin. This basin is not used as a potable water source and there are no plans for development of this basin for groundwater production. Therefore, a sustainable groundwater management plan has not been adopted for the Downtown San Francisco Groundwater Basin. The project site is currently a surface parking lot and completely covered with impervious surfaces. The proposed project would not increase the amount of impervious surface at the project site; therefore, the proposed project would not result in any change in groundwater infiltration or runoff on the project site.

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132 SFPUC. 2016. Stormwater Management Requirements and Design Guidelines. Available https://sfwater.org/Modules/ShowDocument.aspx?documentID=9026. Accessed February 10, 2019.

As discussed in Section E.15, Geology and Soils, groundwater is expected to be encountered at 15 to 20 feet bgs at the project site. [133] The proposed project would excavate the project site to approximately 55 feet bgs for construction of the three-level parking garage. Therefore, groundwater would be encountered during excavation and dewatering activities during construction. The preliminary geotechnical report recommends implementation of a dewatering system to lower groundwater at least 3 feet below the excavation level and to maintain the water level at the specified depth until the building can resist hydrostatic loads.[134] Once dewatering is completed, groundwater levels would return to normal. The project would not require long-term dewatering and does not propose to extract any underlying groundwater supplies. Therefore, the proposed project would not substantially deplete groundwater resources, interfere with groundwater recharge, or conflict with a sustainable groundwater management plan. Impacts related to groundwater would be less than significant and no mitigation measures are required. This impact will not be discussed in the EIR.

Impact HY-3: The proposed project would not substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would result in substantial erosion or siltation onsite or offsite; substantially increase the rate or amount of surface runoff in a manner that would result in flooding onsite or offsite; or impede or redirect flood flows. ***(Less than Significant)***

The project site is covered entirely by impervious surfaces and no streams or creeks occur on the project site. The proposed project would not expand any existing impervious surfaces; therefore, site drainage would remain generally the same as existing conditions. The project would incrementally reduce the amount of impervious surface on the project site through implementation of low-impact design measures as required by the city's Stormwater Management Ordinance and Stormwater Management Requirements and Design Guidelines. Specifically, the proposed project would be required to reduce the existing stormwater rate and volume at the project site by 25 percent for a two-year 24-hour design storm with the implementation of low impact design measures. As discussed in Section A, Project Description, the proposed project would meet this requirement by installing vegetated sidewalk planting areas, permeable pavement, steel planter areas, and a rainwater cistern to manage onsite stormwater. In addition, the proposed project would plant street trees along the project's Jessie Street frontage. Therefore, the proposed project would not be expected to result in substantial erosion or flooding associated with changes in drainage patterns. The impact of the proposed project related to potential erosion or flooding would be less than significant and no mitigation measures are required. This topic will not be discussed in the EIR.

133 Langan Engineering and Environmental Services, Inc. 2017. Preliminary Geotechnical Study- 469 Stevenson Street. August 18, 2017.

134 Langan Engineering and Environmental Services, Inc. 2017. Preliminary Geotechnical Study- 469 Stevenson Street. August 18, 2017.

Impact C-HY-1: The proposed project, in combination with other reasonably foreseeable projects, would not result in a significant cumulative impact related to hydrology and water quality. (*Less than Significant*)

The proposed project would result in no impact with respect to release of pollutants due to inundation. Therefore, the project would not have the potential to combine with cumulative development projects to result in a cumulative impact related to this topic.

Like the proposed project, all cumulative development projects identified in Table 2 would be required to comply with the city's stormwater management ordinance and guidelines, and all stormwater and wastewater would be treated to the standards in the city's NPDES permit. Therefore, cumulative impacts related to increased run-off and water quality would be less than significant.

With regards to groundwater, the Downtown Groundwater Basin is not a potable water source. Further, upon completion of construction activities, the project would have no impact on groundwater levels. For these reasons, the project would not combine with reasonably foreseeable projects to result in cumulative groundwater impacts.

Overall, the proposed project would not combine with reasonably foreseeable future projects to result in cumulative impacts to hydrology and water quality. No mitigation measures are required. This topic will not be discussed in the EIR.

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E.17 Hazards and Hazardous Materials

Topics:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Not Applicable
17. HAZARDS AND HAZARDOUS MATERIALS. Would the project:					
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒	☐
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☒	☐	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☐	☐	☒
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐	☐
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☐	☐	☒

The project site is not located within an airport land use plan area or within an airport land use plan, or within two miles of a public airport or public use airport which would result in a safety hazard or excessive noise for people residing or working in the area; therefore, topic E.15(e) is not applicable. The project site is not located within or adjacent to a wildland area; therefore, topic E.15(g) is not applicable.

Impact HZ-1: The proposed project would not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials. (*Less than Significant*)

Hazardous materials may be stored onsite during construction of the proposed project, such as fuel for construction equipment, paints, solvents, and other types of construction materials that may contain hazardous ingredients. Transportation of hazardous materials to and from the project

site would occur on designated hazardous materials routes, by licensed hazardous materials handlers, as required, and would be subject to regulation by the California Highway Patrol and the California Department of Transportation. Compliance with these regulations would reduce any risk from the routine transport, use, or disposal of hazardous materials to less than significant.

The proposed project's residential and commercial uses would likely result in the use of common types of hazardous materials, such as cleaning products and disinfectants. These products are labeled to inform users of their potential risks and to instruct them in appropriate handling procedures. Most of these materials are consumed through use, resulting in relatively little waste. For these reasons, hazardous materials used during project operation would not pose any substantial public health or safety hazards through their routine transport, use, or disposal. This impact would be less than significant, and no mitigation measures are required. This topic will not be discussed in the EIR.

Impact HZ-2: The proposed project is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5, but would not create a significant hazard to the public or the environment through reasonably foreseeable conditions involving the release of hazardous materials into the environment. (*Less than Significant*)

The project site is included on the list of hazardous materials sites compiled by the California Department of Toxic Substance Control pursuant to Government Code Section 65962.5. The project site is located in an area of San Francisco governed by article 22A of the Health Code, also known as the Maher Ordinance, meaning that it is known or suspected to contain contaminated soil and/or groundwater.[135] The overarching goal of the Maher Ordinance is to protect public health and safety by requiring appropriate handling, treatment, disposal and when necessary, remediation of contaminated soils that are encountered in the building construction process. Projects that disturb 50 cubic yards or more of soil that are located on sites with potentially hazardous soil or groundwater are subject to this ordinance. The proposed project would require excavation to a depth of 55 feet bgs and the disturbance of approximately 55,850 cubic yards of soil. Therefore, the proposed project is subject to the Maher Ordinance, which is administered and overseen by the San Francisco Department of Public Health (health department). The project sponsor submitted an application to the Maher Program and retained the services of a qualified professional to prepare a *phase I environmental site assessment* (site assessment) that meets the requirements of article 22A. The findings of the site assessment are discussed below.[136]

To identify the site's potential inclusion on environmental databases and evaluate offsite environmental concerns, AllWest reviewed a site-specific radius report provided by Environmental Data Resources, Inc. which searched regulatory agency lists and databases for recorded sites within the industry standard search radii. According to the site assessment, by 1913 the project site was part of a United Light & Power Company facility. The facility included three warehouse buildings and a planning mill/machine shop in the east portion of the site and storage

135 San Francisco Planning Department, Expanded Maher Area Map, March 2015. Available online at https://www.sf-planning.org/ftp/files/publications_reports/library_of_cartography/Maher%20Map.pdf, accessed February 14, 2019.
136 AllWest Environmental, Environmental Site Assessment, 469 Stevenson Street, San Francisco, CA 94103, June 2016.

shed in the west portion of the site. The project site was subsequently developed (in the 1940s and 1950s) as a parking lot with a car rental office and fuel dispensing station on the northwestern portion of the site; the car rental office was demolished by 1970 and the site has since been used as a public parking lot. The subject property is identified as a former registered underground storage tank (UST) facility and as a HAZNET waste manifest site for disposal of contaminated soil during removal of the UST in 1998.

According to the site assessment, the abandoned UST was removed from the northwest portion of the property in 1998 during repaving of the subject parking lot. Although few details concerning the tank and its removal were readily available, the San Francisco Local Oversight Program (SFLOP) classified the activity as a UST Removal case rather than as a Leaking Underground Storage Tank case. This classification suggests SFLOP did not observe evidence of a release from the abandoned tank. During the tank removal, soil contamination was identified in excavation soils. According to regulatory records, 0.4507 ton of polychlorinated biphenyl (PCB)-contaminated soil and 0.2293 ton of liquids containing dissolved lead greater than 500 parts per million were removed from the subject property and disposed of offsite. Based on the identified previous property owners, the contamination origin is likely associated with former tenant, United Light & Power Company, or with a former utility substation that operated at the adjoining northeast property at 465 Stevenson Street from 1924 to the 1990s.

The site assessment notes that the former PG&E Substation T (now Clearway Energy's thermal power Station T) located adjacent to the project site to the northeast is identified on numerous contaminated sites databases for historical releases of PCBs, polynuclear aromatic hydrocarbons, toxic metals (e.g., lead; hexavalent chromium; arsenic), hydrocarbon solids; oxygenated solvents and other organic liquids to soil. The former PG&E Substation T property is identified on the RESPONSE database, Superfund Enterprise Management System-Archive (SEMS-ARCHIVE) database and EnviroStor contaminated sites database, as a historical UST facility, and, incorrectly, as a historical manufactured gas facility, as only the northeast portion (approximately 0.1 acre) of the Station T steam facility was occupied by the former Baldwin Manufactured Gas Plant. The Baldwin Manufactured Gas Plant was built at the present location of the Station T facility in 1882 to supply the Baldwin Hotel and Theater with gas; the works were called the Baldwin Gas Plant. After the Baldwin Hotel burned down in 1898, the hotel's gas works remained in existence until 1906, when the great earthquake and fire destroyed the entire area. The site then became entirely occupied by the Station T steam facility.[137]

According to the site assessment, the Department of Toxic Substances Control issued a determination of "no further action" required in June 1993 for the former PG&E site. Although subsurface contamination remains, the Department of Toxic Substances Control likely issued the determination because drinking water in the area is considered non-potable and no drinking

137 Pacific Gas and Electric Company. 1991. Preliminary Endangerment Assessment Report for RP&E's Former Manufactured Gas Plant Sites, Station T, San Francisco. Available online at: https://www.envirostor.dtsc.ca.gov/public/deliverable_documents/2828092813/PG%26E-Station%20T%2C465%20Stevenson%20Street%2C%20SF_Vol%201%20of%202%20Preliminary%20Endangerment%20Assessment%20Report%20for%20PG%26E%20Former%20MGP%20Sites_04.19910001.pdf. Accessed: June 18, 2019.

water wells are present. The area is also capped with asphalt, concrete paving, and building foundations, which effectively limits human health exposure pathways and may also be a factor in the Department of Toxic Substances Control's determination.

AllWest identified the Clearway Energy operation at the adjacent northeast property as a registered UST facility, small quantity generator of hazardous wastes, a HAZNET waste manifest site, and as an Emissions Inventory facility for discharge of regulated air emissions. Two properties adjoining southeast across Jessie Street are identified as a historical auto station and as historical cleaners.

The project sponsor submitted a Maher Application to the San Francisco Department of Health in accordance with article 22A,[138] and the health department will determine if a complete Phase II Site Characterization and Work Plan should be submitted. The project sponsor would also be required to submit a site mitigation plan to the health department or other appropriate state or federal agencies, and to remediate any site contamination in accordance with an approved site mitigation plan prior to the issuance of the building permit. Furthermore, the proposed project would excavate approximately 55,850 cubic yards of soil to construct the three-level parking garage (55 feet bgs) which would remove most of the soil at the project site.

Based on the information and conclusions from the site assessment, and because of required compliance with article 22A, the proposed project would not result in a significant hazard to the public or environment due to the release of hazardous materials into the environment, such as contaminated soil and/or groundwater; the proposed project would result in a less than significant impact. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact HZ-3: The proposed project would not emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within a quarter-mile of an existing or proposed school. (*No Impact)*

There are no schools located within 0.25-mile of the project site. The proposed project would have no impact related to emitting or handling hazardous materials within 0.25-mile of a school. This topic will not be discussed in the EIR.

Impact HZ-4: The proposed project would not expose people or structures to a significant risk of loss, injury or death involving fires, nor interfere with the implementation of an emergency response plan. (*Less than Significant*)

San Francisco ensures fire safety primarily through provisions of the building and fire codes. Final building plans are reviewed by the San Francisco Fire Department (as well as the building department), to ensure conformance with these provisions. In this way, potential fire hazards, including those associated with hydrant water pressures and emergency access, as well as access to the adjacent Clearway Energy Center, would be addressed during the permit review process.

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[138] City and County of San Francisco Department of Public Health and Environmental Health. 2018. Maher Ordinance Application. PDF.

As discussed in Section A, Project Description, the project would require occasional street and sidewalk closures to allow for project construction activities, such as installation of the tower crane, mat foundation construction, or material deliveries. However, during this time, both Jessie and Stevenson streets would not be entirely closed or closed at the same time. It is not expected that construction activities would block Jessie Street for more than one week at a time. Jessie Street could be used for temporary staging of the tower crane; however, that has not been determined. It is anticipated that construction activities would only block 100 feet of Jessie Street for the width of the sidewalk and one travel lane primarily for the tower crane erection and dismantling. Emergency access to the project site, surrounding properties, and the adjacent Clearway Energy Center would not be compromised during project construction.

Implementation of the proposed project could add incrementally to congested traffic conditions in the immediate area in the event of an emergency evacuation. However, the proposed project would not impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan and this impact would be less than significant. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact C-HZ-1: The proposed project, in combination with other reasonably foreseeable projects, would not result in a significant cumulative impact related to hazardous materials. (*Less than Significant*)

The geographic context for an analysis of cumulative impacts related to handling of hazardous materials is generally site-specific. In addition, the cumulative development projects identified in Table 2 would be subject to the same fire safety, emergency response and hazardous materials regulations that are applicable to the proposed project. As such, the proposed project would not combine with reasonably foreseeable projects in the project vicinity to create a significant cumulative impact related to hazards and hazardous materials. No mitigation measures are required. This topic will not be discussed in the EIR.

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E.18 Mineral Resources

Topics:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Not Applicable
18. MINERAL RESOURCES. Would the project:					
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒	☐
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒	☐

Impact MI-1: The proposed project would have no impact on mineral resources. (*No Impact*)

All land in the city, including the project site, is designated Mineral Resource Zone 4 (MRZ-4) by the California Division of Mines and Geology under the Surface Mining and Reclamation Act of 1975.[139] This designation indicates that there is insufficient information available to assign the site to any other mineral resource zone and that the site contains no significant mineral deposits. Furthermore, according to the San Francisco General Plan, no significant mineral resources exist in all of San Francisco.[140] Therefore, the proposed project would not result in the loss of availability of a locally or regionally important mineral resource and would have no impact on mineral resources. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact C-MI-1: The proposed project, in combination with reasonably foreseeable projects, would not result in a significant cumulative impact related to mineral resources. (*No Impact*)

As described above, the entire City of San Francisco is designated MRZ- 4, which indicates that no known significant mineral resources exist at the project site or within the project vicinity. Because the project would result in no impact to mineral resources, the proposed project would not have the potential to contribute to cumulative impacts related to mineral resources. No mitigation measures are required. This topic will not be discussed in the EIR.

139 California Division of Mines and Geology, Mineral Land Classification: Aggregate Materials in the San Francisco – Monterey Bay Area, 1987. Accessed February 4, 2019. ftp://ftp.consrv.ca.gov/pub/dmg/pubs/sr/SR_146-2/SR_146-2_Text.pdf.

140 San Francisco Planning Department, San Francisco General Plan, Environmental Protection Element, December 2004, Accessed February 4, 2019. http://generalplan.sfplanning.org/I6_Environmental_Protection.htm.

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E.19 Energy Resources

Topics:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact	Not Applicable
19. ENERGY. Would the project:					
a) Result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☒	☐	☐
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☒	☐	☐

Impact EN-1: The proposed project would not result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation; or conflict with or obstruct a state or local plan for renewable energy or energy efficiency. (*Less than Significant*)

In California, energy consumption in buildings is regulated by Title 24 of the California Code of Regulations. Title 24 includes standards that regulate energy consumption for the heating, cooling, ventilation, and lighting of residential and non-residential buildings. In San Francisco, documentation demonstrating compliance with Title 24 standards is required to be submitted with a building permit application. Compliance with Title 24 standards is enforced by the building department. The proposed project, which would be located on an infill site, would include new construction and the adaptive reuse of two existing onsite buildings. The proposed project would be required to comply with the standards of Title 24 and the requirements of the San Francisco Green Building Code.

Non-renewable energy consumption would occur during the proposed project construction and operational phases. Construction energy consumption would be primarily in the form of indirect energy inherent in the production of materials used for construction (e.g., the energy necessary to manufacture a steel beam from raw materials) and the fuel used by construction equipment. Construction-related energy consumption is roughly proportional to the size of the new building proposed.

Operational-related energy consumption would include electricity and natural gas, as well as fuel used by residents and commercial employees as expressed through vehicle miles traveled. Electricity and natural gas would be used for building space heating and lighting, as well as for operation of equipment and machines.

Energy conservation design features to meet state and local goals for energy efficiency and renewable energy have been incorporated into the project design to reduce wasteful, inefficient, and unnecessary consumption of energy during project construction and operation. As stated above, the proposed project would be required to comply with the standards of Title 24 and the

requirements of the San Francisco Green Building Code, thus minimizing the amount of fuel, water, and energy used. The proposed project would also incorporate transportation demand management measures into its design, such as car-share parking and bicycle parking and a repair station and be in proximity to several public transportation options. These features would minimize the amount of transportation fuel consumed. As discussed in Section E.5, Transportation and Circulation, the project site is in an area with a comparably low level of VMT per capita, relative to the regional average, and new residents would most likely engage in vehicle use patterns similar to those of the existing population in the neighborhood and general vicinity. Given the project's features and location, it would not result in wasteful use of fuel from vehicle trips.

The following discussion provides a quantitative assessment of the proposed project's energy use, including energy use calculations and a discussion of energy conservation measures. Electrical energy demand is measured by power flow, expressed in kilowatt-hours (kWh) and natural gas is measured in cubic feet of gas or by its heat content in British thermal units (BTUs), or therms. Diesel and gasoline fuel use is measured in gallons. The energy consumption calculations are provided in Appendix C of this initial study.

CONSTRUCTION

Energy use associated with construction of the proposed project would include the use of electric equipment, diesel fuel consumption from on-road hauling trips and off-road construction diesel equipment, and gasoline consumption from on-road worker commute and vendor trips. Construction of the proposed project would use approximately 179,419 gallons of diesel for off-road construction equipment. Approximately 62,131 gallons of diesel and 15,598 gallons of gasoline would be used for on-road trips during construction of the proposed project. Construction of the proposed project would occur over a three-year timeframe; thus, construction-related energy use would be temporary. Furthermore, as compared to other states and the country as whole, construction projects in California and in the San Francisco Bay Area use the most energy-efficient equipment available in order to meet state and local goals for criteria air pollutant and GHG emissions reductions. As a result, construction activities would not have a measurable effect on regional energy supplies or on peak energy demand resulting in a need for additional capacity. Therefore, as a temporary activity, construction of the proposed project would not result in inefficient or wasteful use of fuel or energy.

OPERATION

Energy use associated with operation of the proposed project would include onsite use associated with buildings and fuel from mobile sources. The total project energy use would be approximately 4,096,431 kBTU/year for natural gas and 2,068,157 KWhr/year for electrical use. With implementation of the energy conservation measures required to meet the city's Green Building Code, the proposed project would meet the Title 24 energy conservation standards.

During operation of the proposed project, mobile sources would use approximately 17,317 gallons of diesel and 22,920 gallons of gasoline per year, based on an annual VMT estimate of 783,869 passenger vehicle miles and 105,631 truck miles. As discussed in Section E.5, Transportation and Circulation, project VMT is expected to be at least 15 percent below the regional average. Furthermore, compliance with the city's Transportation Demand Management Programs,

Transportation Sustainability Fee, bicycle parking requirements, low emission car parking requirements, and car sharing requirements would reduce the proposed project's transportation-related emissions.

As such, compliance with the Title 24 energy conservation standards of the California Code of Regulations would ensure that operation of the proposed project would not have a measurable effect on regional energy supplies or on peak energy demand resulting in a need for additional capacity. Natural gas and electric service would be provided to meet the needs of the project, as required by the California Public Utilities Commission, which obligates PG&E and the SFPUC to provide service to its existing and potential customers. PG&E and the SFPUC update their service projections in order to meet regional energy demand. Energy conservation measures incorporated into the proposed project would decrease overall energy consumption, decrease reliance on non-renewable energy sources, and increase reliance on renewable energy sources at the project site. The proposed project would also be consistent with San Francisco's GHG reduction strategy (see Section E.8, Greenhouse Gas Emissions). Therefore, energy consumption associated with operation of the proposed project would not occur in an inefficient or wasteful manner.

In summary, construction and operation of the proposed project would not use energy resources in a wasteful, inefficient, or unnecessary manner, nor would the proposed project conflict with or obstruct implementation of a state or local plan for renewable energy or energy efficiency. Therefore, the proposed project would have a less-than-significant impact on energy resources and no mitigation measures are required. This topic will not be discussed in the EIR.

Impact C-EN-1: The proposed project, in combination with reasonably foreseeable future projects, would not result in cumulative energy impacts. (*Less than Significant*)

The geographic context for the analysis of cumulative impacts associated with energy is the service territory of the energy utility that serves the project site, PG&E, while the geographic context for the analysis of cumulative impacts associated with fuel use is the city. The proposed project would involve construction of new residential and commercial retail uses, resulting in an increase of energy use at the site. Like the proposed project, all new development in the city would be required to comply with the standards of Title 24 and the San Francisco Green Building Code, thereby minimizing the amount of fuel, water, and energy used. Per capita VMT in the city is relatively low compared with the regional average; therefore, reasonably foreseeable development, including the project, would not result in wasteful use of fuel for transportation purposes. As such, the proposed project, in combination with reasonably foreseeable future projects, would have less-than-significant cumulative energy impacts and no mitigation measures are required. This topic will not be addressed in the EIR.

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E.20 Agriculture and Forestry Resources

Topics:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Not Applicable
20. AGRICULTURE AND FORESTRY RESOURCES: In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. **—Would the project:**					
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒	☐
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒	☐
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)) , timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒	☐
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒	☐
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or forest land to non-forest use?	☐	☐	☐	☒	☐

Impact AF-1: The proposed project would not convert farmland; conflict with existing zoning for agricultural uses, forest land, timberland, or Williamson Act contract; and would not result in the loss or conversion of forest land. (*No Impact*)

The project site is located within an urbanized area of San Francisco and developed as a surface parking lot. There are no lands in the City of San Francisco, including the project site, designated Prime Farmland, Unique Farmland, Farmland of State Importance, or Farmland of Local Importance.[141] Additionally, there are no lands in San Francisco zoned agriculture, forest land, or

141 California Department of Conservation. 2016. California Important Farmland Finder. Accessed February 4, 2019. https://maps.conservation.ca.gov/DLRP/CIFF/.

timberland production.[142] The City of San Francisco does not participate in the Williamson Act program and therefore the proposed project would not conflict with a Williamson Act contract.[143] As such, the proposed project would not conflict with zoning for forest land, cause a loss of forest land, or convert forest land to a different use. The proposed project would have no impact on agricultural and forest resources. No mitigation measures are required. This topic will not be discussed in the EIR.

Impact C-AF-1: The proposed project, in combination with other reasonably foreseeable projects, would not result in a significant cumulative impact related to agriculture and forestry resources. (*No Impact*)

As discussed above, the proposed project would result in no impact with respect to agriculture and forestry resources. Therefore, the proposed project would not have the potential to contribute to cumulative impacts related to agriculture and forestry resources. No mitigation measures are required. This topic will not be discussed in the EIR.

142 San Francisco Planning Department. 2018. San Francisco Zoning Map. Accessed February 4, 2019. https://sf-planning.org/zoning-map.

143 California Department of Conservation. 2019. Land Conservation (Williamson) Act. Accessed February 4, 2019. https://www.conservation.ca.gov/dlrp/wa/Pages/LCA_QandA.aspx.

E.21 Wildfire

Topics:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Not Applicable
21. WILDFIRE. If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:					
a) Substantially impair an adopted emergency response plan or emergency evacuation plans?	☐	☐	☐	☐	☒
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☐	☒
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☐	☒
d) Expose people or structure to significant risks including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☐	☒

The project site is not located in or near state responsibility areas or lands classified as very high fire hazard severity zones.[144] Therefore, this topic is not applicable to the project. No mitigation measures are required. This topic will not be discussed in the EIR.

144 California Department of Forestry and Fire Protection. San Francisco County Draft Fire Hazard Severity Zones in Local Responsibility Areas Map, October 5, 2007. http://frap.fire.ca.gov/webdata/maps/san_francisco/fhszl06_1_map.38.pdf.

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E.22 Mandatory Findings of Significance

Topics:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact	Not Applicable
22. MANDATORY FINDINGS OF SIGNIFICANCE. Does the project:					
a) Have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐	☐
b) Have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	☒	☐	☐	☐	☐
c) Have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☒	☐	☐	☐	☐

As discussed in the biological resources section, the proposed project would not significantly affect any habitats, plant or animal communities, or threatened or endangered species. As discussed in Section E.3, Cultural Resources and Section E.4, Tribal Cultural Resources, the proposed project would not result in significant impacts to archeological resources, historic structures, or tribal cultural resources with implementation of mitigation measures. No further analysis will be required in the EIR. As discussed in Section E.6, Noise, the proposed project would not result in significant vibration impacts to adjacent historic and non-historic buildings, or construction noise with implementation of mitigation measures. The project, however, could result in potentially significant impacts to air quality, wind, and shadow. These impacts will be further discussed in the EIR.

The proposed project, in combination with reasonably foreseeable projects as described in Section E, would not result in cumulative impacts to land use, population and housing, transportation and circulation, GHG emissions, recreation, utilities and service systems, public services, biological resources, geology and soils, hydrology and water quality, hazards and hazardous materials, mineral resources, energy resources, agricultural and forest resources, or wildfires.

The proposed project in combination with foreseeable projects could result in cumulative impacts to cultural resources (historic architectural resources and archeological resources), tribal cultural resources, and construction noise. These impacts can be reduced to less than significant levels with implementation of mitigation measures. In addition, the proposed project in combination with

foreseeable projects could result in cumulative impacts to air quality, wind, and shadow which will be further analyzed in the EIR. These topics will be evaluated in the EIR.

F. MITIGATION MEASURES

The following mitigation measures have been agreed to by the project sponsor and are necessary to reduce the potentially significant environmental impacts of the proposed project to less-than-significant levels.

Mitigation Measure M-CR-3: Archeological Testing

Based on a reasonable presumption that archeological resources may be present within the project site, the following measures shall be undertaken to avoid any potentially significant adverse effect from the proposed project on buried or submerged historical resources and on human remains and associated or unassociated funerary objects. The project sponsor shall retain the services of an archaeological consultant from the rotational Department Qualified Archaeological Consultants List (QACL) maintained by the planning department archaeologist. After the first project approval action or as directed by the Environmental Review Officer (ERO), the project sponsor shall contact the department archeologist to obtain the names and contact information for the next three archeological consultants on the QACL. The archeological consultant shall undertake an archeological testing program as specified herein. In addition, the consultant shall be available to conduct an archeological monitoring and/or data recovery program if required pursuant to this measure. The archeological consultant's work shall be conducted in accordance with this measure at the direction of the ERO. All plans and reports prepared by the consultant as specified herein shall be submitted first and directly to the ERO for review and comment, and shall be considered draft reports subject to revision until final approval by the ERO. Archeological monitoring and/or data recovery programs required by this measure could suspend construction of the project for up to a maximum of four weeks. At the direction of the ERO, the suspension of construction can be extended beyond four weeks only if such a suspension is the only feasible means to reduce to a less than significant level potential effects on a significant archeological resource as defined in CEQA Guidelines section. 15064.5 (a) and (c).

Consultation with Descendant Communities: On discovery of an archeological site[145] with descendant Native Americans, the Overseas Chinese, or other potentially interested descendant group an appropriate representative[146] of the descendant group and the ERO shall be contacted. The representative of the descendant group shall be given the opportunity to monitor archeological field investigations of the site and to offer recommendations to the ERO regarding appropriate archeological treatment of the site, of

[145] The term "archeological site" is intended here to minimally include any archeological deposit, feature, burial, or evidence of burial.

[146] An "appropriate representative" of the descendant group is defined here to mean, in the case of Native Americans, any individual listed in the current Native American Contact List for the City and County of San Francisco maintained by the California Native American Heritage Commission and in the case of the Overseas Chinese, the Chinese Historical Society of America. An appropriate representative of other descendant groups should be determined in consultation with the Department archeologist.

recovered data from the site, and, if applicable, any interpretative treatment of the associated archeological site. A copy of the Final Archaeological Resources Report shall be provided to the representative of the descendant group.

Archeological Testing Program. The archeological consultant shall prepare and submit to the ERO for review and approval an *archeological testing plan* (ATP). The *archeological testing program* shall be conducted in accordance with the approved ATP. The ATP shall identify the property types of the expected archeological resource(s) that potentially could be adversely affected by the proposed project, the testing method to be used, and the locations recommended for testing. The purpose of the *archeological testing program* will be to determine to the extent possible the presence or absence of archeological resources and to identify and to evaluate whether any archeological resource encountered on the site constitutes a historical resource under CEQA.

At the completion of the *archeological testing program*, the archeological consultant shall submit a written report of the findings to the ERO. If based on the *archeological testing program* the archeological consultant finds that significant archeological resources may be present, the ERO in consultation with the archeological consultant shall determine if additional measures are warranted. Additional measures that may be undertaken include additional *archeological testing*, *archeological monitoring*, and/or *an archeological data recovery program*. No archeological data recovery shall be undertaken without the prior approval of the ERO or the planning department archeologist. If the ERO determines that a significant archeological resource is present and that the resource could be adversely affected by the proposed project, at the discretion of the project sponsor either:

C. The proposed project shall be re-designed so as to avoid any adverse effect on the significant archeological resource; or

D. A data recovery program shall be implemented, unless the ERO determines that the archeological resource is of greater interpretive than research significance and that interpretive use of the resource is feasible.

Archeological Monitoring Program. If the ERO in consultation with the archeological consultant determines that an archeological monitoring program shall be implemented, the archeological monitoring program shall minimally include the following provisions:

- The archeological consultant, project sponsor, and ERO shall meet and consult on the scope of the AMP reasonably prior to any project-related soils disturbing activities commencing. The ERO in consultation with the archeological consultant shall determine what project activities shall be archeologically monitored. The project shall not require pile driving. In most cases, any soils- disturbing activities, such as demolition, foundation removal, excavation, grading, utilities installation, foundation work, site remediation, etc., shall require *archeological monitoring* because of the risk these activities pose to potential archaeological resources and to their depositional context;
- The archeological consultant shall undertake a worker training program for soil-disturbing workers that will include an overview of expected resource(s), how to

identify the evidence of the expected resource(s), and the appropriate protocol in the event of apparent discovery of an archeological resource;

- The archeological monitor(s) shall be present on the project site according to a schedule agreed upon by the archeological consultant and the ERO until the ERO has, in consultation with the project archeological consultant, determined that project construction activities could have no effect on significant archeological deposits;
- The archeological monitor shall record and be authorized to collect soil samples and artifactual/ecofactual material as warranted for analysis;
- If an intact archeological deposit is encountered, all soils-disturbing activities in the vicinity of the deposit shall cease. The project shall not require pile driving. The archeological monitor shall be empowered to temporarily redirect demolition/excavation installation/construction activities and equipment until the deposit is evaluated. The archeological consultant shall immediately notify the ERO of the encountered archeological deposit. The archeological consultant shall make a reasonable effort to assess the identity, integrity, and significance of the encountered archeological deposit, and present the findings of this assessment to the ERO.

Whether or not significant archeological resources are encountered, the archeological consultant shall submit a written report of the findings of the monitoring program to the ERO.

Archeological Data Recovery Program. The *archeological data recovery program* shall be conducted in accordance with an *archeological data recovery plan* (ADRP). The archeological consultant, project sponsor, and ERO shall meet and consult on the scope of the ADRP prior to preparation of a draft ADRP. The archeological consultant shall submit a draft ADRP to the ERO. The ADRP shall identify how the proposed *data recovery program* will preserve the significant information the archeological resource is expected to contain. That is, the ADRP will identify what scientific/historical research questions are applicable to the expected resource, what *data classes* the resource is expected to possess, and how the expected *data classes* would address the applicable research questions. Data recovery, in general, should be limited to the portions of the historical property that could be adversely affected by the proposed project. Destructive data recovery methods shall not be applied to portions of the archeological resources if nondestructive methods are practical.

The scope of the ADRP shall include the following elements:

- *Field Methods and Procedures*. Descriptions of proposed field strategies, procedures, and operations.
- *Cataloguing and Laboratory Analysis*. Description of selected cataloguing system and artifact analysis procedures.
- *Discard and Deaccession Policy*. Description of and rationale for field and post-field discard and deaccession policies.
- *Interpretive Program*. Consideration of an onsite/offsite public interpretive program during the course of the *archeological data recovery program*.
- *Security Measures*. Recommended security measures to protect the archeological resource from vandalism, looting, and non-intentionally damaging activities.

- *Final Report*. Description of proposed report format and distribution of results.
- *Curation*. Description of the procedures and recommendations for the curation of any recovered data having potential research value, identification of appropriate curation facilities, and a summary of the accession policies of the curation facilities.

Human Remains, Associated or Unassociated Funerary Objects. The treatment of human remains and of associated or unassociated funerary objects discovered during any soils disturbing activity shall comply with applicable State and federal laws. This shall include immediate notification of the ERO and the Medical Examiner of the City and County of San Francisco and, in the event of the Medical Examiner's determination that the human remains are Native American remains, notification of the California State Native American Heritage Commission, who shall appoint a Most Likely Descendant (MLD) . The MLD will complete his or her inspection of the remains and make recommendations or preferences for treatment within 48 hours of being granted access to the site (Public Resources Code section 5097.98). The ERO also shall be notified immediately upon the discovery of human remains (Public Resources Code section 5097.98). The ERO also shall be notified immediately upon the discovery of human remains.

The project sponsor and ERO shall make all reasonable efforts to develop a Burial Agreement ("Agreement") with the MLD, as expeditiously as possible, for the treatment and disposition, with appropriate dignity, of human remains and associated or unassociated funerary objects (as detailed in CEQA Guidelines section 15064.5(d)). The Agreement shall take into consideration the appropriate excavation, removal, recordation, scientific analysis, custodianship, curation, and final disposition of the human remains and associated or unassociated funerary objects. If the MLD agrees to scientific analyses of the remains and/or associated or unassociated funerary objects, the archaeological consultant shall retain possession of the remains and associated or unassociated funerary objects until completion of any such analyses, after which the remains and associated or unassociated funerary objects shall be reinterred or curated as specified in the Agreement.

Nothing in existing State regulations or in this mitigation measure compels the project sponsor and the ERO to accept treatment recommendations of an MLD. However, if the ERO, project sponsor and MLD are unable to reach an Agreement on scientific treatment of the remains and associated or unassociated funerary objects, the ERO, with cooperation of the project sponsor, shall ensure that the remains and/or mortuary materials are stored securely and respectfully until they can be reinterred on the property, with appropriate dignity, in a location not subject to further or future subsurface disturbance.

Treatment of historic-period human remains and of associated or unassociated funerary objects discovered during any soil-disturbing activity, additionally, shall follow protocols laid out in the project's archaeological treatment documents, and in any related agreement established between the project sponsor, Medical Examiner and the ERO.

Final Archeological Resources Report. The archeological consultant shall submit a Draft Final Archeological Resources Report (FARR) to the ERO that evaluates the historical significance of any discovered archeological resource and describes the archeological and historical research

methods employed in the archeological testing/monitoring/data recovery program(s) undertaken. The Draft FARR shall include a curation and deaccession plan for all recovered cultural materials. The Draft FARR shall also include an Interpretation Plan for public interpretation of all significant archeological features. Copies of the Draft FARR shall be sent to the ERO for review and approval. Once approved by the ERO, the consultant shall also prepare a public distribution version of the FARR. Copies of the FARR shall be distributed as follows: California Archaeological Site Survey Northwest Information Center (NWIC) shall receive one (1) copy and the ERO shall receive a copy of the transmittal of the FARR to the NWIC. The environmental planning division of the planning department shall receive one bound and one unlocked, searchable PDF copy on CD of the FARR along with copies of any formal site recordation forms (CA DPR 523 series) and/or documentation for nomination to the National Register of Historic Places/California Register of Historical Resources. In instances of public interest in or the high interpretive value of the resource, the ERO may require a different or additional final report content, format, and distribution than that presented above.

Mitigation Measure M-TCR-1: Tribal Cultural Resources Interpretive Program

During ground-disturbing activities that encounter archeological resources, if the ERO determines that a significant archeological resource is present, and if in consultation with the affiliated Native American tribal representatives, the ERO determines that the resource constitutes a tribal cultural resource (TCR) and that the resource could be adversely affected by the proposed project, the proposed project shall be redesigned so as to avoid any adverse effect on the significant tribal cultural resource, if feasible.

If the ERO determines that preservation-in-place of the TCR is both feasible and effective, then the archeological consultant shall prepare an archeological resource preservation plan (ARPP). Implementation of the approved ARPP by the archeological consultant shall be required when feasible.

If the ERO, in consultation with the affiliated Native American tribal representatives and the project sponsor, determines that preservation-in-place of the tribal cultural resources is not a sufficient or feasible option, the project sponsor shall implement an interpretive program of the TCR in consultation with affiliated tribal representatives. An interpretive plan produced in consultation with the ERO and affiliated tribal representatives, at a minimum, and approved by the ERO, would be required to guide the interpretive program. The plan shall identify, as appropriate, proposed locations for installations or displays, the proposed content and materials of those displays or installation, the producers or artists of the displays or installation, and a long-term maintenance program. The interpretive program may include artist installations, preferably by local Native American artists, oral histories with local Native Americans, artifacts displays and interpretation, and educational panels or other informational displays.

Mitigation Measure M-NO-1: Construction Noise

The project sponsor shall develop site-specific noise attenuation measures under the supervision of a qualified acoustical consultant. At the end of the design phase of this project

and prior to commencing construction, the project sponsor shall submit a noise attenuation plan to the San Francisco Planning Department and Department of Building Inspection to ensure maximum feasible noise attenuation will be achieved. The noise attenuation plan shall reduce construction noise to the degree feasible with a goal of reducing construction noise levels at adjacent noise sensitive receptors (residential, hotel, hospital, convalescent home, school, and church uses) so that noise levels do not exceed 90 dBA and 10 dBA above ambient daytime noise levels. The project sponsor shall include noise attenuation measures in specifications provided to the general contractor and any sub-contractors. Noise attenuation measures shall, at minimum, include the following:

- Require the general contractor to ensure that equipment and trucks used for project construction utilize the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures and acoustically attenuating shields or shrouds), wherever feasible.

- Require the general contractor to perform all work in a manner that minimizes noise to the extent feasible; use equipment with effective mufflers; undertake the noisiest activities during times of least disturbance to surrounding residents and occupants.

- Require the general contractor to use impact tools (e.g., jack hammers, pavement breakers, and rock drills) that are hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. Where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used, along with external noise jackets on the tools, which could reduce noise levels by as much as 10 dBA.

- Require the general contractor to erect temporary plywood noise barriers (at least 0.5-inch-thick) around stationary noise sources and/or the construction site, particularly where a noise source or the site adjoins noise-sensitive uses. The barriers shall be high enough to block the line of sight from the dominant construction noise source to the closest noise-sensitive receptors. Depending on factors such as barrier height, barrier extent, and distance between the barrier and the noise-producing equipment or activity, such barriers may reduce construction noise by 3–15 dBA at the locations of nearby noise-sensitive receptors.

- Require the general contractor to use noise control blankets on a building structure as the building is erected to reduce noise emission from the site.

- Require the general contractor to line or cover hoppers, storage bins, and chutes with sound-deadening material (e.g., apply wood or rubber liners to metal bin impact surfaces).

- Unless safety provisions require otherwise, require the general contractor to adjust audible backup alarms downward in sound level while still maintaining an adequate signal-to-noise ratio for alarm effectiveness. Consider signal persons, strobe lights, or alternative safety equipment and/or processes as allowed to reduce reliance on high-amplitude sonic alarms/beeps.

- Require the general contractor to place stationary noise sources, such as generators and air compressors, on the power station side of the project site, as far away from nearby noise-sensitive receptors as possible. To further reduce noise, the contractor shall locate stationary equipment in pit areas or excavated areas, if feasible.

- Require the general contractor to place non-noise-producing mobile equipment, such as trailers, in the direct sound pathways between suspected major noise-producing sources and noise-sensitive receptors.

- Under the supervision of a qualified acoustical consultant, the project sponsor shall monitor the effectiveness of noise attenuation measures by taking noise measurements as needed.

- Prior to the issuance of a building permit, along with the submission of construction documents, the project sponsor shall submit to the planning department and building department a list of measures that shall be implemented and that shall respond to and track complaints pertaining to construction noise. These measures shall include:

  1. post signs onsite pertaining to permitted construction days and hours;

  2. a procedure and phone numbers for notifying the building department and the San Francisco Police Department (during regular construction hours and off-hours). This telephone number shall be maintained until the proposed project is ready for occupancy;

  3. a sign posted onsite describing noise complaint procedures and a complaint hotline number that shall be answered at all times during construction;

  4. designation of an onsite construction complaint and enforcement manager for the project who shall document, investigate, evaluate, and attempt to resolve all project-related noise complaints.

  5. notification of neighboring residents and non-residential building managers within 300 feet of the project construction area at least 30 days in advance of extreme noise generating activities (defined as activities generating anticipated noise levels of 90 dBA or greater) about the estimated duration of the activity.

Mitigation Measure M-NO-2: HVAC and Mechanical Equipment Exterior Noise

A minimum of 20.5 dB(A) noise reduction is required from the rooftop equipment to achieve the requirements of the San Francisco Police Code. The project sponsor shall implement the following mitigation measure to reduce noise levels from the source equipment and achieve compliance with the police code:

- Enclose as much of the proposed project's rooftop equipment as possible within a mechanical room with small louvered openings to the exterior. The mechanical room

and louvered openings can be treated with acoustic absorption and sound attenuators to reduce noise at the property planes.

- If the equipment remains open to the roof, select rooftop equipment with a maximum sound pressure level of 54.4 dB(A) at 50 feet from the equipment.
- Attach sound attenuators to the outside air and exhaust air openings/fans of the rooftop equipment to minimize environmental noise.

During the design phase, once the project sponsor has selected the specific HVAC and mechanical equipment for the proposed project, a qualified acoustical consultant shall conduct a property plane noise analysis. The property plane analysis report shall evaluate whether the proposed HVAC and mechanical equipment complies with the noise limits in the San Francisco Police Code. The report shall be submitted to the San Francisco Planning Department for review and approval prior to issuance of a building permit or building permit addendum that would permit the HVAC and mechanical equipment.

G. DETERMINATION

On the basis of this Initial Study:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☒ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, no further environmental documentation is required.

DATE_____ _____

Lisa Gibson
Environmental Review Officer

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H. INITIAL STUDY PREPARERS

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Senior Environmental Planner:	Jenny Delumo
Transportation Planner:	Elizabeth White
Archeologist:	Sally Morgan
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Current Planner:	Nicholas Foster

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Senior Noise Analyst:	Tracie Ferguson
Senior Environmental Planner:	Tina Garg
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Transportation Engineer:	Mike Hawkins

ALLWEST ENVIRONMENTAL (ENVIRONMENTAL SITE ASSESSMENT CONSULTANT)

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President:	Marc Cunningham
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LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC (GEOTECHNICAL CONSULTANT)

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Associate Principal	Melissa Burton

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Project Manager:	Victoria Lehman

APPENDIX A: NOISE TECHNICAL MEMORANDUM FOR 469 STEVENSON STREET

To:	Jenny Delumo Planning Department, City and County of San Francisco	From:	Stantec Consulting Services Inc. 1340 Treat Boulevard, Suite 300 Walnut Creek, CA
File:	469 Stevenson Street Project	Date:	September 27, 2019

Reference: Noise Technical Memorandum for 469 Stevenson Street Project

INTRODUCTION

Noise Technical Memo Purpose

The purpose of this Noise Technical Memorandum (Memo) is to support the 469 Stevenson Street Project (proposed project) Initial Study. This Memo provides analyses of potential project-related noise exposure and generation during construction and operations. This Memo has been prepared to analyze the potential construction-related noise and vibration generated from the proposed project and estimate the potential operational noise conditions located at the project site. This Memo will be used as a supplementary analysis to the initial study.

Specifically, the purpose of this Memo is to assess the existing ambient noise conditions at the nearest sensitive receptors and within the proposed project area. This Memo includes an evaluation of the proposed noise-generating uses that could affect noise-sensitive receptors.

Project Description and Location

The project site is a through lot located at 469 Stevenson Street in the South of Market (SoMa) neighborhood of San Francisco (Assessor's Block 3704, Lot 45). The project site is located mid-block between Stevenson Street, Sixth Street, Jessie Street, and Fifth Street. The project site is approximately 28,790 square feet (0.66-acre) and currently developed as a surface parking lot with 176 parking spaces. The proposed project would demolish the existing surface parking lot and construct a new 27-story mixed-use building approximately 274 feet tall (with 10 additional feet for rooftop mechanical equipment) with three below grade parking levels. The proposed project would total approximately 543,000 gross square feet (gsf) consisting of 462 residential units, approximately 3,900 square feet of commercial retail use on the ground floor, and approximately 25,059 square feet of private and common open space. The 462 residential units would be available for rent and include a mix of 358 one-bedroom, 54 two-bedroom, 42 three-bedroom, and 8 five-bedroom units. The proposed project would use the State Density Bonus program and provide affordable housing units onsite. The below grade parking would provide 171 parking spaces and 191 *Class 1* bicycle spaces. In addition, 23 *Class 2* bicycle spaces are proposed along the frontages of Stevenson and Jessie Streets.

The mechanical equipment for the project is anticipated to be located throughout the building, including several pieces of equipment on the roof. The actual mechanical equipment planned for the building is not yet known, however, typical residential and commercial building construction would commonly involve air handling units or make up air units, condensing units, and exhaust fans.

One (1) emergency generator is planned for the proposed project to provide backup energy for the building's mechanical equipment. The generator is planned to be located within a room on the ground floor in the southwest portion of the property. The exact discharge, intake, and exhaust pipe path for the generator are

not yet known, but for the purpose of this analysis, they are assumed to be directly on the Sixth Street property plane to simulate a worst-case condition. The generator was assumed to be tested during weekday, daytime hours.

The proposed project is anticipated to be constructed on a mat foundation and no pile driving or piers are proposed or required. Construction of the proposed project is anticipated to begin in 2020 and be completed by 2023, requiring approximately 36 months of construction. Construction activities would include site preparation / demolition, excavation and shoring, foundation and below grade construction, building construction, exterior finishing, and sitework / paving work. Construction would generally occur between the hours of 7:00 a.m. and 8:00 p.m. up to seven days a week. Nighttime construction activities would take place for a maximum of five (5) nights total and would include the following activities

1. Erection and dismantling of the tower crane;
2. Miscellaneous utility work
3. Fire alarm testing; and
4. Concrete pour for the mat slab foundation

Noise Fundamentals and Terminology

Noise is generally defined as unwanted sound that annoys or disturbs people and potentially causes an adverse psychological or physiological effect on human health. Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches, hotels, and residences are considered noise sensitive receptors because they are more sensitive to noise intrusion than are commercial or industrial activities. Ambient noise levels can also affect the perceived desirability or livability of a development. Because noise is an environmental pollutant that can interfere with human activities, evaluation of noise is necessary when considering the environmental impacts of a proposed project.

Sound is mechanical energy transmitted by pressure waves over a medium such as air or water. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level is the most common descriptor used to characterize the loudness of an ambient (existing) sound level. Although the decibel (dB) scale, a logarithmic scale, is used to quantify sound intensity, it does not accurately describe how sound intensity is perceived by human hearing. The perceived loudness of sound is dependent upon many factors, including sound pressure level and frequency content. The human ear is not equally sensitive to all frequencies in the entire spectrum, so noise measurements are weighted more heavily for frequencies to which humans are sensitive in a process called A-weighting, written as dB(A) and referred to as A-weighted decibels. There is a strong correlation between A-weighted sound levels and community response to noise. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. Table 1 defines sound measurements and other terminology used in this Memo, and Table 2 summarizes typical A-weighted sound levels for different noise sources.

With respect to how humans perceive and react to changes in noise levels, a 1dB(A) increase is imperceptible, a 3 dB(A) increase is barely perceptible, a 6 dB(A) increase is clearly noticeable, and a 10 dB(A) increase is subjectively perceived as approximately twice as loud (Egan 2007). These subjective reactions to changes in noise levels were developed on the basis of test subjects' reactions to changes in the levels of steady-state pure tones or broad-band noise and to changes in levels of a given noise source. These statistical indicators are thought to be most applicable to noise levels in the range of 50 to 70 dBA, as this is the usual range of voice and interior noise levels.

Different types of measurements are used to characterize the time-varying nature of sound. These measurements include the equivalent sound level (Leq), the minimum and maximum sound levels (Lmin and Lmax), percentile-exceeded sound levels (such as L10, L20), the day-night sound level (Ldn), and the community noise equivalent level (CNEL). Ldn and CNEL values typically differ by less than 1 dB. As a matter of practice, Ldn and CNEL values are considered to be equivalent and are treated as such in this assessment.

For a point source such as a stationary compressor or construction equipment, sound attenuates based on geometry at rate of 6 dB per doubling of distance. For a line source such as free flowing traffic on a freeway, sound attenuates at a rate of 3 dB per doubling of distance (Federal Highway Administration 2011). Atmospheric conditions including wind, temperature gradients, and humidity can change how sound propagates over distance and can affect the level of sound received at a given location. The degree to which the ground surface absorbs acoustical energy also affects sound propagation. Sound that travels over an acoustically absorptive surface, such as grass, attenuates at a greater rate than sound that travels over a hard surface, such as pavement. The increased attenuation is typically in the range of 1–2 dB per doubling of distance. Barriers such as buildings and topography that block the line of sight between a source and receptor also increase the attenuation of sound over distance.

Table 1: Definition of Sound Measurement

Sound Measurements	Definition
Decibel (dB)	A measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micro-pascals.
A-Weighted Decibel (dB(A))	An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
C-Weighted Decibel (dB(C))	The sound pressure level in decibels as measured using the C- weighting filter network. The C-weighting is very close to an unweighted or flat response. C-weighting is only used in special cases when low-frequency noise is of particular importance. A comparison of measured A- and C-weighted level gives an indication of low frequency content.
Maximum Sound Level (Lmax)	The maximum sound level measured during the measurement period.
Minimum Sound Level (Lmin)	The minimum sound level measured during the measurement period.
Equivalent Sound Level (Leq)	The equivalent steady state sound level that in a stated period of time would contain the same acoustical energy.
Percentile-Exceeded Sound Level (Lxx)	The sound level exceeded xx % of a specific time period. L10 is the sound level exceeded 10% of the time. L90 is the sound level exceeded 90% of the time. L90 is often considered to be representative of the background noise level in a given area.
Day-Night Level (Ldn)	The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.
Community Noise Equivalent Level (CNEL)	The energy average of the A-weighted sound levels occurring during a 24-hour period with 5 dB added to the A-weighted sound levels occurring during the period from 7:00 p.m. to 10:00 p.m. and 10 dB added to the A-weighted sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.

Sound Measurements	Definition
Peak Particle Velocity (Peak Velocity or PPV)	A measurement of ground vibration defined as the maximum speed (measured in inches per second) at which a particle in the ground is moving relative to its inactive state. PPV is usually expressed in inches/second.
Frequency: Hertz (Hz)	The number of complete pressure fluctuations per second above and below atmospheric pressure.

Source: Federal Highway Administration 2006a

Table 2: Typical A-Weighted Sound Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	-110	Rock band
Jet flyover at 1,000 Feet		
	-100-	
Gas lawnmower at 3 Feet		
	-90-	
Diesel truck at 50 Feet at 50 MPH		Food blender at 3 Feet
Noisy urban area, daytime	-80-	Garbage Disposal at 3 Feet
Gas lawnmower, 100 Feet		
Commercial area	-70-	Vacuum Cleaner at 10 Feet
Heavy traffic at 300 Feet		Normal Speech at 3 Feet
	-60-	
Quiet urban daytime		Large business office
	-50-	Dishwasher in next room
Quiet urban nighttime		
Quiet suburban nighttime	-40-	Theater, large conference room (Background)
Quiet rural nighttime	-30-	Library
	-20-	Bedroom at night, concert hall (Background)
	-10-	Broadcast/recording studio
	-0-	

Decibel Addition

Because decibels are logarithmic units, sound pressure levels cannot be added or subtracted through ordinary arithmetic. On the dB scale, a doubling of sound energy corresponds to a 3-dB increase. In other words, when two identical sources are each producing sound of the same loudness, their combined sound level at a given distance would be 3 dB higher than one source under the same conditions. For example, if one source produces a sound pressure level of 70 dB(A), two identical sources would not produce 140 dB(A)—rather, they would combine to produce 73 dB(A). The cumulative sound level of any number of sources can be determined using decibel addition.

Vibration

Operation of heavy construction equipment, particularly pile driving and other impact devices such as pavement breakers, create seismic waves that radiate along the surface of the earth and downward into the earth. These surface waves can be felt as ground vibration. Vibration from operation of this equipment can result in effects ranging from annoyance of people to damage of structures. Varying geology and distance will result in different vibration levels containing different frequencies and displacements. In all cases, vibration amplitudes will decrease with increasing distance.

Perceptible groundborne vibration is generally limited to areas within a few hundred feet of construction activities. As seismic waves travel outward from a vibration source, they excite the particles of rock and soil through which they pass and cause them to oscillate. The actual distance that these particles move is usually only a few ten-thousandths to a few thousandths of an inch. The rate or velocity (in inches per second) at which these particles move is the commonly accepted descriptor of the vibration amplitude, referred to as the peak particle velocity (PPV). Table 3 summarizes typical vibration levels generated by construction equipment (Federal Transit Administration Transit Noise and Vibration Impact Assessment Manual, September 2018).

Table 3: Vibration Source Levels for Construction Equipment

Equipment	Reference PPV at 25 Feet	Estimated PPV at 50 Feet
Large bulldozer	0.089	0.031
Caisson drilling	0.089	0.031
Loaded trucks	0.076	0.027
Small bulldozer	0.003	0.001

Source: Federal Transit Administration Transit Noise and Vibration Impact Assessment Manual, September 2018

Vibration amplitude attenuates over distance and is a complex function of how energy is imparted into the ground and the soil conditions through which the vibration is traveling. The following equation can be used to estimate the vibration level at a given distance for typical soil conditions (Federal Transit Administration Transit Noise and Vibration Impact Assessment Manual, September 2018). PPVref is the reference PPV from Table 3.

$$PPV = PPVref \times (25/Distance)^{1.5}$$

Table 4 summarizes the guidelines for vibration annoyance potential criteria suggested by Caltrans (California Department of Transportation 2004). Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous and frequent intermittent sources are sources that continue for an extended period of time and include activities such as impact pile drivers, pogo-stick compactors, crack-and-seal equipment, vibratory pile drivers, and vibratory compaction equipment.

Table 4: Guideline Vibration Annoyance Potential Criteria

Human Response	Maximum PPV (in/sec)	
	Transient Sources	Continuous and Frequent Intermittent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04

Human Response	Maximum PPV (in/sec)	
	Transient Sources	Continuous and Frequent Intermittent Sources
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

Source: California Department of Transportation 2004.

Table 5 summarizes the guidelines for building damage potential from vibration suggested by Caltrans (California Department of Transportation 2004).

Table 5: Guideline Vibration Damage Potential Criteria

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structure	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5
Source: California Department of Transportation 2004.		

REGULATORY SETTING

California Building Code

Part 2, Title 24 of the California Code of Regulations California Noise Insulation Standards establishes minimum noise insulation standards to protect persons within new hotels, motels, dormitories, long-term care facilities, apartment houses, and dwellings other than single-family residences. Under Section 1207.11 “Exterior Sound Transmission Control”, interior noise levels attributable to exterior noise sources cannot exceed 45 Ldn in any habitable room. Where such residences are located in an environment where exterior noise is 60 Ldn or greater, an acoustical analysis is required to ensure interior levels do not exceed the 45 Ldn interior standard. If the interior allowable noise levels are met by requiring that windows be kept closed, the design for the building must also specify a ventilation or air conditioning system to provide a habitable interior environment.

Paragraph 1207.4 “Allowable Interior Noise Levels” states “Interior noise levels attributable to exterior sources shall not exceed 45 dB in any habitable room. The noise metric shall be either the day-night average sound level (Ldn) or the community noise equivalent level (CNEL), consistent with the noise element on the local general plan.”

California Green Building Standards (CALGREEN)

The 2016 California Green Building Standards Code (CalGreen), Section 5.507 “Environmental Comfort”, states the following:

5.507.4.1 Exterior noise transmission. Wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall meet a composite STC[1] rating of at least 50 or a composite OITC[2] rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 in the following locations:

1. Within the 65 CNEL noise contour of an airport

Exceptions:

1. Ldn or CNEL for military airports shall be determined by the facility Air Installation Compatible Land Use Zone (AICUZ) plan.
2. Ldn or CNEL for other airports and heliports for which a land use plan that has not been developed shall be determined by the local general plan noise element.
3. Within the 65 CNEL or Ldn noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway notice source as determined by the Noise Element of the General Plan.

5.507.4.1.1 Noise exposure where noise contours are not readily available. Buildings exposed to a noise level of 65 dB Leq-1-hr during any hour of operation shall have building, addition or alteration exterior wall and roof-ceiling assemblies exposed to the noise source meeting a composite STC rating of at least 45 (or OITC 35), with exterior windows of a minimum STC of 40 (or OITC 30).

5.507.4.2 Performance method. For buildings located as defined in Section 5.507.4.1 or 5.507.4.1.1, wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level (Leq -1Hr) of 50 dBA in occupied areas during any hours of operations

5.507.4.2.1 Site features. Exterior features such as sound walls or earth berms may be utilized as appropriate to the building, addition or alteration project to mitigate sound migration to the interior.

5.507.4.2.2 Documentation of compliance. An acoustical analysis documenting complying interior sound levels shall be prepared by personnel approved by the architect or engineer of record.

5.507.4.3 Interior sound transmission. Wall and floor-ceiling assemblies separating tenant spaces and tenant spaces and public places shall have an STC of at least 40.

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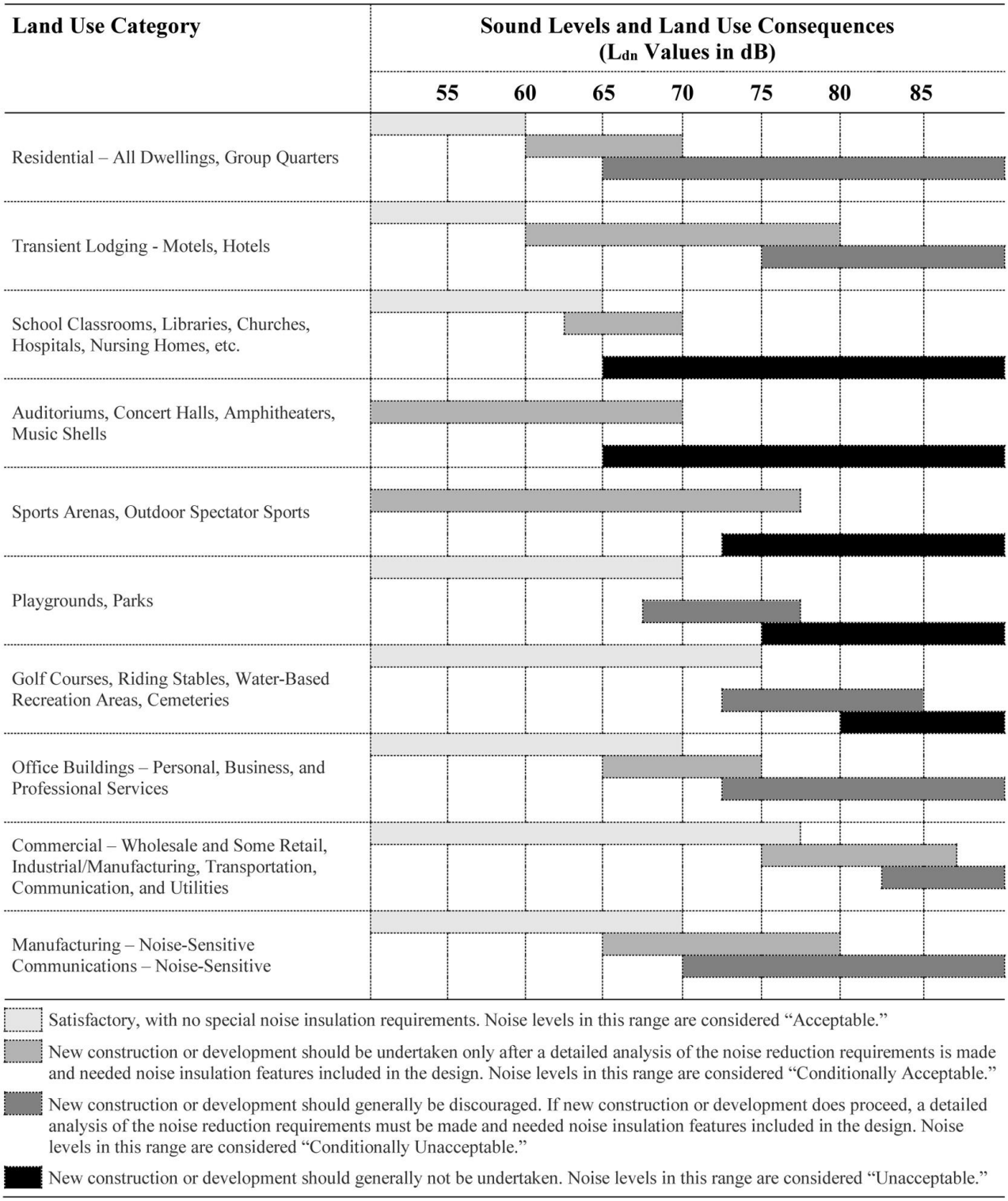
[1] STC or Sound Transmission Class Rating is a one-number rating that describes how well a building partition or element attenuates airborne sound. STC ratings focus mainly on the mid-to-high frequency range associated with speech.
[2] OITC or Outside-Inside Transmission Class Ratings are also a one-number rating that described how well an exterior façade element, such as walls and windows, attenuate airborne noise. OITC ratings place more focus on the lower frequency ranges most associated with transportation noise sources.

The proposed project's interiors will be required to comply with the California Building Code and California Green Building Standards. The San Francisco Building Department would review the building plans for the proposed project to determine compliance with these standards.

San Francisco General Plan

The Environmental Protection Element within the San Francisco General Plan addresses those environmental issues that affect the residents of San Francisco, including noise concerns. Objective 11 of the Environmental Protection Element is directed toward achieving an environment in which noise levels will not interfere with the health and welfare of people in their everyday activities. Policy 11.1 identifies land use compatibility noise standards for noise-sensitive land uses affected by transportation and non-transportation noise sources. As shown in Figure 1, for residential buildings that are affected by transportation noise sources, the "normally acceptable" exterior noise level is 50-60 dB(A) Ldn. Exterior noise levels up to 70 dB(A) Ldn are considered "conditionally acceptable" and should be undertaken only after a detailed analysis of the noise reduction requirements are made. Exterior noise levels between 65 dB(A) and 90 dB(A) Ldn are considered "normally unacceptable." New construction with exterior noise levels in this range would require a detailed analysis of the noise reduction requirements and noise insulation features to be incorporated in the project to maintain "normally acceptable" interior noise levels. These policies and objectives of the general plan are implemented by individual projects through required building code requirements (see above discussion).

Figure 1: San Francisco Land Use Compatibility Chart for Community Noise



San Francisco Police Code

Article 29 “Regulation of Noise” of the San Francisco Police Code states the following:

Section 2909 “Noise Limits”

“(a) Residential Property Noise Limits.

(1) No person shall produce or allow to be produced by any machine, or device, music or entertainment or any combination of same, on residential property over which the person has ownership or control, a noise level more than five dBA above the ambient at any point outside of the property plane.

(2) No person shall produce or allow to be produced by any machine, or device, music or entertainment or any combination of same, on multi-unit residential property over which the person has ownership or control, a noise level more than five dBA above the local ambient three feet from any wall, floor, or ceiling inside any dwelling unit on the same property, when the windows and doors of the dwelling unit are closed, except within the dwelling unit in which the noise source or sources may be located.

(b) Commercial and Industrial Property Noise Limits. No person shall produce or allow to be produced by any machine, or device, music or entertainment or any combination of same, on commercial or industrial property over which the person has ownership or control, a noise level more than eight dBA above the local ambient at any point outside of the property plane. With respect to noise generated from a licensed Place of Entertainment, licensed Limited Live Performance Locale, or other location subject to regulation by the Entertainment Commission or its Director, in addition to the above dBA criteria a secondary low frequency dBC criteria shall apply to the definition above. No noise or music associated with a licensed Place of Entertainment, licensed Limited Live Performance Locale, or other location subject to regulation by the Entertainment Commission or its Director, shall exceed the low frequency ambient noise level defined in Section 2901(f) by more than 8 dBC.

(d) Fixed Residential Interior Noise Limits. In order to prevent sleep disturbance, protect public health and prevent the acoustical environment from progressive deterioration due to the increasing use and influence of mechanical equipment, no fixed noise source may cause the noise level measured inside any sleeping or living room in any dwelling unit located on residential property to exceed 45 dBA between the hours of 10:00 p.m. to 7:00 a.m. or 55 dBA between the hours of 7:00 a.m. to 10:00p.m. with windows open except where building ventilation is achieved through mechanical systems that allow windows to remain closed.”

Section 2901 “Definitions”

“(d) “Emergency Work” means work made necessary to restore property to a safe condition following a public calamity or work required to protect persons or property from an imminent exposure to danger or work by private or public utilities when restoring utility service. This term shall not include testing of emergency equipment.”

Section 2907 “Construction Equipment”

“(a) Except as provided for in Subsections (b), (c), and (d) hereof, it shall be unlawful for any person to operate any powered construction equipment if the operation of such equipment emits noise at a level in excess of 80 dBA when measured at a distance of 100 feet from such equipment, or an equivalent sound level at some other convenient distance.

(b) The provisions of Subsections (a) of this Section shall not be applicable to impact tools and equipment, provided that such impact tools and equipment shall have intake and exhaust mufflers recommended by the manufacturers thereof and approved by the Director of Public Works or the Director of Building Inspection as best accomplishing maximum noise attenuation, and that pavement breakers and jackhammers shall also be equipped with acoustically attenuating shields or shrouds recommended by the manufacturers thereof and approved by the Director of Public Works or the Director of Building Inspection as best accomplishing maximum noise attenuation.

(c) The provisions of Subsection (a) of this Section shall not be applicable to construction equipment used in connection with emergency work."

Section 2908 "Construction Work at Night"

"It shall be unlawful for any person, between the hours of 8:00 p.m. of any day and 7:00 a.m. of the following day to erect, construct, demolish, excavate for, alter or repair any building or structure if the noise level created thereby is in excess of the ambient noise level by 5 dBA at the nearest property plane, unless a special permit therefor has been applied for and granted by the Director of Public Works or the Director of Building Inspection. In granting such special permit the Director of Public Works or the Director of Building Inspection shall consider: if construction noise in the vicinity of the proposed work site would be less objectionable at night than during daytime because of different population levels or different neighboring activities if obstruction and interference with traffic, particularly on streets of major importance, would be less objectionable at night than during daytime; if the kind of work to be performed emits noises at such a low level as to not cause significant disturbance in the vicinity of the work site, if the neighborhood of the proposed work site is primarily residential in character wherein sleep could be disturbed: if great economic hardship would occur if the work were spread over a longer times if the work will abate or prevent hazard to life or property; and if the proposed night work is in the general public interest. The Director of Public Works or the Director of Building Inspection shall prescribe such conditions, working times, types of construction equipment to be used, and permissible noise emissions, as required in the public interest.

The provisions of this Section shall not be applicable to emergency work."

Places of Entertainment

Noise Regulations relating to Residential Uses Near Places of Entertainment (Ordinance 70-15, effective June 19, 2015) states residential structures to be located where the day-night average sound level (Ldn) or community noise equivalent level (CNEL) exceeds 60 decibels shall require an acoustical analysis with the application of a building permit showing that the proposed design would limit exterior noise to 45 decibels in any habitable room. Furthermore, the regulations require the San Francisco Planning Department and planning commission to consider the compatibility of uses when approving residential uses adjacent to or near existing permitted places of entertainment and take all reasonably available means through the city's design review and approval processes to ensure that the design of new residential development projects take into account the needs and interests of both the places of entertainment and the future residents of the new development.

The proposed project would be located within 300 feet of two (2) places of entertainment, OMG Bar and Nightclub (directly adjacent to the project site to the southwest) and Mezzanine (215 feet northeast of the project site). In addition, The Warfield is 334 feet northwest of the project site and the SHN Golden Gate Theater is 454 feet northwest of the project site.

The ambient noise level measured at the Jessie Street edge of the site during the early morning hours is an average of 71.4 dB(C). According to Section 2090 "Noise Limits", Paragraph (b) "Commercial and Industrial Property Noise Limits" in the San Francisco Police Code, the loudest noise level the establishments would be

able to generate at the project site is 79.4 dB(C). The project exterior façade would be designed taking into account the noise levels generated by the neighboring places of entertainment as verified by the Project Sponsor via e-mail on July 26, 2019.

EXISTING NOISE ENVIRONMENT

Existing Ambient Noise Levels

The existing noise environment in a project area is characterized by the area's general level of development due to the high correlation between the level of development and ambient noise levels. Areas which are not urbanized are relatively quiet, while areas which are more urbanized are noisier as a result of roadway traffic, industrial activities, and other human activities.

The City of San Francisco is exposed to several sources of noise, including traffic on the local roadways, such as Market Street, Sixth Street, and Fifth Street. Traffic noise depends primarily on traffic speed (tire noise increases with speed), proportion of medium and large truck traffic (trucks generate engine, exhaust, and wind noise, in addition to tire noise), and number of speed control devices, such as traffic lights (accelerating and decelerating vehicles and trucks can generate more noise).

Changes in traffic volumes can also have an impact on overall traffic noise levels. For example, it takes 25 percent more traffic volume to produce an increase of only 1 dB(A) in the ambient noise level. For roads already heavy with traffic volume, an increase in traffic numbers could even reduce noise because the heavier volumes could slow down the average speed of the vehicles. A doubling of traffic volume generally results in a 3 dB(A) increase in noise levels.

The main source of noise at the 469 Stevenson Street site is the steam generation plant on the adjacent Clearway Energy property. The noise from the steam generation plant is a constant, tonal noise produced from the mechanical equipment outside the building and the operation of the facility. Other sources of noise at the site include traffic on Sixth Street, very sparse traffic on Stevenson and Jessie streets, sidewalk activity, parking lot activity, aircraft fly overs, activity from businesses (back-up beepers, etc.), and noise from distant construction sites. The traffic in the area is comprised of vehicles, medium and large trucks, motorcycles, MUNI buses and streetcars, construction vehicles, and emergency vehicles. The project site is well-shielded from traffic noise along Market and Fifth Streets.

Photo 1: Microphone on Roof of 989 Market Building

A noise survey was conducted between Thursday, March 14, 2019 and Sunday, March 17, 2019 to establish the existing baseline condition for the project. The survey involved securing a calibrated Larson Davis LxT sound level meter to the roof of the adjacent building at 989 Market Street, about 95 feet above the ground. The microphone was extended approximately two feet out from the building and directly faced Stevenson Street (within the red circle in Photo 1). The unattended meter collected data continuously between Tuesday and Sunday for a minimum of 24-hours.

One (1) additional spot measurement was taken during the same time period to extrapolate the 24-hour noise level to a different elevation to gain an understanding of sound across the full project site. The spot measurement was taken at the edge of the existing parking lot facing Jessie Street using a fully calibrated Larson Davis 831 sound level meter. The microphone was about 5 feet 6 inches above the sidewalk for the measurement. The results of the ambient noise measurements are shown in Table

7 below. Average 15-minute sound pressure levels measured at the 24-hour measurement location are shown in Appendix 1 attached to this Memo.

Table 7: Ambient Noise Level Measurement Results

Location	Ldn, dB(A)[3]	Maximum One-Hour Leq, dB(A)[4]	Maximum 15-Min Daytime Leq, dB(A)	Minimum 15-Min Daytime Leq, dB(A)	Minimum 15-Min Nighttime Leq, dB(A)[5]
Stevenson Street – Rooftop	67.0 – 70.5 dB(A)	68.8 dB(A)	68.4 dB(A)	59.1 dB(A)	57.5 dB(A)
Jessie Street – Ground Level	64.5 – 68.0 dB(A)	66.3 dB(A)	65.9 dB(A)	56.6 dB(A)	55.0 dB(A)

The dates of the noise survey included the Hello Dolly show at the SHN Golden Gate Theater (March 16 and March 17, 2019), The Nils Frahm concert (March 15, 2019) and the Graveyard and Uncle Acid & The Deadbeats concert (March 16, 2019) at the Warfield, The Dirtybird Quarterly event at Mezzanine (March 15, 2019), and typical weekend activity at OMG Bar & Nightclub. Ambient noise levels measured during the early morning hours, or during the anticipated operational hours of the noise-generating entertainment uses, ranged between 70.2-73.4 dB(C). Ambient noise levels exceed the “satisfactory" category on the Land Use Compatibility Chart for Community noise.

Noise-Sensitive Receptors

Noise-sensitive receptors around the project site include The Wilson apartments at 973 Market Street, the Hampton Inn San Francisco Downtown at the corner of Mint Street and Mission Street, and various hotels and residential buildings near the corner of Sixth Street and Stevenson Street, including the Desmond Hotel at 42 Sixth Street, the Seneca Hotel at 34 Sixth Street, the Haveli Hotel at 37 Sixth Street, the Whitaker Hotel at 45 Sixth Street, the Hillsdale at 51 Sixth Street, the Oak Tree Hotel at 45 Sixth Street, the Winsor Hotel at 20 Sixth Street, and various residential spaces above 87-99 Sixth Street. The noise-sensitive receptors within 300 feet of the 469 Stevenson project site are shown in Appendix 2 attached to this memo.

Vibration-Sensitive Receptors

Historic buildings are more susceptible to vibration as compared with buildings with modern construction. Historic buildings adjacent to the project site include The Haveli Hotel at 35-37 Sixth Street (Date of Construction – 1908), The Whitaker Hotel at 39-41 Sixth Street (Date of Construction – 1906), The Oak Tree Hotel at 43-45 Sixth Street (Date of Construction – 1907), and The Hillsdale Hotel at 47-51 Sixth Street (Date of Construction – 1912). These structures are adjacent to the project site’s western property line. 65-83 Sixth Street (Date of Construction – 1913), 986 Mission Street/481 Jessie Street (Date of Construction – 1922), 980-984 Mission Street/479 Jessie Street (Date of Construction – 1924), 972-976 Mission Street (Date of Construction – 1925), 968 Mission Street (Date of Construction – 1930), 471 Jessie Street (Date of Construction – 1912), and 956-960 Mission Street (Date of Construction – 1910) are also historic buildings, and are located across the street from the project’s Jessie Street frontage. 995 Market Street/1 Sixth Street (Date of Original Construction – 1908), 979-989 Market Street (Date of Construction – 1907), 973 Market Street (Date of Construction – 1904) are historic buildings and are located across the street from the project’s Stevenson Street frontage. Additionally, the three-story building and two smokestacks located at 460 Jessie Street are located at the adjacent Clearway Energy thermal power station to the east of the project site and

[3] The day-night noise level, Ldn, is relevant for noise interior to the residential units.
[4] The maximum one-hour equivalent noise level, Leq, is referenced for CalGreen.
[5] The minimum 15-minute nighttime equivalent noise level is used for the fixed-source mechanical noise property plane noise analysis.

are historical resources as contributors to the California Register-eligible PG&E City Beautiful Substations Discontinuous Thematic Historic District. All vibration-sensitive buildings within 300 feet of the project site are also shown in Appendix 2 attached to this Memo and distinguished from noise-sensitive receptors as shown in the legend.

Existing Noise-Generating Uses

This neighborhood of the City contains several entertainment facilities which are in operation for weekly scheduled events or for special events. Noise generated by the operation of the facilities will be part of the ambient noise environment experienced by the subject project. Noise-generating uses around the project include places used for scheduled events, such as The Warfield (982 Market Street), Piano Fight (144 Taylor Street), Pandora Karaoke & Bar (50 Mason Street), OMG Bar and Nightclub (43 Sixth Street), Mezzanine (444 Jessie Street), Exit Stage Left (156 Eddy Street), and the SHN Golden Gate Theater (1 Taylor Street), and spaces used for special events, such as Club Six (60 Sixth Street), and the SF Mint (88 Fifth Street).

METHODOLOGY

In accordance with the requirements of the California Environmental Quality Act (CEQA), the noise analysis evaluates the project's noise sources to determine the impact of the proposed project on the existing ambient noise environment. This analysis does not analyze the impact of the existing ambient noise environment on the proposed project's residents. However, as discussed in the regulatory setting above, existing regulations are in place to ensure adequate interior noise levels are achieved for a proposed project.

Results from the long-term site measurements were used to provide baseline noise conditions at nearby sensitive receptors and within the project site vicinity. For the purpose of this analysis, potential sensitive receptors were determined by reviewing current aerial photography and by walking the project site.

Operational Noise

Project-generated traffic should not increase existing noise levels by 5 dBA Ldn if existing or existing plus project-generated noise levels are within the City's "Satisfactory" category per the general plan's land use compatibility chart for community noise (Figure 1 above). If existing or resulting with project noise levels are above the "Satisfactory" category, project-generated traffic noise should not result in an increase of 3 dBA Ldn. Anticipated noise increases from future project-related traffic were estimated using predicted vehicle traffic generated from the 469 Stevenson project as detailed in the traffic analysis prepared by Fehr & Peers.

In addition, the proposed project would require one diesel emergency backup generator and a generator to operate a fire pump, required by the building code to ensure life safety requirements are met. Given their limited operation, noise from these generators are analyzed qualitatively for their potential to increase ambient noise levels.

Noise from the proposed project's mechanical and HVAC systems would operate regularly and are therefore analyzed for compliance with article 2909(a) and (d) of the noise ordinance (refer to regulatory discussion above).

The proposed project would not include sources of vibration during operations. Therefore, no operational vibration assessment is required.

Construction Noise

The San Francisco Police Code does not specify quantitative noise limits for impact equipment or combined noise impacts from the simultaneous operation of multiple pieces of construction equipment. Therefore, the

quantitative evaluation of daytime construction noise effects is based on criteria in the Federal Transit Administration (FTA) guidelines for residential land uses which is 90 dBA Leq.[6]

The planning department also evaluates whether construction noise would result in an increase of 10 dBA over existing noise levels ("Ambient + 10 dBA") at sensitive receptors, which generally represents a perceived doubling of loudness. The quantitative analysis typically evaluates the noise levels from the simultaneous operation of multiple pieces of construction equipment to provide a worst-case assessment of potential noise during construction. Although a more refined analysis evaluating the noise levels from all equipment associated with a construction phase is also acceptable. The quantitative criteria above are only part of the evaluation of construction noise. The evaluation also considers the duration and intensity of any quantitative noise exceedance. In addition, nighttime construction noise is assessed to determine whether sleep disturbance would occur (if construction noise would exceed 45 dBA at residential interiors for prolonged periods of time). The nighttime construction noise analysis also considers the frequency and duration of nighttime construction activities.

The Federal Highway Administration Roadway Construction Noise Model (RCNM) was used to determine noise generated from construction activities. The RCNM is used as the Federal Highway Administration's national standard for predicting noise generated from construction activities. The RCNM analysis includes the calculation of noise levels (Lmax and Leq) at incremental distances for a variety of construction equipment. The spreadsheet inputs include acoustical use factors, Lmax values, and Leq values at various distances depending on the ambient noise measurement location. Construction noise levels were calculated for each phase of construction based on the equipment list provided by the project sponsor. Given the limited extent and duration of nighttime construction activities, the potential for nighttime construction noise to result in sleep disturbance is analyzed qualitatively.

Construction Vibration

Vibration from construction equipment is analyzed at the surrounding buildings and compared to the applicable Caltrans building damage criteria to determine whether construction activities would generate vibration at levels that could result in building damage. Given the limited extent and duration of nighttime construction activities, the potential for vibration effects to result in sleep disturbance are analyzed qualitatively.

ENVIRONMENTAL ANALYSIS

Traffic Noise Levels

To describe future noise levels due to traffic added from the proposed project, peak hour traffic counts (with and without the project) listed in the traffic study by Fehr & Peers were used to determine the percent increase of traffic on the roads adjacent to the project site and near adjacent sensitive receptors.

Table 8 shows the existing peak hour traffic count and the estimated traffic levels under existing plus project conditions on nearby roadways. The last columns in the table show the overall percentage change and the estimated difference in peak hour noise level. Calculations to support the table are contained in Appendix 3 attached to this memo.

[6] Federal Transit Administration (FTA), 2018, Transit Noise and Vibration Impact Assessment, DTA-VA- 90-1003-06, Chapter 12, September 2018, U.S. Department of Transportation. http://www.fta.dot.gov/12347_2233.html.

Table 8: Traffic Peak Hour Counts and Estimated Noise Increase

Roadway	Existing Peak Hour Traffic Counts	Estimated Peak Hour Traffic with Project	Percentage Change	Estimated dB(A) Change
Market Street	580	580	0%	0 dB(A)
Sixth Street	1,844	1,859	1%	0.04 dB(A)
Stevenson Street	108	152	41%	1.6 dB(A)
Fifth Street	1,402	1,4230	2%	0.08 dB(A)

The proposed project is expected to minimally increase traffic volumes along Market Street, Sixth Street, and Fifth Street. There would essentially be no perceptible change in traffic noise expected along these streets. Peak traffic volumes are expected to increase approximately 41 percent along Stevenson Street between Fifth and Sixth Streets with implementation of the proposed project. Traffic increases of 41 percent only raise noise levels approximately 1.6 dB(A), which is imperceptible.

Project Fixed-Source Noise

HVAC and Mechanical Systems Exterior Noise

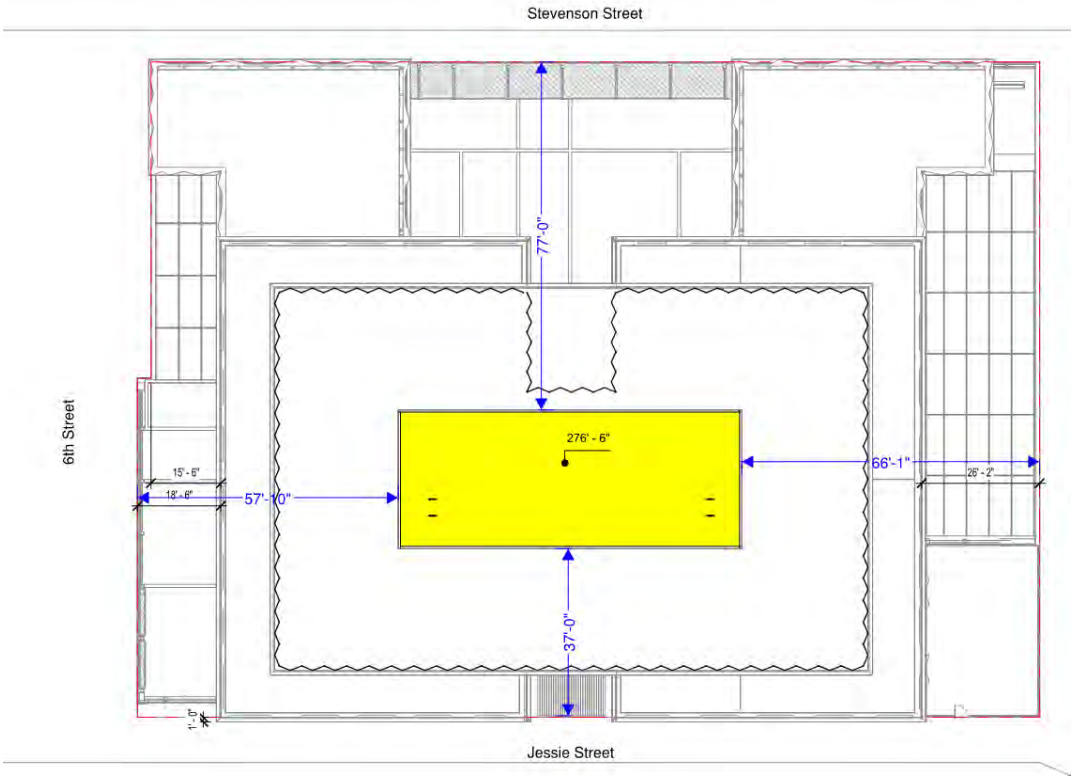
Per San Francisco Police Code section 2909(a) residential properties may not produce a noise level more than 5 dB(A) above the ambient noise level at any point outside of the property plane. Typical residential and commercial building construction would involve new rooftop mechanical equipment, such as air handling units, condensing units, make-up air units, and exhaust fans. This equipment would generate noise that would radiate to neighboring properties.

Noise from HVAC equipment can vary greatly, depending on the size of the equipment and the type of equipment used. The project sponsor has verified that water-source heat pumps are planned for the residential units and the main pieces of mechanical equipment would be located on the roof[7]. While the project sponsor has not selected the exact mechanical equipment to be installed on the project site, the following assumptions were used in the exterior analysis of the mechanical equipment based on HVAC equipment similar to standard package units installed on buildings similar to the proposed project:

- A standard HVAC unit would produce sound pressure levels in the range of 70 to 75 dBA at 50 feet.[1].[8]
- The mechanical equipment was assumed to be centrally located in the mechanical area indicated on the roof as shown in the yellow-highlighted area below in Figure 2:

[7] August 19, 2019 e-mail from Victoria Lehman, Build
[8] Hoover and Keith, Noise Control for Buildings, Manufacturing Plants, Equipment, and Products, 2000, Houston, TX.

Figure 2: Assumed Location of Rooftop Mechanical Equipment



- The mechanical area is visually blocked from the surrounding buildings by a 9 foot, 3-inch tall screen. Even though there is a screen, effects of the screen were not considered in the analysis to meet the requirements of the San Francisco Police Code section 2909(a) because this code requirement is a “property plane” requirement. This means the noise level requirements listed in the code must be met at an infinite vertical plane as defined by the subject project’s property line. Therefore, this analysis is conducted just above the screen during nighttime hours to simulate a worst-case scenario.

Using the sound pressure levels and the analysis assumptions listed above, the results of the noise levels from exterior mechanical systems at the property plane are as follows:

Table 9: Calculated Rooftop Mechanical Equipment Noise Levels at the Project Property Planes

Property Plane	Nighttime Ambient Noise Level	2909(a) Noise Limit (Ambient + 5 dB(A))	Distance between Mechanical Area and Property Plane	Estimated Noise Level at Property Plane	Exceeds 2909(a) Noise Limit?
Stevenson Street	57.5 dB(A)	62.5 dB(A)	77'-0"	74.2 dB(A)	Yes
Jessie Street	55.0 dB(A)	60.0 dB(A)	37'-0"	80.5 dB(A)	Yes
Western property plane (near Sixth Street)	55.0 dB(A)	60.0 dB(A)	57'-10"	76.7 dB(A)	Yes
Eastern property plane (near Fifth Street)	57.5 dB(A)	62.5 dB(A)	66'-1"	75.0 dB(A)	Yes

The supporting calculations for the property plane noise analysis are attached to this memo in Appendix 4.

A minimum of 20.5 dB(A) noise reduction is required from the rooftop equipment to achieve the requirements of the San Francisco Police Code Section 2909(a) during nighttime hours. The project sponsor shall implement the following mitigation measures to reduce noise levels from the source equipment and achieve compliance with the police code:

- Enclose as much of the proposed project's rooftop equipment as possible within a mechanical room with small louvered openings to the exterior. The mechanical room and louvered openings can be treated with acoustic absorption and sound attenuators to reduce noise at the property planes.
- If the equipment remains open to the roof, select rooftop equipment with a maximum sound pressure level of 54.4 dB(A) at 50 feet' from the equipment.
- Attach sound attenuators to the outside air and exhaust air openings/fans of the rooftop equipment to minimize environmental noise.

During the design phase, once the project sponsor has selected the specific HVAC and mechanical equipment for the proposed project, a qualified acoustical consultant shall conduct a property plane noise analysis. The property plane analysis report shall evaluate whether the proposed HVAC and mechanical equipment complies with the noise limits in the San Francisco Police Code. The report shall be submitted to the San Francisco Planning Department for review and approval prior to issuance of a building permit or building permit addendum that would permit the HVAC and mechanical equipment.

<u>HVAC and Mechanical Systems Interior Noise</u>

Per San Francisco Police Code section 2909(d), fixed noise sources cannot intrude into a sleeping or living room in any dwelling unit located on residential property to produce interior noise levels that exceed 45 dB(A) between the hours of 10:00 PM to 7:00 AM or 55 dB(A) between the hours of 7:00 AM to 10:00 PM. The tallest closest noise-sensitive receptors to the 469 Stevenson Project are at 47-Sixth Street (approximately 20 feet from the project site) with a building height of 85'-0" and 973 Market Street (approximately 22 feet from the project site) with a building height of 101'-0". These residential buildings are the tallest buildings located directly adjacent to the Project site and therefore, the residential units in these buildings will be the closest to the rooftop mechanical equipment on the 469 Stevenson Street building.

Noise from the projected project's rooftop equipment to these residential properties was calculated to verify compliance with section 2909(d) of the San Francisco Police Code. All analysis assumptions listed above under HVAC and Mechanical Systems Exterior Noise also apply for the interior noise analysis, except the screen. Because the section 2909(d) analysis is a point calculation to the closest residential units and not a property plane analysis, the effects of the 9 foot 3-inch tall screen shielding the rooftop mechanical equipment was included in the analysis of interior noise for the mechanical systems. The interior noise analysis also accounts for a 15 dB(A) reduction in noise from the building façade. This is a typical noise reduction factor that assumes windows are open. The results of the interior noise analysis are shown in Table 10 below. The supporting calculations for the interior residential noise analysis are included at the end of this memo in Appendix 4.

Table 10: Calculated Rooftop Mechanical Equipment Noise Levels at the Nearest Residential Receptors

Receptor Location	Estimated Rooftop Equipment Noise Level at Residence	Façade Noise Reduction[9]	Calculated Interior Noise Level	Criterion	Exceeds Criterion?
47 Sixth Street	41.5 dB(A)	15 dB(A)	26.5 dB(A)	45 dB(A)	No
973 Market Street	42.7 dB(A)	15 dB(A)	27.7 dB(A)	45 dB(A)	No

Emergency Generators

One emergency generator is planned for the proposed project. The generator is planned to be located within the main electrical room on the ground floor in the southwest portion of the property. The exact discharge, intake, and exhaust pipe paths for the generator are not yet known. The generator would be tested regularly, typically once per month. However, the generator will require a permit to operate from the Bay Area Air Quality Management District, which typically permits emergency generators to operate for testing purposes up to 50 hours per year. The generator would typically be tested during the weekday, daytime hours. Given the generator would be located in an enclosed room and operate at most 1 hour per week during daytime hours, noise from the generator is not anticipated to substantially increase daytime ambient noise levels.

Short-Term Construction Noise

Daytime Construction Noise

Construction activities associated with the proposed project would include site preparation and demolition, excavation and shoring, foundation and below grade work, building construction, exterior finishing, and sitework/paving. Each construction stage has its own mix of equipment and, consequently, its own noise characteristics. These various construction operations would change the character of the noise generated at the project site and, therefore, the ambient noise level as construction progresses. The loudest phases of construction include excavation and shoring and building construction phases, as the noisiest construction equipment is earthmoving and grading equipment and concrete/industrial saws. Table 11 lists types of construction equipment that may be used throughout construction and the maximum and average noise level as measured at 20 feet from the operating equipment. The 20-foot distance represents the approximate distance between the project property line and the closest noise-sensitive receptors at 35 Sixth Street, 39-41 Sixth Street, 43-45 Sixth Street, and 47 Sixth Street, which are hotels and residential over retail. The 20-foot distance represents a worst-case assessment of noise impacts on nearby receptors because it assumes the equipment operates at the property line closest to the sensitive receptor. The project site is approximately 170

[9] Facade noise reduction is typically 15 dBA with windows open. See http://researchrepository.napier.ac.uk/2040/1/TWFrepNANR_116.pdf

feet wide along its Jesse and Stevenson street frontages and therefore equipment will often be operating at distances greater than 20-feet from the closest sensitive receptors.

Table 11: Summary of Construction Equipment Noise Levels at the Nearest Noise-Sensitive Receptor

Equipment	Distance to Nearest Noise-Sensitive Receptor	Sound Level at Nearest Noise-Sensitive Receptor		
		Lmax, dB(A)	Acoustical Use Factor (%)	Leq, dB(A)
Backhoe	20 feet	85.5	40	81.5
Crane	20 feet	88.5	16	80.6
Concrete Mixer Truck	20 feet	86.8	40	82.8
Concrete Saw	20 feet	97.5	20	90.5
Compressor (air)[1]	20 feet	85.6	40	81.6
Excavator	20 feet	88.7	40	84.7
Front End Loader[2]	20 feet	87.1	40	83.1
Flat Bed Truck	20 feet	82.2	40	78.2
Grader	20 feet	93.0	40	89.0
Paver	20 feet	85.2	50	82.2
Welder / Torch	20 feet	82.0	40	78.0
Tractor[3]	20 feet	92.0	40	88.0
Man Lift[4]	20 feet	82.7	20	75.7
Drill Rig	20 feet	87.1	20	80.1
Dump Truck	20 feet	84.4	40	80.4
Pumps	20 feet	88.9	50	85.9

Source: Stantec 2019, Federal Highway Administration Roadway Construction Noise Model Version 1.1, 2008

Notes:

1. Used to approximate noise from a pressure washer for this project.
2. Used to approximate noise from the skid steer loader for this project.
3. Used to approximate noise from the forklift and rough-terrain forklift for this project.
4. Used to approximate noise from the aerial lift and scissor lift for this project.

Construction of the entire project would be conducted in sequential phases and each phase would use different pieces of construction equipment. The noise-producing equipment for each construction phase as defined by the Project Sponsor are shown in Table 12.

Table 12: Construction Phases and Equipment

Construction Phase	Equipment
Site Preparation / Demolition	Dump Truck (2) Excavator (1)
Excavation and Shoring	Bore / Drill Rigs (1) Dumper / Tenders (1) Excavators (1) Skid Steer Loaders (1) Tractors / Loaders / Backhoes (1) Aerial Lifts (1) Dump Truck (2)
Foundation and Below Grade Construction	Concrete Pump (1) Manlift (1) Dump Truck (1)
Building Construction	Aerial Lifts (1) Cranes (1) Forklift (1) Rough Terrain Forklifts (1) Electric-Powered Welders (1) Concrete / Industrial Saws (2) Dump Truck (1) Manlift (1) Scissor Lift (3) Welders (1)
Exterior Finishing	Air Compressors (1) Forklift (1) Manlift (1) Welders (1)
Sitework / Paving	Cement and Mortar Mixers (1) Pavers (1) Paving Equipment (1) Pressure Washer (1)

A worst-case condition for construction activity would assume all noise-generating equipment for each construction phase were operating at the same time and at the same distance away from the closest noise-sensitive receptor. Using this assumption, the RCNM program calculated the following combined Leq and Lmax noise levels from each phase and stage of construction as shown in Table 13.

Table 13: Calculated Noise Level from Each Construction Phase

Construction Stage	Distance to Nearest Noise-Sensitive Receptor	Sound Level at Nearest Noise-Sensitive Receptor	
		Lmax, dB(A)	Leq, dB(A)
Site Preparation / Demolition	20 feet	91.1 dB(A)	87.1 dB(A)
Excavation and Shoring	20 feet	95.0 dB(A)	90.5 dB(A)
Foundation and Below Grade Construction	20 feet	91.2 dB(A)	85.0 dB(A)
Building Construction	20 feet	102.2 dB(A)	96.1 dB(A)
Exterior Finishing	20 feet	93.6 dB(A)	89.4 dB(A)
Sitework / Paving	20 feet	91.8 dB(A)	88.2 dB(A)

The construction noise modeling output results are attached to this memo in Appendix 5.

Construction noise during the Excavation and Shoring Phase and the Building Construction phase are expected to exceed the FTA 90 dB(A) Leq guideline at the closest noise-sensitive receptors. The excavation and shoring phase is expected to take approximately two months to complete. Building construction is expected to take a total of about 29 months to complete. The loudest part of the building construction phase is anticipated to be during the beginning of the phase when the concrete/industrial saws would be used. The Building Construction phase, the Exterior Finishing Phase, and the Sitework/Paving Phase will all run concurrently.

Because the ambient daytime noise level in the project vicinity is approximately 70 dBA, noise levels from all phases of construction are expected to be 10 dB(A) above the ambient noise level at the closest sensitive receptors. As discussed previously, a 10 dBA increase in noise level is perceived as a doubling of loudness.

The entire construction process is expected to take approximately 36 months to complete. Therefore, noise sensitive receptors would be potentially exposed to noise levels 10 dBA above the ambient for the entire duration of construction. However, noise levels would fluctuate throughout the day depending upon the specific equipment being used at any one time. While the construction activity will extend over 36 months, the use of the most noise producing equipment, such as bulldozers, graders, and concrete/industrial saws would be limited to the excavation/shoring phase and the first part of the building construction phases.

<u>Nighttime Construction Noise</u>

Most construction would occur during daytime hours, but some nighttime construction would occur. During the total 36-month construction phase, nighttime construction work may be required on up to five (5) nights and would include the following activities:

1. Erection and dismantling of the tower crane;
2. Miscellaneous utility work
3. Fire alarm testing; and
4. Concrete pour for the mat slab foundation

This required nighttime work would occur at different times throughout the 36-month construction period and not for 5 sequential nights. Therefore, given the duration of nighttime work it is not expected to result in sleep disturbance for a substantial period of time.

Construction Noise Control Measures

The following measures would reduce construction noise at nearby sensitive receptors.

Construction Noise Control Plan

The project sponsor shall develop site-specific noise attenuation measures under the supervision of a qualified acoustical consultant. At the end of the design phase of this project and prior to commencing construction, the project sponsor shall submit a noise attenuation plan to the San Francisco Planning Department and Department of Building Inspection to ensure maximum feasible noise attenuation will be achieved. The noise attenuation plan shall reduce construction noise to the degree feasible with a goal of reducing construction noise levels at adjacent noise sensitive receptors (residential, hotel, hospital, convalescent home, school, and church uses)so that noise levels do not exceed 90 dBA and 10 dBA above ambient daytime noise levels. The project sponsor shall include noise attenuation measures in specifications provided to the general contractor and any sub-contractors. Noise attenuation measures shall, at minimum, include the following:

- Require the general contractor to ensure that equipment and trucks used for project construction utilize the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures and acoustically-attenuating shields or shrouds), wherever feasible.

- Require the general contractor to perform all work in a manner that minimizes noise to the extent feasible; use equipment with effective mufflers; undertake the noisiest activities during times of least disturbance to surrounding residents and occupants, as feasible.

- Require the general contractor to use impact tools (e.g., jack hammers, pavement breakers, and rock drills) that are hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. Where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used, along with external noise jackets on the tools, which could reduce noise levels by as much as 10 dBA.

- Require the general contractor to erect temporary plywood noise barriers (at least 0.5-inch-thick) around stationary noise sources and/or the construction site, particularly where a noise source or the site adjoins noise-sensitive uses. The barriers shall be high enough to block the line of sight from the dominant construction noise source to the closest noise-sensitive receptors. Depending on factors such as barrier height, barrier extent, and distance between the barrier and the noise-producing equipment or activity, such barriers may reduce construction noise by 3–15 dBA at the locations of nearby noise-sensitive receptors.

- Require the general contractor to use noise control blankets on a building structure as the building is erected to reduce noise emission from the site.

- Require the general contractor to line or cover hoppers, storage bins, and chutes with sound-deadening material (e.g., apply wood or rubber liners to metal bin impact surfaces).

- Unless safety provisions require otherwise, require the general contractor to adjust audible backup alarms downward in sound level while still maintaining an adequate signal-to-noise ratio for alarm

effectiveness. Consider signal persons, strobe lights, or alternative safety equipment and/or processes as allowed to reduce reliance on high-amplitude sonic alarms/beeps.

- Require the general contractor to place stationary noise sources, such as generators and air compressors, on the east side of the project site, as far away from nearby noise-sensitive receptors as possible. To further reduce noise, the contractor shall locate stationary equipment in pit areas or excavated areas, if feasible.

- Require the general contractor to place non-noise-producing mobile equipment, such as trailers, in the direct sound pathways between suspected major noise-producing sources and noise-sensitive receptors.

- Under the supervision of a qualified acoustical consultant, the project sponsor shall monitor the effectiveness of noise attenuation measures by taking noise measurements before any construction or ground disturbing activity and regularly during each phase of construction.

- Prior to the issuance of a building permit, along with the submission of construction documents, the project sponsor shall submit to the planning department and building department a list of measures that shall be implemented and that shall respond to and track complaints pertaining to construction noise. These measures shall include:

  (1) posted signs on-site pertaining to permitted construction days and hours;

  (2) a procedure and phone numbers for notifying the building department and the San Francisco Police Department (during regular construction hours and off-hours). This telephone number shall be maintained until the proposed project has been considered commissioned and is ready for occupancy. If the telephone is not staffed 24 hours per day, the contractor shall include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended;

  (3) a sign posted on site describing noise complaint procedures and a complaint hotline number that shall be answered at all times during construction;

  (4) designation of an on-site construction complaint and enforcement manager for the project who shall document, investigate, evaluate, and attempt to resolve all project-related noise complaints; and

  (5) notification of neighboring residents and non-residential building managers within 300 feet of the project construction area at least 30 days in advance of extreme noise generating activities (defined as activities generating anticipated noise levels of 90 dBA or greater, about the estimated duration of the activity.

Construction Vibration

During construction of the proposed project, equipment may be used as close as 20 feet from the nearest sensitive receptors along Sixth Street. Also, older and historic buildings can be damaged by excessive vibration associated with construction activities.

Sleep Disturbance from Vibration

As discussed above, nighttime construction work would be limited to 8 total nights over the entire 36-month construction period. It is not anticipated that nighttime construction work would require vibration generating equipment. Therefore, construction activities are not expected to result in vibration during nighttime hours that would be perceptible and thereby result in sleep disturbance.

Building Damage Assessment

The properties nearest to the project site that are most susceptible to vibration are as follows:

- 35 Sixth Street, 39-41 Sixth Street, 43-45 Sixth Street, and 47 Sixth Street – Approximately 20' from the Project site. All of these buildings are historic resources according to the San Francisco Planning Department South of Market Historic Resource Survey Map[10] and the associated Primary Records[11]. These buildings are constructed of masonry or concrete clad in textured stucco and capped by a flat roof. Therefore, these buildings are assumed to be under the "Historic and Some Old Buildings" category as defined by Caltrans.

- 979-989 Market Street – Approximately 22' from the Project site. This is a non-historic building, but originally constructed in 1907. Based on observation and electronic visual references, this building is assumed to fall within the Caltrans building damage category of "Historic and Some Old" buildings.

- 973 Market Street – Approximately 22' from the Project Site. Non-historic building, but originally constructed in 1904. Based on observation and electronic visual references, this building is assumed to fall within the Caltrans building damage category of "Historic and Some Old Buildings".

- Clearway Energy Thermal Power Station – Main Building and Smokestack Approximately 40' from the Project Site. Non-Historic Building. Based on observation and electronic visual references, the smokestack is assumed to be constructed with concrete and masonry with no plaster and would likely fall within the Caltrans building damage category of "Historic and Some Old" buildings.

- 481, 479, 477 Jessie Street – Approximately 40' from Project Site. Non-historic buildings, but originally constructed in 1922. Based on observation and electronic visual references, these buildings are assumed to fall within the Caltrans building damage category of "Historic and Some Old" buildings.

- 65-83 Sixth Street – Approximately 52' from Project Site. Non-historic buildings, but originally constructed in 1913. Based on observation and electronic visual references, these buildings are assumed to fall within the Caltrans building damage category of "Historic and Some Old" buildings.

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[10] (https://sfplanning.org/resource/south-market-historic-resource-survey-map)
[11] https://sfgov.org/sfplanningarchive/ftp/files/GIS/SouthSoMa/Docs/3704%20051.pdf

- 972-976 Mission – Approximately 42' from Project Site. Non-historic building, but originally constructed in 1925. Based on observation and electronic visual references, this building is assumed to fall within the Caltrans building damage category of "Historic and Some Old" buildings.

- 968 Mission Street – Approximately 42' from Project Site. Non-historic building, but originally constructed in 1930. Based on observation and electronic visual references, this building is assumed to fall within the Caltrans building damage category of "Historic and Some Old" buildings.

- 471 Jessie Street – Approximately 42' from Project Site. Non-historic building, but originally constructed in 1912. Based on observation and electronic visual references, this building is assumed to fall within the Caltrans building damage category of "Historic and Some Old" buildings.

- 956-960 Mission Street – Approximately 51' from Project Site. Non-historic building, but originally constructed in 1910. Based on observation and electronic visual references, this building is assumed to fall within the Caltrans building damage category of "Historic and Some Old" buildings.

- 995 Market / 1 Sixth Street – Approximately 38' from Project Site. Non-historic building, but originally constructed in 1908. Based on observation and electronic visual references, this building is assumed to fall within the Caltrans building damage category of "Historic and Some Old" buildings.

Table 14 estimates the vibration levels at the nearest receptors to the project site generated by construction equipment that is expected to produce groundborne vibration. As stated previously in this memo, vibration levels are determined using the following formula, PPV = PPVref x $(25/\text{Distance})^{1.5}$, where PPVref is as listed in Table 3.

Table 14: Vibration Source Levels for Construction Equipment

Equipment	Estimated PPV at 20 Feet	Estimated PPV at 22 Feet	Estimated PPV at 40 Feet
Large bulldozer[1]	0.12	0.11	0.044
Caisson drilling[2]	0.12	0.11	0.044
Loaded trucks	0.11	0.092	0.038
Small bulldozer	0.042	0.036	0.015

Source: Federal Transit Administration 2018

Notes:

1. Used to approximate vibration from a large tractor, backhoe, and loader for this project
2. Used to approximate vibration from a drill rig for this project.

Table 15 shows the expected vibration levels at the neighboring buildings from construction activity related to the estimated Caltrans Construction Vibration Damage Criteria:

Table 15: Expected Construction Vibration Levels at Closest Properties Related to Caltrans Criteria

Vibration-Sensitive Buildings	Caltrans Building Damage Criteria	Distance between Vibration Sensitive Building and Project Site	Calculated Maximum PPV at Property	Exceeds Criteria?
35-37 Sixth Street	0.25	20 feet	0.12	No
39-41 Sixth Street	0.25	20 feet	0.12	No
43-45 Sixth Street	0.25	20 feet	0.12	No
47-51 Sixth Street	0.25	20 feet	0.12	No
53-55 Sixth Street	0.25	20 feet	0.12	No
65-83 Sixth Street	0.25	52 feet	0.03	No
Clearway Energy Thermal Power Station	0.25	40 feet	0.04	No
986 Mission Street / 481 Jessie Street	0.25	42 feet	0.04	No
972-976 Mission Street	0.25	42 feet	0.04	No
968 Mission Street	0.25	42 feet	0.04	No
471 Jessie Street	0.25	42 feet	0.04	No
956-960 Mission Street	0.25	51 feet	0.03	No
995 Market Street / 1 Sixth Street	0.25	38 feet	0.05	No
979-989 Market Street	0.25	22 feet	0.11	No
973 Market Street	0.25	22 feet	0.11	No
Clearway Energy Thermal Power Station	0.25	40 feet	0.04	No
481 Jessie Street	0.25	42 feet	0.04	No
479 Jessie Street	0.25	42 feet	0.04	No
477 Jessie Street	0.25	42 feet	0.04	No

As shown in Table 15, construction activities and equipment as proposed by the project sponsor would not generate vibration levels that exceed the building damage criteria.

Cumulative Noise

There are currently 17 cumulative projects in proximity to the proposed project. One of these projects are transportation network projects (Better Market Street Project) and the rest are development projects. Thirteen of these cumulative projects are within 0.25 mile (1,320 feet) of the 469 Stevenson project site such that their construction and operational noise would have the potential to combine with the project's construction and operational noise at the nearest sensitive receptor locations. These projects include the following:

- 1025 Howard Street (Howard and Sixth Streets)
- 1055 Market Street (Between Sixth and Seventh Streets)
- 1082 Howard Street (Between Sixth and Seventh Streets)
- 1088 Howard Street (Howard and Seventh Streets)
- 1125 Market Street (Between Seventh and Eighth Streets)
- 457-475 Minna Street (Between Fifth and Sixth Streets)
- 481-483 Tehama Street (Tehama and Sixth Streets)
- 527 Stevenson Street (Stevenson and Sixth Streets)
- 57 Taylor Street (Taylor and Market Streets)
- 921 Howard Street (Between Fifth and Sixth Streets)
- 984 Folsom Street (Folsom and Sixth Streets)
- 996 Mission Street (Between Fifth and Sixth Streets)
- Better Market Street (Market Street, between Octavia Boulevard to Steuart Street)

Construction Noise

Of these projects, the closest to the 469 Stevenson Street Project are the, the 996 Mission Street project, the Better Market Street project, and the 527 Stevenson Street project, being about, 145 feet, 246 feet, and 425 feet away from the project site, respectively. All other project sites are separated from the proposed project by an extended distance. All cumulative projects would have multiple existing buildings between them and the 469 Stevenson Street project site that would provide shielding of their construction to limit the noise which combines with the project construction noise, if they were to be constructed simultaneously. Also, construction at all the cumulative project sites would be subject to the same noise regulations as the proposed project, such as limiting construction hours and equipment noise levels. In addition, the noisiest phases of demolition, construction, excavation, and foundation installation, would be relatively brief and less likely to overlap than the less noisy phases of construction, such as interior work. However, given the large number of cumulative projects nearby and the potential for numerous projects to be under construction simultaneously as the proposed project, cumulative construction noise could be substantial by both increasing the intensity of noise levels in the area and the duration that sensitive receptors experience construction noise. The noise control measures identified above are recommended and would reduce the contribution of construction noise generated by the proposed project.

Construction Vibration

Vibration effects are highly localized, and vibration attenuates rapidly from the source. Therefore, vibration impacts attributable to construction activities generally would be limited to buildings and structures adjacent to the project site. Since the proposed project would not result in vibration-related damage to adjacent structures during construction activities, vibration effects are localized and attenuate rapidly with distance from the source, vibration-generating equipment from the proposed project would not likely combine with that of even

the closest cumulative projects (996 Mission Street, Better Market Street, and Sixth Street Improvement projects) to result in cumulative vibration effects that would damage nearby buildings.

Operational Noise

With respects to operational noise, the proposed project would include new fixed noise sources that would produce operational noise on the project site. Similar new fixed noise sources would produce noise for the cumulative development projects within a 0.25-mile radius of the project site, such as the 996 Mission Street and 527 Stevenson Street projects. This could result in a permanent increase in ambient noise above existing levels. However, noise from the proposed project's mechanical equipment and mechanical equipment from the cumulative projects would be localized, would attenuate with added distance, and would be required to comply with the noise regulations of the San Francisco Police Code. Therefore, the proposed project and cumulative projects would be unlikely to combine to increase ambient noise levels in the area.

Cumulative development projects would also result in operational noise from project-generated vehicular traffic. To estimate future cumulative noise levels due to traffic, peak hour cumulative plus project traffic estimates were used to determine the percent increase of traffic on the roads adjacent to the project site. Due to expected changes in traffic patterns and vehicle restrictions from the Better Market Street Project along Market Street and the Sixth Street Pedestrian Safety Project, the 469 Stevenson Street project plus cumulative projects would actually reduce future peak hour traffic volumes and associated traffic noise along Market Street and Sixth Street. Table 16 shows the existing and cumulative future peak hour traffic volume on the local roadway network. The last columns in the table show the overall percent change and the estimated difference in peak hour noise level.

Table 16: Cumulative Peak HourTraffic Volumes and Estimated Noise Increase

Roadway	Existing Peak Hour Traffic Count	Cumulative Peak Hour Traffic Volumes with Project	Percent Change	Estimated dB(A) Change
Market Street	580	400	-31%	-1.2 dB(A)
Sixth Street	1,844	1,561	-15%	-0.6 dB(A)
Stevenson Street	108	244	126%	Less than 1 dB(A)
Fifth Street	1,402	2,448	75%	3 dB(A)

Peak traffic is expected to increase approximately 125 percent along Stevenson Street between Fifth Street and Sixth Street with the cumulative projects plus the proposed project. Even though the traffic on Stevenson Street is expected to increase by 125 percent, the overall peak hour traffic number is still very low. Cumulative plus project peak hour traffic volumes on Stevenson Street are only expected to be 244 cars. Traffic volumes this low is not expected to generate a great deal of noise and ambient noise levels at the site would still be dominated by the existing noise sources. The estimated change in ambient noise levels along Stevenson Street is estimated to be below 1 dB(A).

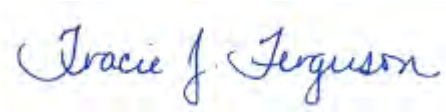
Cumulative plus project peak traffic volumes along Fifth Street between Stevenson Street and Market Street are expected to increase by 75 percent. Traffic increases of 75 percent only increase noise levels approximately 3 dB(A). The project would contribute 28 vehicle trips to Fifth Street under cumulative conditions, which represents a minor proportion of the overall cumulative traffic volume on that segment of Fifth Street.

CONCLUSION

Noise generation associated with the proposed project is typically attributed to the project construction activities. These include site grading, construction of the building and apparatuses, and the increase traffic related to facility use. Operational noise generation can be attributed to the slight increase in traffic volumes from residents as well as from typical commercial and residential fixed mechanical equipment.

Based on the FHWA RCNM, the proposed project can generate high levels of construction noise which are temporary and would not result in long-term noise increases from construction. While the noise levels presented are a “worst-case” scenario and may at times be audible over traffic-related noise levels surrounding the area, these high levels are not expected to be continuous. Moreover, the highest noise levels would occur only during the hours allowed by the San Francisco Police Code and should be reduced by the application of measures to control construction noise at the project site. Noise control techniques should be implemented to ensure that noise generated from temporary construction activities would not be substantial at nearby sensitive receptors.

Stantec Consulting Services Inc.



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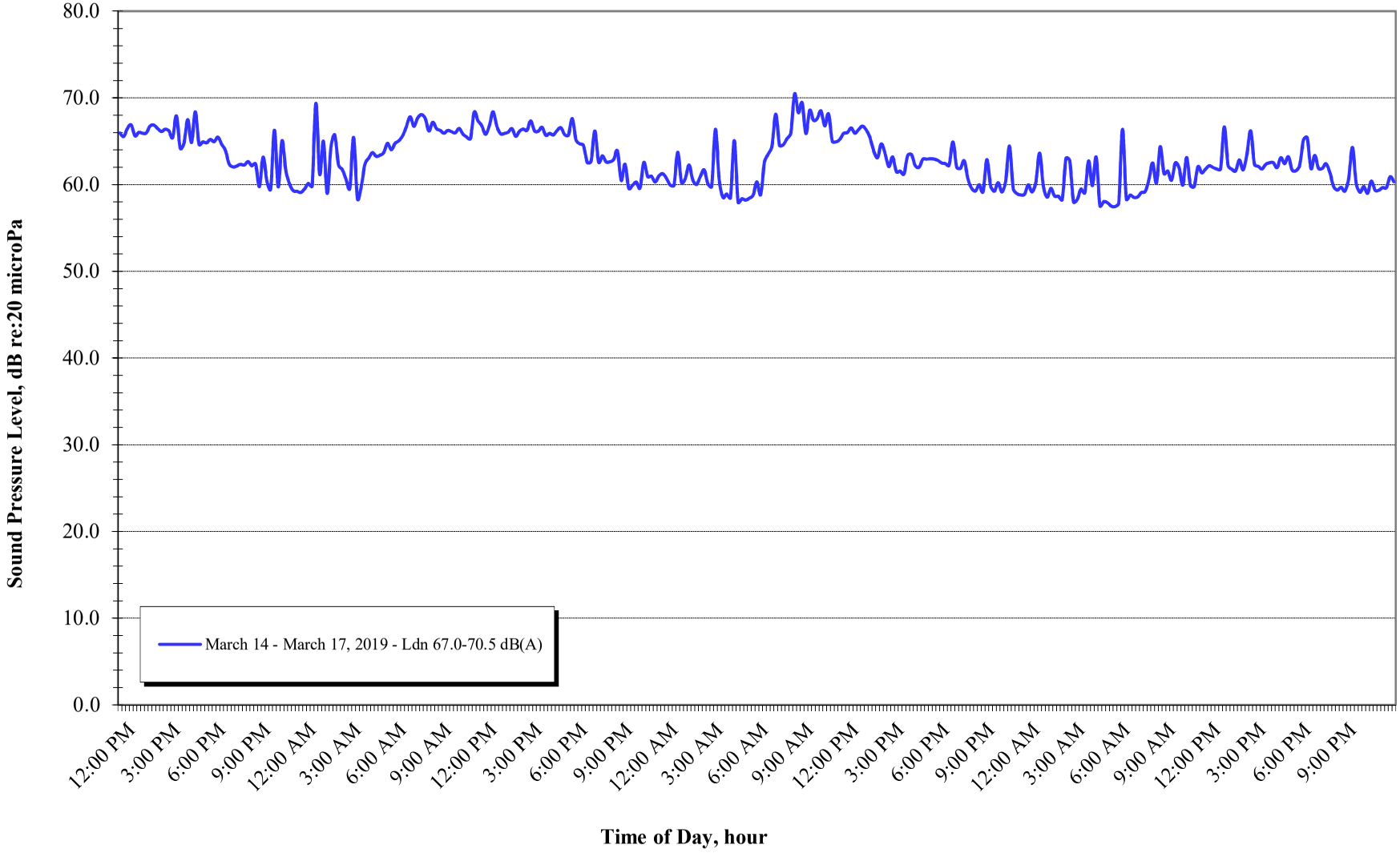
APPENDIX 1: Measured Hourly Ambient Noise Levels at Project Site

469 Stevenson Street - San Francisco, CA

15-Minute Noise Levels (Leq) at Long Term Measurement Location

Ambient Noise Levels - Thursday, March 14 - Sunday, March 17, 2019



APPENDIX 2: Noise and Vibration-Sensitive Receivers Within 300-ft of Project Site

1. The Wilson Apartments at 973 Market Street
2. Hampton Inn San Francisco Downtown
3. Desmond Hotel
4. Seneca Hotel
5. Haveli Hotel
6. The Whitaker Hotel
7. The Hillside Hotel
8. Oak Tree Hotel
9. Winsor Hotel
10. Residential Above 87-89 Sixth Street
11.460 Jessie Street
12. 65-83 Sixth Street
13. 986 Mission Street/481 Jessie Street
14. 980-984 Mission Street/479 Jessie Street
15. 972- 976 Mission Street
16. 968 Mission Street
17. 471 Jessie Street
18. 956-960 Mission Street
19. 955 Market Street/ 1 Sixth Street
20. 979-989 Market Street

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

469 Stevenson Street Project

Case No. 2017-014833ENV.

Noise- and Vibration-Sensitive Receptors within 300 feet of Project Site

\\Us1304-f02\workgroup\1857\active\185704245\03. data\gis\mxd\fig. 20 noise receptors.mxd Revised: 2019-09-30 By: kaeijohnson

APPENDIX 3: Peak Hour Traffic Count Noise Calculation Results

469 Stevenson
Traffic Counts
27-Sep-19

Market between 5th and 6th

PM Peak without Project	PM Peak with Project	Estimated dB Increase
580	580	
580	580	
	0%	0

6th between Stevenson and Market

PM Peak without Project	PM Peak with Project	Estimated dB Increase
1844	1859	
1844	1859	
	1%	0.0

Stevenson Street between 6th and 5th

PM Peak without Project	PM Peak with Project	Estimated dB Increase
108	152	
108	152	
	41%	1.6

5th Street between Stevenson and Market

PM Peak without Project	PM Peak with Project	Estimated dB Increase
1402	1430	
1402	1430	
	2%	0.08

1180 Main Street
Cumulative Traffic Counts
27-Sep-19

Market between 5th and 6th

PM Peak without Project	Cumulative PM Peak with Project	Estimated dB Increase
580	400	
580	400	
	-31%	-1.24

6th between Stevenson and Market

PM Peak without Project	Cumulative PM Peak with Project	Estimated dB Increase
1844	1561	
1844	1561	
	-15%	-0.6

Stevenson Street between 6th and 5th

PM Peak without Project	Cumulative PM Peak with Project	Estimated dB Increase
108	244	
108	244	
	126%	5.04

5th Street between Stevenson and Market

PM Peak without Project	Cumulative PM Peak with Project	Estimated dB Increase
1402	2448	
1402	2448	
	75%	3

APPENDIX 4: Property Plane and Interior Residential Calculation Results

Project Name:	469 Stevenson	**Tag:**	Rooftop Mechanical	**Created by:**	TJF	**Date:**	7/26/2019
Proj. Num:	185704245	**Area Served:**	--			**Revised:**	
Phase:	--	**Run:**	Estimated Exterior Noise to 6th Street Property Plane			**Revised:**	
Mech Set Date:	--	**Notes:**	Property Plane is 57'-10" From Equipment Area			**Revised:**	
			Noise levels used in analysis are 75 dB(A) Lp at 50 ft from the equipment				

Tag	Side	Type	Size	CFM	SP	MANF	Side	dBA	63	125	250	500	1000	2000	4000	8000
Estimated Rooftop Eq.		--	--	--	--	--	Outside	75	79	72	71	72	70	68	63	54

Barrier Attenuation, POINT SOURCE - HARRIS (Acoustical Measurements and Noise Control, p. 3.19)

Does not include distance attenuation

$A_{bar} = 10*\log(3+10NK)-A_{ground}$

Elevation of Source	272.4	**Path-Length (DIRECT), r_d**	57.8
Source-to-Barrier	27.4	**Path-Length (BARRIER), r_b**	57.8
Top of Barrier	273.3	**Path-Length Difference, r_b - r_d = d_{diff}**	0.0 (NO OBSTRUCTION)
Barrier-to-Receiver	30.4		
Elevation of Receiver	274.5		

Hz	63	125	250	500	1000	2000	4000	8000
Wave, λ	17.89	9.02	4.51	2.25	1.13	0.56	0.28	0.14
Fresnel No.				**$(2/\lambda)(d_{diff}) = N$**				
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ground Atten.				**A_{ground}**				
	0	0	0	0	0	0	0	0
							>>	0 0 0 0 0 0 0 0

Distance, POINT SOURCE

	Q2	R1(ft)	R2(ft)	Lp1-Lp2 = -10*LOG(Q)+20*LOG(R2/R1)
Lp1-Lp2 (in far field & free field)	2	50'	58'	
				>> -2 -2 -2 -2 -2 -2 -2 -2

1. Predicted Lp:			**dBA**	**76.7**	81	74	73	74	72	70	65	56
2. Design Criteria:	**dB(A)**	**60.0**										

Project Name:	469 Stevenson	**Tag:**	Rooftop Mechanical	**Created by:**	TJF	**Date:**	7/26/2019
Proj. Num:	185704245	**Area Served:**	--			**Revised:**	
Phase:	--	**Run:**	Estimated Exterior Noise to 5th Street Property Plane			**Revised:**	
Mech Set Date:	--	**Notes:**	Property Plane is 66'-1" From Equipment Area			**Revised:**	
			Noise levels used in analysis are 75 dB(A) Lp at 50 ft from the equipment				

Tag	Side	Type	Size	CFM	SP	MANF	Side	dBA	63	125	250	500	1000	2000	4000	8000
Estimated Rooftop Eq.		--	--	--	--	--	Outside	75	79	72	71	72	70	68	63	54

Barrier Attenuation, POINT SOURCE - HARRIS (Acoustical Measurements and Noise Control, p. 3.19)

Does not include distance attenuation

$A_{bar} = 10*\log(3+10NK)-A_{ground}$

Elevation of Source	272.4	**Path-Length (DIRECT), r_d**	66.1
Source-to-Barrier	28.0	**Path-Length (BARRIER), r_b**	66.1
Top of Barrier	273.3	**Path-Length Difference, r_b - r_d = d_{diff}**	0.0 (NO OBSTRUCTION)
Barrier-to-Receiver	38.1		
Elevation of Receiver	274.5		

Hz	63	125	250	500	1000	2000	4000	8000								
Wave, λ	17.89	9.02	4.51	2.25	1.13	0.56	0.28	0.14								
Fresnel No.				**$(2/\lambda)(d_{diff})$ = N**												
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
Ground Atten.				**A_{ground}**												
	0	0	0	0	0	0	0	0								
								>>	0	0	0	0	0	0	0	0

Distance, POINT SOURCE

	Q2	R1(ft)	R2(ft)	Lp1-Lp2 = -10*LOG(Q)+20*LOG(R2/R1)									
Lp1-Lp2 (in far field & free field)	2	50'	66'										
				>>	-1	-1	-1	-1	-1	-1	-1	-1

1. Predicted Lp:			**dBA**	**75.5**	80	73	72	73	71	69	64	55
2. Design Criteria:	**dB(A)**	**62.5**										

Project Name:	469 Stevenson	**Tag:**	Rooftop Mechanical	**Created by:**	TJF	**Date:**	7/26/2019
Proj. Num:	185704245	**Area Served:**	--			**Revised:**	
Phase:	--	**Run:**	Estimated Exterior Noise to Stevenson Street Property Plane			**Revised:**	
Mech Set Date:	--	**Notes:**	Property Plane is 77'-0" From Equipment Area			**Revised:**	
			Noise levels used in analysis are 75 dB(A) Lp at 50 ft from the equipment				

Tag	Side	Type	Size	CFM	SP	MANF	Side	dBA	63	125	250	500	1000	2000	4000	8000
Estimated Rooftop Eq.		--	--	--	--	--	Outside	75	79	72	71	72	70	68	63	54

Barrier Attenuation, POINT SOURCE - HARRIS (Acoustical Measurements and Noise Control, p. 3.19)

Does not include distance attenuation

$A_{bar} = 10*\log(3+10NK)-A_{ground}$

Elevation of Source	272.4	**Path-Length (DIRECT), r_d**	77.0
Source-to-Barrier	27.0	**Path-Length (BARRIER), r_b**	77.0
Top of Barrier	273.3	**Path-Length Difference, r_b - r_d = d_{diff}**	0.0 (NO OBSTRUCTION)
Barrier-to-Receiver	50.0		
Elevation of Receiver	275.0		

Hz	63	125	250	500	1000	2000	4000	8000
Wave, λ	17.89	9.02	4.51	2.25	1.13	0.56	0.28	0.14
Fresnel No.				**$(2/\lambda)(d_{diff}) = N$**				
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ground Atten.				**A_{ground}**				
	0	0	0	0	0	0	0	0

								>>	0	0	0	0	0	0	0	0

Distance, POINT SOURCE

	Q2	R1(ft)	R2(ft)	Lp1-Lp2 = -10*LOG(Q)+20*LOG(R2/R1)
Lp1-Lp2 (in far field & free field)	2	50'	77'	

>>	1	1	1	1	1	1	1	1

1. Predicted Lp:			**dBA**	**74.2**	78	71	70	71	69	67	62	53
2. Design Criteria:	**dB(A)**	**62.5**										

Project Name:	469 Stevenson	**Tag:**	Rooftop Mechanical	**Created by:**	TJF	**Date:**	7/26/2019
Proj. Num:	185704245	**Area Served:**	--			**Revised:**	
Phase:	--	**Run:**	Estimated Exterior Noise to Jessie Street Property Plane			**Revised:**	
Mech Set Date:	--	**Notes:**	Property Plane is 37'-0" From Equipment Area			**Revised:**	
			Noise levels used in analysis are 75 dB(A) Lp at 50 ft from the equipment				

Tag	Side	Type	Size	CFM	SP	MANF	Side	dBA	63	125	250	500	1000	2000	4000	8000
Estimated Rooftop Eq.		--	--	--	--	--	Outside	75	79	72	71	72	70	68	63	54

Barrier Attenuation, POINT SOURCE - HARRIS (Acoustical Measurements and Noise Control, p. 3.19)

Does not include distance attenuation

$A_{bar} = 10*\log(3+10NK)-A_{ground}$

Elevation of Source	272.4	**Path-Length (DIRECT), r_d**	37.0
Source-to-Barrier	27.0	**Path-Length (BARRIER), r_b**	37.0
Top of Barrier	273.3	**Path-Length Difference, r_b - r_d = d_{diff}**	0.0 (NO OBSTRUCTION)
Barrier-to-Receiver	10.0		
Elevation of Receiver	274.0		

Hz	63	125	250	500	1000	2000	4000	8000								
Wave, λ	17.89	9.02	4.51	2.25	1.13	0.56	0.28	0.14								
Fresnel No.				**$(2/\lambda)(d_{diff})$ = N**												
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
Ground Atten.				**A_{ground}**												
	0	0	0	0	0	0	0	0								
								>>	0	0	0	0	0	0	0	0

Distance, POINT SOURCE

	Q2	R1(ft)	R2(ft)	Lp1-Lp2 = -10*LOG(Q)+20*LOG(R2/R1)									
Lp1-Lp2 (in far field & free field)	2	50'	37'										
				>>	-6	-6	-6	-6	-6	-6	-6	-6	

1. Predicted Lp:			**dBA**	**80.5**	85	78	77	78	76	74	69	60	
2. Design Criteria:	**dB(A)**	**60.0**											

Project Name:	469 Stevenson	**Tag:**	Rooftop Mechanical	**Created by:**	TJF	**Date:**	7/26/2019
Proj. Num:	185704245	**Area Served:**	--			**Revised:**	
Phase:	--	**Run:**	Estimated Exterior Noise to 47 6th Street Residential			**Revised:**	
Mech Set Date:	--	**Notes:**	Property Plane is 57'-10" From Equipment Area			**Revised:**	

Noise levels used in analysis are 75 dB(A) Lp at 50 ft from the equipment
Equipment is at 272.4' elevation, Receiver is at 85' elevation.

Tag	Side	Type	Size	CFM	SP	MANF	Side	dBA	63	125	250	500	1000	2000	4000	8000
Estimated Rooftop Eq.		--	--	--	--	--	Outside	75	79	72	71	72	70	68	63	54

Barrier Attenuation, POINT SOURCE - HARRIS (Acoustical Measurements and Noise Control, p. 3.19)
Does not include distance attenuation

$A_{bar} = 10*\log(3+10NK)-A_{ground}$

Elevation of Source	272.4	**Path-Length (DIRECT), r_d**	196.1
Source-to-Barrier	27.4	**Path-Length (BARRIER), r_b**	218.1
Top of Barrier	273.3	**Path-Length Difference, r_b - r_d = d_{diff}**	22.0
Barrier-to-Receiver	30.4		
Elevation of Receiver	85.0		

Hz	63	125	250	500	1000	2000	4000	8000
Wave, λ	17.89	9.02	4.51	2.25	1.13	0.56	0.28	0.14
Fresnel No.				**$(2/\lambda)(d_{diff})$ = N**				
	2.46	4.88	9.76	19.51	39.03	78.05	156.10	312.20
Ground Atten.				**A_{ground}**				
	0	0	0	0	0	0	0	0
								>>

	14	17	20	23	26	29	32	35

Distance, POINT SOURCE

	Q2	R1(ft)	R2(ft)	Lp1-Lp2 = -10*LOG(Q)+20*LOG(R2/R1)
Lp1-Lp2 (in far field & free field)	2	50'	196'	
				>>

	9	9	9	9	9	9	9	9

1. Predicted Lp:			**dBA**	**41.5**	56	46	42	40	35	30	22	10
2. Design Criteria:	**dB(A)**	**45.0**										

Project Name:	469 Stevenson	**Tag:**	Rooftop Mechanical	**Created by:**	TJF	**Date:**	7/26/2019
Proj. Num:	185704245	**Area Served:**	--			**Revised:**	
Phase:	--	**Run:**	Estimated Exterior Noise to 973 Market Residential			**Revised:**	
Mech Set Date:	--	**Notes:**	Property Plane is 77'-0" From Equipment Area			**Revised:**	

Noise levels used in analysis are 75 dB(A) Lp at 50 ft from the equipment
Equipment is at 272.4' elevation, Receiver is at 101' elevation.

Tag	Side	Type	Size	CFM	SP	MANF	Side	dBA	63	125	250	500	1000	2000	4000	8000
Estimated Rooftop Eq.		--	--	--	--	--	Outside	75	79	72	71	72	70	68	63	54

Barrier Attenuation, POINT SOURCE - HARRIS (Acoustical Measurements and Noise Control, p. 3.19)
Does not include distance attenuation

$A_{bar} = 10*\log(3+10NK)-A_{ground}$

Elevation of Source	272.4	**Path-Length (DIRECT), r_d**	192.2
Source-to-Barrier	27.0	**Path-Length (BARRIER), r_b**	209.4
Top of Barrier	273.3	**Path-Length Difference, r_b - r_d = d_{diff}**	17.2
Barrier-to-Receiver	60.0		
Elevation of Receiver	101.0		

Hz	63	125	250	500	1000	2000	4000	8000
Wave, λ	17.89	9.02	4.51	2.25	1.13	0.56	0.28	0.14
Fresnel No. $(2/\lambda)(d_{diff}) = N$	1.92	3.82	7.63	15.26	30.52	61.04	122.08	244.16
Ground Atten. A_{ground}	0	0	0	0	0	0	0	0
>>	13	16	19	22	25	28	31	34

Distance, POINT SOURCE

	Q2	R1(ft)	R2(ft)	Lp1-Lp2 = -10*LOG(Q)+20*LOG(R2/R1)
Lp1-Lp2 (in far field & free field)	2	50'	192'	

	63	125	250	500	1000	2000	4000	8000
>>	9	9	9	9	9	9	9	9

1. Predicted Lp:			**dBA**	**42.7**	57	47	43	41	36	31	23	11
2. Design Criteria:	**dB(A)**	**45**										

APPENDIX 5: Roadway Construction Noise Model Output Results

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/19/2019
Case Description: 469 Stevenson Construction Noise - Site Preparation / Demolition

		---- Receptor #1 ----		
		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
43 6th Street	Residential	66.2	61.7	62.2

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Dump Truck	No	40		76.5	20	0
Dump Truck	No	40		76.5	20	0
Excavator	No	40		80.7	20	0

			Results											
	Calculated (dBA)				Noise Limits (dBA)						Noise Limit Exceedance (dBA)			
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dump Truck	84.4	80.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dump Truck	84.4	80.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	88.7	84.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	91.1	87.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/19/2019
Case Description: 469 Stevenson Construction Noise - Excavation and Shoring

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
43 6th Street	Residential	66.2	61.7	62.2

Equipment

Description		Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Drill Rig Truck		No	20		79.1	20	0
Dump Truck		No	40		76.5	20	0
Excavator		No	40		80.7	20	0
Front End Loader	(Steer Skid Loader)	No	40		79.1	20	0
Backhoe		No	40		77.6	20	0
Man Lift	(Aerial Lift)	No	20		74.7	20	0
Dump Truck		No	40		76.5	20	0
Dump Truck		No	40		76.5	20	0

Results

		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
Equipment		Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Drill Rig Truck		87.1	80.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dump Truck		84.4	80.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator		88.7	84.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	(Steer Skid Loader)	87.1	83.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe		85.5	81.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	(Aerial Lift)	82.7	75.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dump Truck		84.4	80.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dump Truck		84.4	80.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	95	90.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/19/2019
Case Description: 469 Stevenson Construction Noise - Foundation and Below Grade Construction

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
43 6th Street	Residential	66.2	61.7	62.2

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Pump Truck	No	20		81.4	20	0
Man Lift	No	20		74.7	20	0
Dump Truck	No	40		76.5	20	0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Concrete Pump Truck	89.4	82.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	82.7	75.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dump Truck	84.4	80.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	91.2	85	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/19/2019
Case Description: 469 Stevenson Construction Noise - Building Constructior

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
43 6th Street	Residential	66.2	61.7	62.2

Description		Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Man Lift	(Aerial Lift)	No	20		74.7	20	0
Crane		No	16		80.6	20	0
Tractor	(Forklift)	No	40	84		20	0
Tractor	(Rough Terrain Forklift)	No	40	84		20	0
Welder / Torch		No	40		74	20	0
Concrete Saw		No	20		89.6	20	0
Concrete Saw		No	20		89.6	20	0
Dump Truck		No	40		76.5	20	0
Man Lift		No	20		74.7	20	0
Man Lift	(Scissor Lift)	No	20		74.7	20	0
Man Lift	(Scissor Lift)	No	20		74.7	20	0
Man Lift	(Scissor Lift)	No	20		74.7	20	0
Welder / Torch		No	40		74	20	0

Results

		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
Equipment		Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Man Lift	(Aerial Lift)	82.7	75.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane		88.5	80.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	(Forklift)	92	88	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	(Rough Terrain Forklift)	92	88	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch		82	78	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Saw		97.5	90.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Saw		97.5	90.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dump Truck		84.4	80.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift		82.7	75.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	(Scissor Lift)	82.7	75.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	(Scissor Lift)	82.7	75.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	(Scissor Lift)	82.7	75.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch		82	78	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	102.2	96.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/19/2019
Case Description: 469 Stevenson Construction Noise - Exterior Finishing

		---- Receptor #1 ----		
		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
43 6th Street	Residential	66.2	61.7	62.2

				Equipment			
				Spec	Actual	Receptor	Estimated
		Impact		Lmax	Lmax	Distance	Shielding
Description		Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Compressor (air)		No	40		77.7	20	0
Tractor	(Forklift)	No	40	84		20	0
Man Lift		No	20		74.7	20	0
Welder / Torch		No	40		74	20	0

				Results											
		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
Equipment		Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Compressor (air)		85.6	81.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	(Forklift)	92	88	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift		82.7	75.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch		82	78	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	93.6	89.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/19/2019
Case Description: 469 Stevenson Construction Noise - Sitework / Paving

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
43 6th Street	Residential	66.2	61.7	62.2

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Mixer Truck	No	40		78.8	20	0
Paver	No	50		77.2	20	0
Paver (Paving Equipment)	No	50		77.2	20	0
Compressor (air) (Pressure Washer)	No	40		77.7	20	0

Results

		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
Equipment		Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Concrete Mixer Truck		86.8	82.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paver		85.2	82.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paver	(Paving Equipment)	85.2	82.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)	(Pressure Washer)	85.6	81.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	91.8	88.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

APPENDIX B: TRANSPORTATION ANALYSIS

Technical Appendix E.5

469 Stevenson Street Project Initial Study

August 2019

SF18-1002

Case No. 2017.014833ENV

FEHR PEERS

Appendix E.5-1

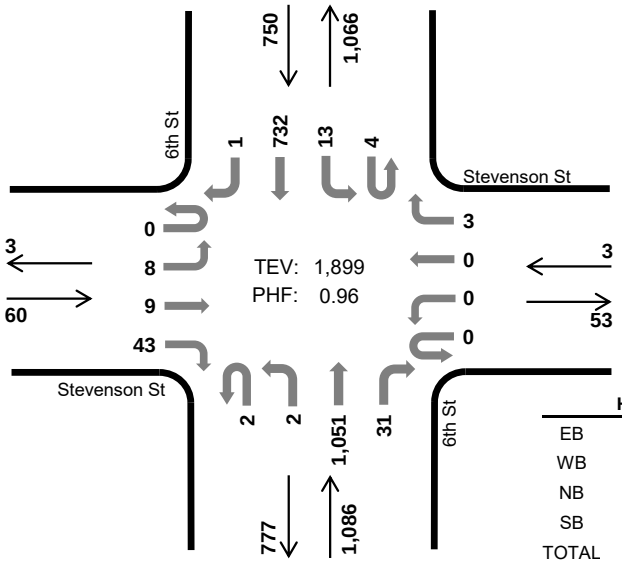
Peak Hour Turning Movement Counts

6th St
Stevenson St

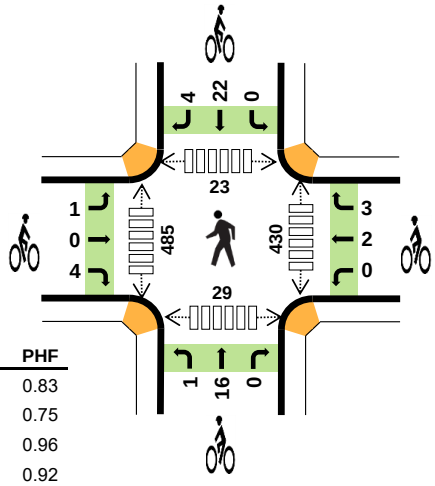
Date: 10-09-2018
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:45 PM to 5:45 PM

N

Peak Hour



	HV %:	PHF
EB	6.7%	0.83
WB	0.0%	0.75
NB	1.2%	0.96
SB	1.9%	0.92
TOTAL	1.6%	0.96



Two-Hour Count Summaries

Interval Start		Stevenson St Eastbound UT	LT	TH	RT	Stevenson St Westbound UT	LT	TH	RT	6th St Northbound UT	LT	TH	RT	6th St Southbound UT	LT	TH	RT	15-min Total	Rolling One Hour
4:00 PM		0	1	0	4	0	0	0	1	0	0	206	7	0	5	197	1	422	0
4:15 PM		0	1	1	7	0	0	0	1	0	1	213	11	3	5	182	2	427	0
4:30 PM		0	0	3	10	0	0	0	0	1	0	224	17	0	3	199	0	457	0
4:45 PM		**0**	**1**	**2**	**12**	**0**	**0**	**0**	**1**	**1**	**0**	**240**	**7**	**2**	**6**	**181**	**0**	**453**	1,759
5:00 PM		**0**	**3**	**3**	**12**	**0**	**0**	**0**	**0**	**0**	**2**	**267**	**7**	**0**	**3**	**199**	**1**	**497**	1,834
5:15 PM		**0**	**2**	**3**	**11**	**0**	**0**	**0**	**1**	**1**	**0**	**273**	**8**	**1**	**1**	**171**	**0**	**472**	1,879
5:30 PM		**0**	**2**	**1**	**8**	**0**	**0**	**0**	**1**	**0**	**0**	**271**	**9**	**1**	**3**	**181**	**0**	**477**	**1,899**
5:45 PM		0	3	0	9	0	0	0	0	0	0	248	9	0	8	176	0	453	1,899
Count Total		0	13	13	73	0	0	0	5	3	3	1,942	75	7	34	1,486	4	3,658	0
Peak Hour	**All**	**0**	**8**	**9**	**43**	**0**	**0**	**0**	**3**	**2**	**2**	**1,051**	**31**	**4**	**13**	**732**	**1**	**1,899**	**0**
	HV	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**1**	**0**	**12**	**0**	**0**	**0**	**14**	**0**	**31**	**0**
	HV%	**-**	**0%**	**22%**	**5%**	**-**	**-**	**-**	**0%**	**50%**	**0%**	**1%**	**0%**	**0%**	**0%**	**2%**	**0%**	**2%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals EB	WB	NB	SB	Total	Bicycles EB	WB	NB	SB	Total	Pedestrians (Crossing Leg) East	West	North	South	Total
4:00 PM	1	0	4	7	*12*	2	1	2	2	*7*	104	130	7	6	*247*
4:15 PM	2	0	1	6	*9*	2	5	5	3	*15*	114	129	4	11	*258*
4:30 PM	0	0	2	7	*9*	3	2	3	8	*16*	107	113	4	6	*230*
4:45 PM	**1**	**0**	**6**	**4**	***11***	**0**	**1**	**2**	**7**	***10***	**101**	**114**	**5**	**8**	*228*
5:00 PM	**3**	**0**	**4**	**3**	***10***	**0**	**2**	**3**	**6**	***11***	**114**	**136**	**6**	**7**	*263*
5:15 PM	**0**	**0**	**2**	**6**	***8***	**5**	**2**	**6**	**7**	***20***	**130**	**125**	**5**	**5**	*265*
5:30 PM	**0**	**0**	**1**	**1**	***2***	**0**	**0**	**6**	**6**	***12***	**85**	**110**	**7**	**9**	***211***
5:45 PM	0	0	3	4	*7*	1	1	7	8	*17*	100	131	5	4	*240*
Count Total	7	0	23	38	*68*	13	14	34	47	*108*	855	988	43	56	*1,942*
Peak Hour	**4**	**0**	**13**	**14**	***31***	**5**	**5**	**17**	**26**	***53***	**430**	**485**	**23**	**29**	***967***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Stevenson St				Stevenson St				6th St				6th St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	1	0	0	0	0	0	0	4	0	0	0	7	0	12	0
4:15 PM	0	0	0	2	0	0	0	0	0	0	0	1	0	0	5	1	9	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	7	0	9	0
4:45 PM	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**5**	**0**	**0**	**0**	**4**	**0**	**11**	41
5:00 PM	**0**	**0**	**1**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**3**	**0**	**10**	39
5:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**6**	**0**	**8**	38
5:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**2**	**31**
5:45 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	4	0	7	27
Count Total	0	0	2	5	0	0	0	0	1	0	21	1	0	0	37	1	68	0
Peak Hour	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**0**	**1**	**0**	**12**	**0**	**0**	**0**	**14**	**0**	**31**	**0**

Two-Hour Count Summaries - Bikes

Interval Start	Stevenson St			Stevenson St			6th St			6th St			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	1	1	0	1	0	0	0	2	0	1	1	0	7	0
4:15 PM	1	0	1	1	3	1	2	3	0	0	3	0	15	0
4:30 PM	0	1	2	1	0	1	0	3	0	0	8	0	16	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**2**	**0**	**0**	**3**	**4**	**10**	48
5:00 PM	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**3**	**0**	**0**	**6**	**0**	**11**	52
5:15 PM	**1**	**0**	**4**	**0**	**1**	**1**	**0**	**6**	**0**	**0**	**7**	**0**	**20**	57
5:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**5**	**0**	**0**	**6**	**0**	**12**	**53**
5:45 PM	0	0	1	1	0	0	0	5	2	1	7	0	17	60
Count Total	3	2	8	4	5	5	3	29	2	2	41	4	108	0
Peak Hour	**1**	**0**	**4**	**0**	**2**	**3**	**1**	**16**	**0**	**0**	**22**	**4**	**53**	**0**

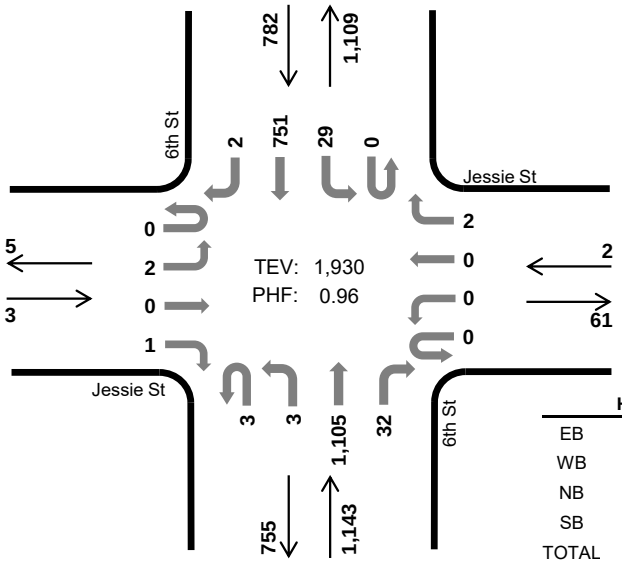
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

6th St
Jessie St

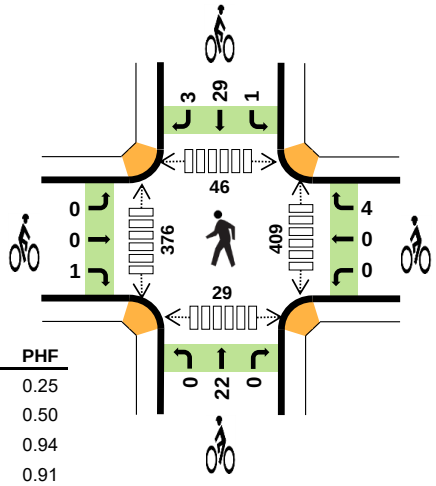
Date: 10-09-2018
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 5:00 PM to 6:00 PM

N

Peak Hour



	HV %:	PHF
EB	0.0%	0.25
WB	0.0%	0.50
NB	1.0%	0.94
SB	2.0%	0.91
TOTAL	1.4%	0.96



Two-Hour Count Summaries

Interval Start		Jessie St Eastbound UT	LT	TH	RT	Jessie St Westbound UT	LT	TH	RT	6th St Northbound UT	LT	TH	RT	6th St Southbound UT	LT	TH	RT	15-min Total	Rolling One Hour
4:00 PM		0	0	0	1	0	0	0	0	1	2	218	9	0	4	198	0	433	0
4:15 PM		0	1	0	0	0	0	0	0	0	1	226	13	0	4	186	0	431	0
4:30 PM		0	0	0	1	0	0	0	0	1	0	238	12	1	8	204	0	465	0
4:45 PM		0	0	0	1	0	0	0	0	0	1	245	10	0	7	178	2	444	1,773
5:00 PM		**0**	**2**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	**273**	**9**	**0**	**7**	**208**	**1**	**503**	1,843
5:15 PM		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**295**	**7**	**0**	**6**	**184**	**0**	**494**	1,906
5:30 PM		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**1**	**270**	**8**	**0**	**7**	**185**	**0**	**473**	1,914
5:45 PM		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**267**	**8**	**0**	**9**	**174**	**1**	**460**	**1,930**
Count Total		0	3	0	4	0	0	0	2	5	7	2,032	76	1	52	1,517	4	3,703	0
Peak Hour	**All**	**0**	**2**	**0**	**1**	**0**	**0**	**0**	**2**	**3**	**3**	**1,105**	**32**	**0**	**29**	**751**	**2**	**1,930**	**0**
	HV	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**11**	**0**	**0**	**1**	**15**	**0**	**27**	**0**
	HV%	**-**	**0%**	**-**	**0%**	**-**	**-**	**-**	**0%**	**0%**	**0%**	**1%**	**0%**	**-**	**3%**	**2%**	**0%**	**1%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals EB	WB	NB	SB	Total	Bicycles EB	WB	NB	SB	Total	Pedestrians (Crossing Leg) East	West	North	South	Total
4:00 PM	1	0	5	7	*13*	0	0	4	3	*7*	115	101	13	8	*237*
4:15 PM	0	0	1	7	*8*	0	0	4	7	*11*	109	108	6	12	*235*
4:30 PM	0	0	4	7	*11*	0	2	4	8	*14*	87	111	7	14	*219*
4:45 PM	0	0	6	4	*10*	2	0	1	4	*7*	100	105	10	10	*225*
5:00 PM	**0**	**0**	**4**	**6**	***10***	**0**	**0**	**3**	**8**	***11***	**105**	**106**	**10**	**11**	*232*
5:15 PM	**0**	**0**	**2**	**5**	***7***	**0**	**0**	**8**	**11**	***19***	**120**	**86**	**12**	**10**	*228*
5:30 PM	**0**	**0**	**1**	**1**	***2***	**1**	**1**	**6**	**6**	***14***	**95**	**89**	**13**	**3**	*200*
5:45 PM	**0**	**0**	**4**	**4**	***8***	**0**	**3**	**5**	**8**	***16***	**89**	**95**	**11**	**5**	***200***
Count Total	1	0	27	41	*69*	3	6	35	55	*99*	820	801	82	73	*1,776*
Peak Hour	**0**	**0**	**11**	**16**	***27***	**1**	**4**	**22**	**33**	***60***	**409**	**376**	**46**	**29**	***860***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Jessie St				Jessie St				6th St				6th St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	1	0	0	0	0	0	1	4	0	0	0	7	0	13	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	7	0	8	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	2	2	0	0	7	0	11	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	5	1	0	0	4	0	10	42
5:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**1**	**5**	**0**	**10**	39
5:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**5**	**0**	**7**	38
5:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**2**	29
5:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**4**	**0**	**8**	**27**
Count Total	0	0	0	1	0	0	0	0	0	1	23	3	0	1	40	0	69	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**11**	**0**	**0**	**1**	**15**	**0**	**27**	**0**

Two-Hour Count Summaries - Bikes

Interval Start	Jessie St			Jessie St			6th St			6th St			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	3	1	0	3	0	7	0
4:15 PM	0	0	0	0	0	0	0	4	0	0	7	0	11	0
4:30 PM	0	0	0	0	0	2	0	3	1	0	8	0	14	0
4:45 PM	0	0	2	0	0	0	0	1	0	0	4	0	7	39
5:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**7**	**1**	**11**	43
5:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**0**	**10**	**1**	**19**	51
5:30 PM	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**6**	**0**	**1**	**5**	**0**	**14**	51
5:45 PM	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**5**	**0**	**0**	**7**	**1**	**16**	**60**
Count Total	0	0	3	0	0	6	0	33	2	1	51	3	99	0
Peak Hour	**0**	**0**	**1**	**0**	**0**	**4**	**0**	**22**	**0**	**1**	**29**	**3**	**60**	**0**

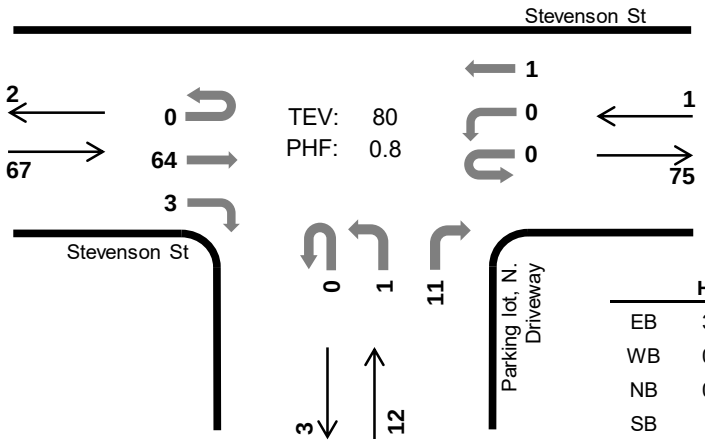
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Parking lot, N. Driveway
Stevenson St

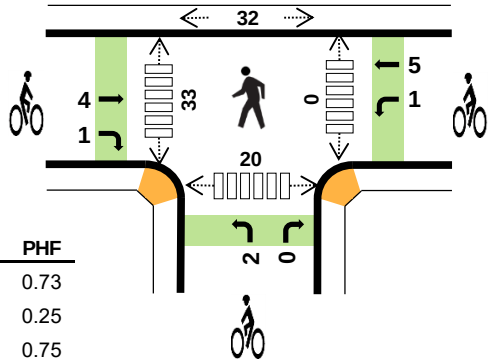
N

Peak Hour

Date: 10-09-2018
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:00 PM to 5:00 PM



	HV %:	PHF
EB	3.0%	0.73
WB	0.0%	0.25
NB	0.0%	0.75
SB	-	-
TOTAL	2.5%	0.80



Two-Hour Count Summaries

Interval Start		Stevenson St Eastbound				Stevenson St Westbound				Parking lot, N. Driveway Northbound				0 Southbound				15-min Total	Rolling One Hour
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM		**0**	**0**	**14**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**2**	**0**	**0**	**0**	**0**	**17**	0
4:15 PM		**0**	**0**	**14**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**18**	0
4:30 PM		**0**	**0**	**22**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**25**	0
4:45 PM		**0**	**0**	**14**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**20**	**80**
5:00 PM		0	0	13	0	0	0	0	0	0	1	0	2	0	0	0	0	16	79
5:15 PM		0	0	13	0	0	0	0	0	0	1	0	4	0	0	0	0	18	79
5:30 PM		0	0	12	1	0	0	0	0	0	1	0	3	0	0	0	0	17	71
5:45 PM		0	0	17	1	0	0	0	0	0	0	0	4	0	0	0	0	22	73
Count Total		0	0	119	5	0	0	1	0	0	4	0	24	0	0	0	0	153	0
Peak Hour	**All**	**0**	**0**	**64**	**3**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**11**	**0**	**0**	**0**	**0**	**80**	**0**
	HV	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**
	HV%	**-**	**-**	**3%**	**0%**	**-**	**-**	**0%**	**-**	**-**	**0%**	**-**	**0%**	**-**	**-**	**-**	**-**	**3%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	**0**	**0**	**0**	**0**	***0***	**3**	**1**	**0**	**0**	***4***	**0**	**10**	**15**	**4**	*29*
4:15 PM	**1**	**0**	**0**	**0**	***1***	**0**	**3**	**0**	**0**	***3***	**0**	**3**	**9**	**9**	*21*
4:30 PM	**0**	**0**	**0**	**0**	***0***	**1**	**2**	**2**	**0**	***5***	**0**	**13**	**1**	**3**	*17*
4:45 PM	**1**	**0**	**0**	**0**	***1***	**1**	**0**	**0**	**0**	***1***	**0**	**7**	**7**	**4**	***18***
5:00 PM	1	0	0	0	*1*	1	0	2	0	*3*	1	7	12	10	*30*
5:15 PM	0	0	0	0	*0*	0	1	0	0	*1*	0	14	9	4	*27*
5:30 PM	0	0	0	0	*0*	1	1	0	0	*2*	4	8	8	6	*26*
5:45 PM	0	0	0	0	*0*	4	1	0	0	*5*	1	2	5	8	*16*
Count Total	3	0	0	0	*3*	11	9	4	0	*24*	6	64	66	48	*184*
Peak Hr	**2**	**0**	**0**	**0**	***2***	**5**	**6**	**2**	**0**	***13***	**0**	**33**	**32**	**20**	***85***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Stevenson St				Stevenson St				Parking lot, N. Driveway				0				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:15 PM	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:45 PM	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**2**
5:00 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Count Total	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
Peak Hour	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**

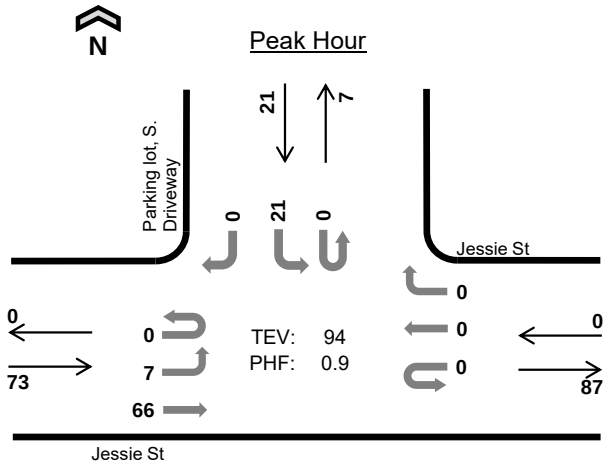
Two-Hour Count Summaries - Bikes

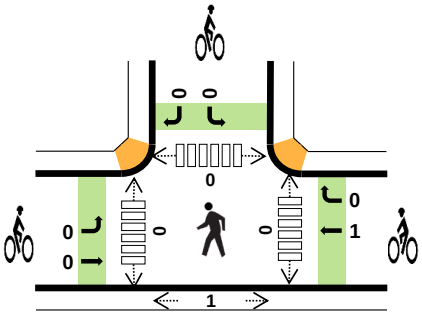
Interval Start	Stevenson St			Stevenson St			Parking lot, N. Driveway			0			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	**0**	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	0
4:15 PM	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	0
4:30 PM	**0**	**1**	**0**	**0**	**2**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**5**	0
4:45 PM	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**13**
5:00 PM	0	1	0	0	0	0	2	0	0	0	0	0	3	12
5:15 PM	0	0	0	0	1	0	0	0	0	0	0	0	1	10
5:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	2	7
5:45 PM	0	4	0	0	1	0	0	0	0	0	0	0	5	11
Count Total	0	9	2	1	8	0	4	0	0	0	0	0	24	0
Peak Hour	**0**	**4**	**1**	**1**	**5**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**13**	**0**

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Parking lot, S. Driveway
Jessie St

Date: 10-09-2018
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:15 PM to 5:15 PM





	HV %:	PHF
EB	5.5%	0.91
WB	-	-
NB	-	-
SB	0.0%	0.66
TOTAL	4.3%	0.90

Two-Hour Count Summaries

Interval Start		Jessie St Eastbound UT	LT	TH	RT	Jessie St Westbound UT	LT	TH	RT	0 Northbound UT	LT	TH	RT	Parking lot, S. Driveway Southbound UT	LT	TH	RT	15-min Total	Rolling One Hour
4:00 PM		0	0	12	0	0	0	0	0	0	0	0	0	0	5	0	0	17	0
4:15 PM		**0**	**1**	**18**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**22**	0
4:30 PM		**0**	**1**	**19**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**0**	**0**	**26**	0
4:45 PM		**0**	**4**	**14**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**0**	**26**	91
5:00 PM		**0**	**1**	**15**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**20**	**94**
5:15 PM		0	1	11	0	0	0	0	0	0	0	0	0	0	7	0	1	20	92
5:30 PM		0	0	16	0	0	0	0	0	0	0	0	0	0	7	0	1	24	90
5:45 PM		0	0	18	0	0	0	0	1	0	0	0	0	0	4	0	0	23	87
Count Total		0	8	123	0	0	0	0	1	0	0	0	0	0	44	0	2	178	0
Peak Hour	**All**	**0**	**7**	**66**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**21**	**0**	**0**	**94**	**0**
	HV	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**
	HV%	**-**	**0%**	**6%**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**0%**	**-**	**-**	**4%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals EB	WB	NB	SB	Total	Bicycles EB	WB	NB	SB	Total	Pedestrians (Crossing Leg) East	West	North	South	Total
4:00 PM	0	0	0	0	*0*	0	0	0	0	*0*	0	0	0	1	*1*
4:15 PM	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
4:30 PM	**2**	**0**	**0**	**0**	***2***	**0**	**1**	**0**	**0**	***1***	**0**	**0**	**0**	**1**	*1*
4:45 PM	**1**	**0**	**0**	**0**	***1***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
5:00 PM	**1**	**0**	**0**	**0**	***1***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
5:15 PM	0	0	0	0	*0*	0	0	0	0	*0*	0	0	0	1	*1*
5:30 PM	0	0	0	0	*0*	0	0	0	0	*0*	0	0	0	1	*1*
5:45 PM	0	0	0	0	*0*	0	2	0	0	*2*	0	0	0	0	*0*
Count Total	4	0	0	0	*4*	0	3	0	0	*3*	0	0	0	4	*4*
Peak Hr	**4**	**0**	**0**	**0**	***4***	**0**	**1**	**0**	**0**	***1***	**0**	**0**	**0**	**1**	***1***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Jessie St				Jessie St				0				Parking lot, S. Driveway				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:30 PM	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	0
4:45 PM	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	3
5:00 PM	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**4**
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Count Total	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
Peak Hour	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**

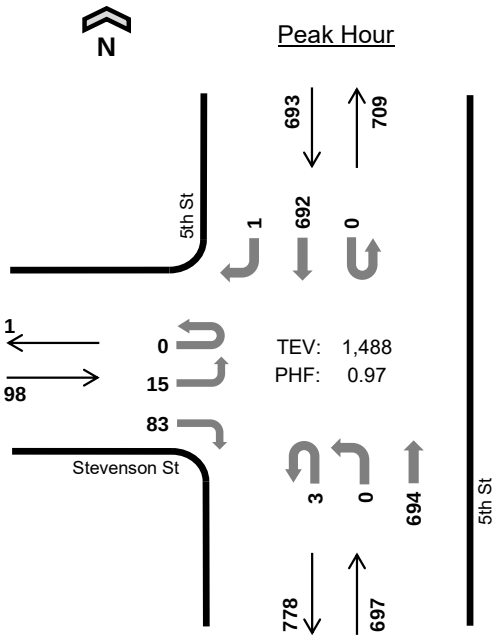
Two-Hour Count Summaries - Bikes

Interval Start	Jessie St			Jessie St			0			Parking lot, S. Driveway			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:30 PM	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	1
5:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	2	0	0	0	0	0	0	0	2	2
Count Total	0	0	0	0	3	0	0	0	0	0	0	0	3	0
Peak Hour	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**

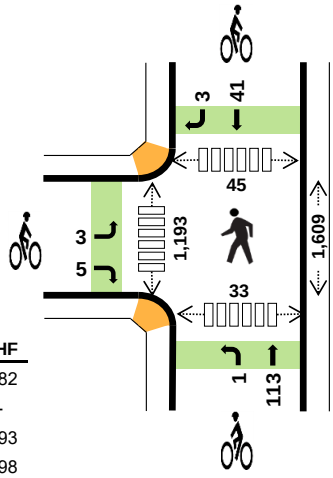
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

5th St
Stevenson St

Date: 10-09-2018
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 5:00 PM to 6:00 PM



	HV %:	PHF
EB	1.0%	0.82
WB	-	-
NB	2.3%	0.93
SB	8.8%	0.98
TOTAL	5.2%	0.97



Two-Hour Count Summaries

Interval Start		Stevenson St Eastbound UT	LT	TH	RT	0 Westbound UT	LT	TH	RT	5th St Northbound UT	LT	TH	RT	5th St Southbound UT	LT	TH	RT	15-min Total	Rolling One Hour
4:00 PM		0	5	0	12	0	0	0	0	2	0	126	0	0	0	155	1	301	0
4:15 PM		0	3	0	21	0	0	0	0	2	0	180	0	0	0	175	0	381	0
4:30 PM		0	7	0	23	0	0	0	0	0	0	149	0	0	0	156	0	335	0
4:45 PM		0	2	0	19	0	0	0	0	1	0	171	0	0	0	172	1	366	1,383
5:00 PM		**0**	**5**	**0**	**18**	**0**	**0**	**0**	**0**	**0**	**0**	**180**	**0**	**0**	**0**	**168**	**1**	**372**	1,454
5:15 PM		**0**	**3**	**0**	**20**	**0**	**0**	**0**	**0**	**1**	**0**	**158**	**0**	**0**	**0**	**174**	**0**	**356**	1,429
5:30 PM		**0**	**2**	**0**	**20**	**0**	**0**	**0**	**0**	**1**	**0**	**186**	**0**	**0**	**0**	**173**	**0**	**382**	1,476
5:45 PM		**0**	**5**	**0**	**25**	**0**	**0**	**0**	**0**	**1**	**0**	**170**	**0**	**0**	**0**	**177**	**0**	**378**	**1,488**
Count Total		0	32	0	158	0	0	0	0	8	0	1,320	0	0	0	1,350	3	2,871	0
Peak Hour	**All**	**0**	**15**	**0**	**83**	**0**	**0**	**0**	**0**	**3**	**0**	**694**	**0**	**0**	**0**	**692**	**1**	**1,488**	**0**
	HV	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**16**	**0**	**0**	**0**	**61**	**0**	**78**	**0**
	HV%	**-**	**0%**	**-**	**1%**	**-**	**-**	**-**	**-**	**0%**	**-**	**2%**	**-**	**-**	**-**	**9%**	**0%**	**5%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals EB	WB	NB	SB	Total	Bicycles EB	WB	NB	SB	Total	Pedestrians (Crossing Leg) East	West	North	South	Total
4:00 PM	0	0	10	15	*25*	2	0	11	5	*18*	252	246	11	6	*515*
4:15 PM	1	0	6	21	*28*	0	0	10	13	*23*	259	211	7	8	*485*
4:30 PM	0	0	4	13	*17*	2	0	11	11	*24*	343	242	12	12	*609*
4:45 PM	1	0	5	9	*15*	1	0	23	7	*31*	363	240	4	7	*614*
5:00 PM	**1**	**0**	**2**	**17**	***20***	**1**	**0**	**32**	**16**	***49***	**436**	**303**	**12**	**4**	*755*
5:15 PM	**0**	**0**	**4**	**14**	***18***	**0**	**0**	**27**	**9**	***36***	**397**	**306**	**9**	**11**	*723*
5:30 PM	**0**	**0**	**3**	**13**	***16***	**0**	**0**	**28**	**10**	***38***	**376**	**303**	**12**	**4**	*695*
5:45 PM	**0**	**0**	**7**	**17**	***24***	**7**	**0**	**27**	**9**	***43***	**400**	**281**	**12**	**14**	***707***
Count Total	3	0	41	119	*163*	13	0	169	80	*262*	2,826	2,132	79	66	*5,103*
Peak Hr	**1**	**0**	**16**	**61**	***78***	**8**	**0**	**114**	**44**	***166***	**1,609**	**1,193**	**45**	**33**	***2,880***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Stevenson St				0				5th St				5th St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	10	0	0	0	15	0	25	0
4:15 PM	0	0	0	1	0	0	0	0	0	0	6	0	0	0	21	0	28	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	13	0	17	0
4:45 PM	0	0	0	1	0	0	0	0	0	0	5	0	0	0	9	0	15	85
5:00 PM	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**17**	**0**	**20**	80
5:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**14**	**0**	**18**	70
5:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**13**	**0**	**16**	69
5:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**7**	**0**	**0**	**0**	**17**	**0**	**24**	**78**
Count Total	0	0	0	3	0	0	0	0	0	0	41	0	0	0	119	0	163	0
Peak Hour	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**16**	**0**	**0**	**0**	**61**	**0**	**78**	**0**

Two-Hour Count Summaries - Bikes

Interval Start	Stevenson St			0			5th St			5th St			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	0	2	0	0	0	0	11	0	0	4	1	18	0
4:15 PM	0	0	0	0	0	0	0	10	0	0	12	1	23	0
4:30 PM	0	0	2	0	0	0	0	11	0	0	10	1	24	0
4:45 PM	1	0	0	0	0	0	0	23	0	0	7	0	31	96
5:00 PM	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**31**	**0**	**0**	**15**	**1**	**49**	127
5:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**27**	**0**	**0**	**9**	**0**	**36**	140
5:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**28**	**0**	**0**	**10**	**0**	**38**	154
5:45 PM	**3**	**0**	**4**	**0**	**0**	**0**	**0**	**27**	**0**	**0**	**7**	**2**	**43**	**166**
Count Total	4	0	9	0	0	0	1	168	0	0	74	6	262	0
Peak Hour	**3**	**0**	**5**	**0**	**0**	**0**	**1**	**113**	**0**	**0**	**41**	**3**	**166**	**0**

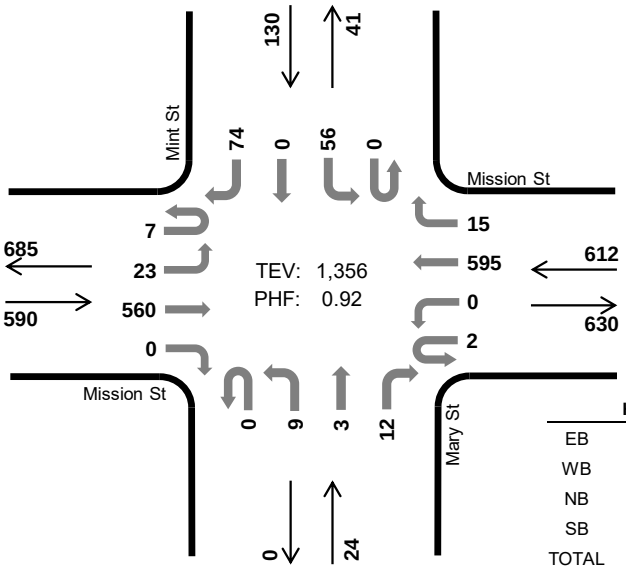
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Mint St
Mission St

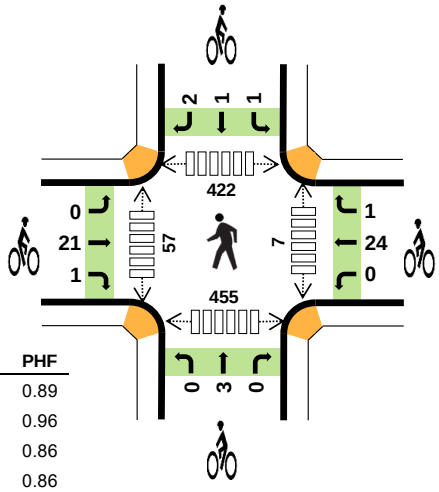
Date: 10-09-2018
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:30 PM to 5:30 PM

N

Peak Hour



	HV %:	PHF
EB	6.3%	0.89
WB	6.5%	0.96
NB	4.2%	0.86
SB	3.1%	0.86
TOTAL	6.0%	0.92



Two-Hour Count Summaries

Interval Start		Mission St Eastbound UT	LT	TH	RT	Mission St Westbound UT	LT	TH	RT	Mary St Northbound UT	LT	TH	RT	Mint St Southbound UT	LT	TH	RT	15-min Total	Rolling One Hour
4:00 PM		3	6	165	0	0	0	101	4	0	4	1	0	0	13	0	16	313	0
4:15 PM		2	12	135	0	1	0	116	2	0	1	0	5	0	12	0	18	304	0
4:30 PM		**4**	**9**	**153**	**0**	**1**	**0**	**151**	**4**	**0**	**3**	**1**	**3**	**0**	**16**	**0**	**22**	**367**	0
4:45 PM		**0**	**5**	**145**	**0**	**0**	**0**	**141**	**1**	**0**	**2**	**0**	**2**	**0**	**13**	**0**	**24**	**333**	1,317
5:00 PM		**1**	**2**	**127**	**0**	**1**	**0**	**148**	**5**	**0**	**2**	**2**	**3**	**0**	**17**	**0**	**13**	**321**	1,325
5:15 PM		**2**	**7**	**135**	**0**	**0**	**0**	**155**	**5**	**0**	**2**	**0**	**4**	**0**	**10**	**0**	**15**	**335**	**1,356**
5:30 PM		4	3	118	0	1	0	146	7	0	5	0	3	0	15	0	17	319	1,308
5:45 PM		1	6	145	0	0	0	160	3	0	6	1	7	0	10	0	16	355	1,330
Count Total		17	50	1,123	0	4	0	1,118	31	0	25	5	27	0	106	0	141	2,647	0
Peak Hour	**All**	**7**	**23**	**560**	**0**	**2**	**0**	**595**	**15**	**0**	**9**	**3**	**12**	**0**	**56**	**0**	**74**	**1,356**	**0**
	HV	**0**	**0**	**37**	**0**	**0**	**0**	**40**	**0**	**0**	**0**	**0**	**1**	**0**	**2**	**0**	**2**	**82**	**0**
	HV%	**0%**	**0%**	**7%**	**-**	**0%**	**-**	**7%**	**0%**	**-**	**0%**	**0%**	**8%**	**-**	**4%**	**-**	**3%**	**6%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals EB	WB	NB	SB	Total	Bicycles EB	WB	NB	SB	Total	Pedestrians (Crossing Leg) East	West	North	South	Total
4:00 PM	13	13	0	1	*27*	5	7	1	0	*13*	0	8	95	87	*190*
4:15 PM	11	9	0	1	*21*	1	7	0	2	*10*	0	10	120	63	*193*
4:30 PM	**10**	**11**	**0**	**1**	***22***	**3**	**6**	**1**	**0**	***10***	**1**	**14**	**101**	**98**	*214*
4:45 PM	**10**	**10**	**0**	**1**	***21***	**4**	**6**	**1**	**1**	***12***	**1**	**12**	**90**	**105**	*208*
5:00 PM	**8**	**10**	**1**	**2**	***21***	**7**	**9**	**1**	**1**	***18***	**2**	**15**	**111**	**106**	*234*
5:15 PM	**9**	**9**	**0**	**0**	***18***	**8**	**4**	**0**	**2**	***14***	**3**	**16**	**120**	**146**	***285***
5:30 PM	7	10	0	0	*17*	5	6	0	1	*12*	0	11	136	103	*250*
5:45 PM	5	9	0	0	*14*	6	11	0	3	*20*	0	9	129	93	*231*
Count Total	73	81	1	6	*161*	39	56	4	10	*109*	7	95	902	801	*1,805*
Peak Hour	**37**	**40**	**1**	**4**	***82***	**22**	**25**	**3**	**4**	***54***	**7**	**57**	**422**	**455**	***941***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Mission St				Mission St				Mary St				Mint St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	13	0	0	0	12	1	0	0	0	0	0	0	0	1	27	0
4:15 PM	0	0	11	0	0	0	9	0	0	0	0	0	0	0	0	1	21	0
4:30 PM	**0**	**0**	**10**	**0**	**0**	**0**	**11**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**22**	0
4:45 PM	**0**	**0**	**10**	**0**	**0**	**0**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**21**	91
5:00 PM	**0**	**0**	**8**	**0**	**0**	**0**	**10**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**1**	**21**	85
5:15 PM	**0**	**0**	**9**	**0**	**0**	**0**	**9**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**18**	**82**
5:30 PM	0	0	7	0	0	0	10	0	0	0	0	0	0	0	0	0	17	77
5:45 PM	0	0	5	0	0	0	9	0	0	0	0	0	0	0	0	0	14	70
Count Total	0	0	73	0	0	0	80	1	0	0	0	1	0	2	0	4	161	0
Peak Hour	**0**	**0**	**37**	**0**	**0**	**0**	**40**	**0**	**0**	**0**	**0**	**1**	**0**	**2**	**0**	**2**	**82**	**0**

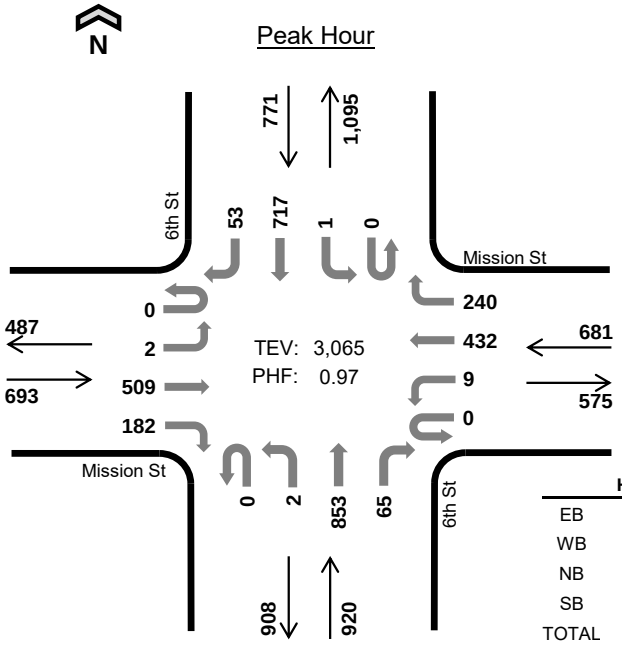
Two-Hour Count Summaries - Bikes

Interval Start	Mission St			Mission St			Mary St			Mint St			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	5	0	0	7	0	0	0	1	0	0	0	13	0
4:15 PM	0	1	0	0	7	0	0	0	0	0	2	0	10	0
4:30 PM	**0**	**3**	**0**	**0**	**6**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**10**	0
4:45 PM	**0**	**3**	**1**	**0**	**5**	**1**	**0**	**1**	**0**	**1**	**0**	**0**	**12**	45
5:00 PM	**0**	**7**	**0**	**0**	**9**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**18**	50
5:15 PM	**0**	**8**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**14**	**54**
5:30 PM	0	5	0	0	6	0	0	0	0	1	0	0	12	56
5:45 PM	0	6	0	0	10	1	0	0	0	1	0	2	20	64
Count Total	0	38	1	0	54	2	0	3	1	3	3	4	109	0
Peak Hour	**0**	**21**	**1**	**0**	**24**	**1**	**0**	**3**	**0**	**1**	**1**	**2**	**54**	**0**

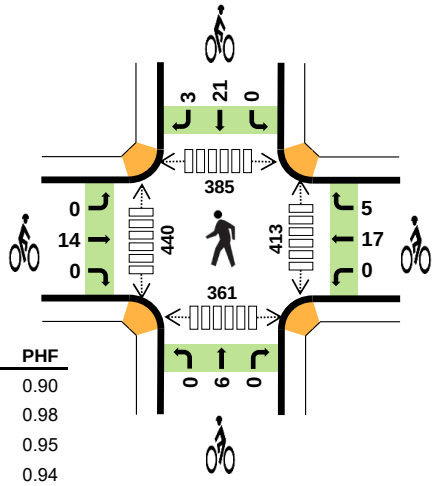
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

6th St
Mission St

Date: 10-09-2018
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:30 PM to 5:30 PM



	HV %:	PHF
EB	5.6%	0.90
WB	6.0%	0.98
NB	1.7%	0.95
SB	2.7%	0.94
TOTAL	3.8%	0.97



Two-Hour Count Summaries

Interval Start		Mission St Eastbound UT	LT	TH	RT	Mission St Westbound UT	LT	TH	RT	6th St Northbound UT	LT	TH	RT	6th St Southbound UT	LT	TH	RT	15-min Total	Rolling One Hour
4:00 PM		0	1	144	44	0	3	84	35	0	0	196	19	0	1	184	10	721	0
4:15 PM		0	1	136	52	0	2	86	48	0	0	185	20	0	1	173	13	717	0
4:30 PM		**0**	**0**	**137**	**55**	**0**	**2**	**111**	**50**	**0**	**0**	**212**	**17**	**0**	**1**	**189**	**13**	**787**	0
4:45 PM		**0**	**0**	**134**	**56**	**0**	**1**	**111**	**61**	**0**	**1**	**196**	**18**	**0**	**0**	**169**	**10**	**757**	2,982
5:00 PM		**0**	**1**	**111**	**38**	**0**	**3**	**110**	**59**	**0**	**0**	**220**	**13**	**0**	**0**	**191**	**13**	**759**	3,020
5:15 PM		**0**	**1**	**127**	**33**	**0**	**3**	**100**	**70**	**0**	**1**	**225**	**17**	**0**	**0**	**168**	**17**	**762**	**3,065**
5:30 PM		0	2	110	56	0	4	113	56	0	0	225	9	0	0	178	7	760	3,038
5:45 PM		0	5	148	41	0	3	118	51	0	0	218	19	0	0	161	16	780	3,061
Count Total		0	11	1,047	375	0	21	833	430	0	2	1,677	132	0	3	1,413	99	6,043	0
Peak Hour	**All**	**0**	**2**	**509**	**182**	**0**	**9**	**432**	**240**	**0**	**2**	**853**	**65**	**0**	**1**	**717**	**53**	**3,065**	**0**
	HV	**0**	**1**	**33**	**5**	**0**	**6**	**32**	**3**	**0**	**0**	**12**	**4**	**0**	**0**	**16**	**5**	**117**	**0**
	HV%	**-**	**50%**	**6%**	**3%**	**-**	**67%**	**7%**	**1%**	**-**	**0%**	**1%**	**6%**	**-**	**0%**	**2%**	**9%**	**4%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals EB	WB	NB	SB	Total	Bicycles EB	WB	NB	SB	Total	Pedestrians (Crossing Leg) East	West	North	South	Total
4:00 PM	11	14	7	8	*40*	3	7	2	2	*14*	115	88	66	89	*358*
4:15 PM	11	9	2	6	*28*	1	7	4	6	*18*	116	99	83	84	*382*
4:30 PM	**11**	**11**	**5**	**6**	***33***	**2**	**6**	**1**	**6**	***15***	**81**	**119**	**92**	**71**	*363*
4:45 PM	**10**	**9**	**6**	**6**	***31***	**2**	**5**	**1**	**5**	***13***	**100**	**111**	**82**	**91**	*384*
5:00 PM	**8**	**12**	**4**	**2**	***26***	**6**	**6**	**1**	**4**	***17***	**113**	**100**	**121**	**84**	*418*
5:15 PM	**10**	**9**	**1**	**7**	***27***	**4**	**5**	**3**	**9**	***21***	**119**	**110**	**90**	**115**	***434***
5:30 PM	8	10	2	3	*23*	3	7	4	7	*21*	89	87	87	99	*362*
5:45 PM	8	10	2	3	*23*	4	9	4	7	*24*	83	103	95	73	*354*
Count Total	77	84	29	41	*231*	25	52	20	46	*143*	816	817	716	706	*3,055*
Peak Hour	**39**	**41**	**16**	**21**	***117***	**14**	**22**	**6**	**24**	***66***	**413**	**440**	**385**	**361**	***1,599***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Mission St				Mission St				6th St				6th St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	11	0	0	3	10	1	0	0	5	2	0	0	7	1	40	0
4:15 PM	0	0	9	2	0	2	6	1	0	0	0	2	0	0	5	1	28	0
4:30 PM	**0**	**0**	**9**	**2**	**0**	**1**	**10**	**0**	**0**	**0**	**4**	**1**	**0**	**0**	**5**	**1**	**33**	0
4:45 PM	**0**	**0**	**9**	**1**	**0**	**1**	**7**	**1**	**0**	**0**	**5**	**1**	**0**	**0**	**6**	**0**	**31**	132
5:00 PM	**0**	**0**	**7**	**1**	**0**	**3**	**8**	**1**	**0**	**0**	**3**	**1**	**0**	**0**	**0**	**2**	**26**	118
5:15 PM	**0**	**1**	**8**	**1**	**0**	**1**	**7**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**5**	**2**	**27**	**117**
5:30 PM	0	0	6	2	0	3	7	0	0	0	1	1	0	0	3	0	23	107
5:45 PM	0	1	5	2	0	3	6	1	0	0	2	0	0	0	3	0	23	99
Count Total	0	2	64	11	0	17	61	6	0	0	20	9	0	0	34	7	231	0
Peak Hour	**0**	**1**	**33**	**5**	**0**	**6**	**32**	**3**	**0**	**0**	**12**	**4**	**0**	**0**	**16**	**5**	**117**	**0**

Two-Hour Count Summaries - Bikes

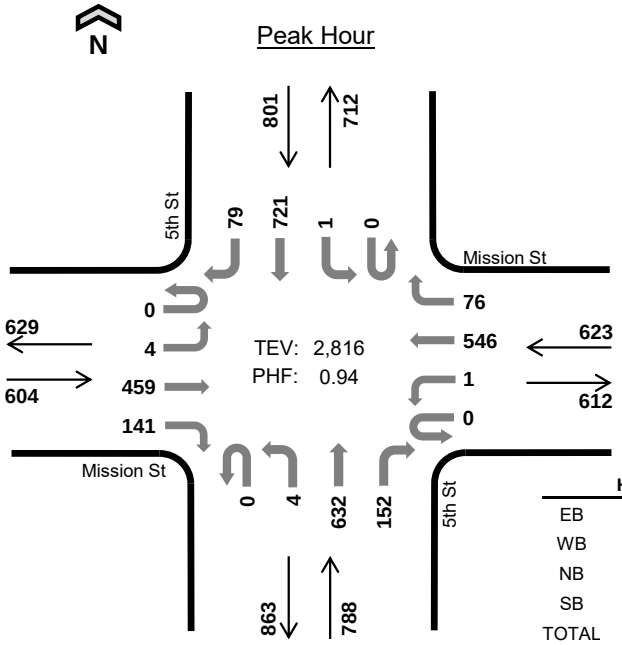
Interval Start	Mission St			Mission St			6th St			6th St			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	3	0	0	7	0	0	2	0	0	2	0	14	0
4:15 PM	0	1	0	0	7	0	0	4	0	0	4	2	18	0
4:30 PM	**0**	**2**	**0**	**0**	**4**	**2**	**0**	**1**	**0**	**0**	**5**	**1**	**15**	0
4:45 PM	**0**	**2**	**0**	**0**	**5**	**0**	**0**	**1**	**0**	**0**	**4**	**1**	**13**	60
5:00 PM	**0**	**6**	**0**	**0**	**6**	**0**	**0**	**1**	**0**	**0**	**3**	**1**	**17**	63
5:15 PM	**0**	**4**	**0**	**0**	**2**	**3**	**0**	**3**	**0**	**0**	**9**	**0**	**21**	**66**
5:30 PM	0	3	0	0	7	0	0	4	0	0	3	4	21	72
5:45 PM	0	4	0	0	8	1	0	4	0	0	7	0	24	83
Count Total	0	25	0	0	46	6	0	20	0	0	37	9	143	0
Peak Hour	**0**	**14**	**0**	**0**	**17**	**5**	**0**	**6**	**0**	**0**	**21**	**3**	**66**	**0**

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

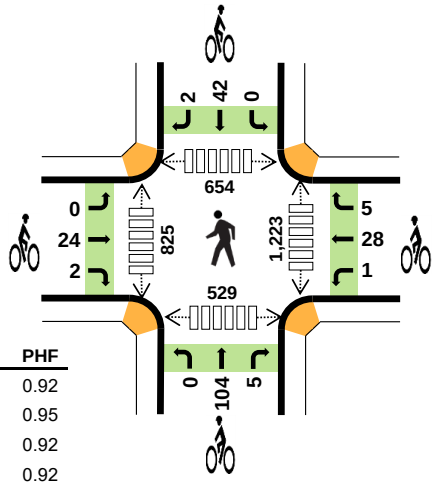
5th St
Mission St

Date: 10-09-2018
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 5:00 PM to 6:00 PM

Peak Hour



	HV %:	PHF
EB	5.1%	0.92
WB	6.1%	0.95
NB	2.3%	0.92
SB	8.0%	0.92
TOTAL	5.4%	0.94



Two-Hour Count Summaries

Interval Start		Mission St Eastbound UT	LT	TH	RT	Mission St Westbound UT	LT	TH	RT	5th St Northbound UT	LT	TH	RT	5th St Southbound UT	LT	TH	RT	15-min Total	Rolling One Hour
4:00 PM		0	2	132	43	0	1	93	23	0	1	113	26	0	0	166	8	608	0
4:15 PM		0	1	102	47	0	1	108	19	1	0	155	35	0	0	184	9	662	0
4:30 PM		0	0	136	46	0	2	142	16	0	1	120	34	0	2	163	13	675	0
4:45 PM		0	1	113	40	0	0	133	24	0	0	141	28	0	1	176	8	665	2,610
5:00 PM		**0**	**1**	**115**	**40**	**0**	**1**	**137**	**26**	**0**	**0**	**164**	**37**	**0**	**0**	**176**	**19**	**716**	2,718
5:15 PM		**0**	**2**	**113**	**31**	**0**	**0**	**138**	**19**	**0**	**0**	**132**	**33**	**0**	**0**	**181**	**18**	**667**	2,723
5:30 PM		**0**	**0**	**98**	**39**	**0**	**0**	**128**	**14**	**0**	**2**	**171**	**42**	**0**	**0**	**165**	**25**	**684**	2,732
5:45 PM		**0**	**1**	**133**	**31**	**0**	**0**	**143**	**17**	**0**	**2**	**165**	**40**	**0**	**1**	**199**	**17**	**749**	**2,816**
Count Total		0	8	942	317	0	5	1,022	158	1	6	1,161	275	0	4	1,410	117	5,426	0
Peak Hour	**All**	**0**	**4**	**459**	**141**	**0**	**1**	**546**	**76**	**0**	**4**	**632**	**152**	**0**	**1**	**721**	**79**	**2,816**	**0**
	HV	**0**	**0**	**27**	**4**	**0**	**0**	**36**	**2**	**0**	**2**	**15**	**1**	**0**	**0**	**63**	**1**	**151**	**0**
	HV%	**-**	**0%**	**6%**	**3%**	**-**	**0%**	**7%**	**3%**	**-**	**50%**	**2%**	**1%**	**-**	**0%**	**9%**	**1%**	**5%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals EB	WB	NB	SB	Total	Bicycles EB	WB	NB	SB	Total	Pedestrians (Crossing Leg) East	West	North	South	Total
4:00 PM	13	13	7	15	*48*	5	8	9	4	*26*	203	149	142	90	*584*
4:15 PM	11	10	4	23	*48*	1	6	10	11	*28*	199	145	150	99	*593*
4:30 PM	10	10	4	13	*37*	2	7	10	9	*28*	226	183	144	109	*662*
4:45 PM	11	10	5	10	*36*	4	6	23	9	*42*	261	169	144	116	*690*
5:00 PM	**10**	**10**	**2**	**20**	***42***	**7**	**11**	**30**	**13**	***61***	**328**	**210**	**151**	**114**	*803*
5:15 PM	**8**	**11**	**4**	**14**	***37***	**8**	**3**	**25**	**9**	***45***	**291**	**223**	**161**	**152**	*827*
5:30 PM	**9**	**9**	**4**	**11**	***33***	**5**	**8**	**27**	**12**	***52***	**307**	**208**	**170**	**141**	*826*
5:45 PM	**4**	**8**	**8**	**19**	***39***	**6**	**12**	**27**	**10**	***55***	**297**	**184**	**172**	**122**	***775***
Count Total	76	81	38	125	*320*	38	61	161	77	*337*	2,112	1,471	1,234	943	*5,760*
Peak Hour	**31**	**38**	**18**	**64**	***151***	**26**	**34**	**109**	**44**	***213***	**1,223**	**825**	**654**	**529**	***3,231***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Mission St				Mission St				5th St				5th St				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	13	0	0	0	11	2	0	0	7	0	0	0	14	1	48	0
4:15 PM	0	1	9	1	0	0	10	0	0	0	4	0	0	0	23	0	48	0
4:30 PM	0	0	8	2	0	0	10	0	0	0	4	0	0	0	12	1	37	0
4:45 PM	0	0	9	2	0	0	9	1	0	0	4	1	0	0	9	1	36	169
5:00 PM	**0**	**0**	**9**	**1**	**0**	**0**	**9**	**1**	**0**	**0**	**2**	**0**	**0**	**0**	**19**	**1**	**42**	163
5:15 PM	**0**	**0**	**6**	**2**	**0**	**0**	**10**	**1**	**0**	**0**	**3**	**1**	**0**	**0**	**14**	**0**	**37**	152
5:30 PM	**0**	**0**	**8**	**1**	**0**	**0**	**9**	**0**	**0**	**1**	**3**	**0**	**0**	**0**	**11**	**0**	**33**	148
5:45 PM	**0**	**0**	**4**	**0**	**0**	**0**	**8**	**0**	**0**	**1**	**7**	**0**	**0**	**0**	**19**	**0**	**39**	**151**
Count Total	0	1	66	9	0	0	76	5	0	2	34	2	0	0	121	4	320	0
Peak Hour	**0**	**0**	**27**	**4**	**0**	**0**	**36**	**2**	**0**	**2**	**15**	**1**	**0**	**0**	**63**	**1**	**151**	**0**

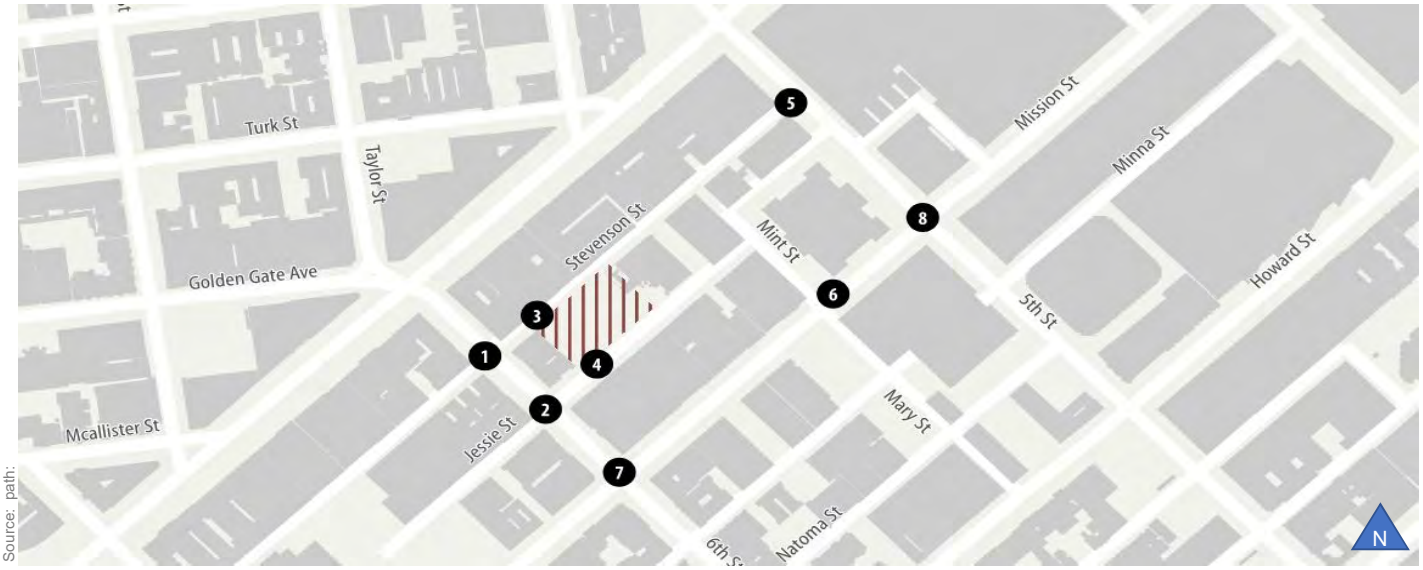
Two-Hour Count Summaries - Bikes

Interval Start	Mission St			Mission St			5th St			5th St			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	5	0	0	7	1	0	9	0	0	4	0	26	0
4:15 PM	0	0	1	0	6	0	0	10	0	0	10	1	28	0
4:30 PM	0	2	0	0	6	1	0	10	0	0	9	0	28	0
4:45 PM	0	3	1	0	4	2	0	22	1	0	7	2	42	124
5:00 PM	**0**	**6**	**1**	**0**	**8**	**3**	**0**	**27**	**3**	**0**	**12**	**1**	**61**	159
5:15 PM	**0**	**8**	**0**	**0**	**3**	**0**	**0**	**24**	**1**	**0**	**9**	**0**	**45**	176
5:30 PM	**0**	**5**	**0**	**1**	**5**	**2**	**0**	**26**	**1**	**0**	**11**	**1**	**52**	200
5:45 PM	**0**	**5**	**1**	**0**	**12**	**0**	**0**	**27**	**0**	**0**	**10**	**0**	**55**	**213**
Count Total	0	34	4	1	51	9	0	155	6	0	72	5	337	0
Peak Hour	**0**	**24**	**2**	**1**	**28**	**5**	**0**	**104**	**5**	**0**	**42**	**2**	**213**	**0**

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Appendix E.5-2

Project Trip Assignment



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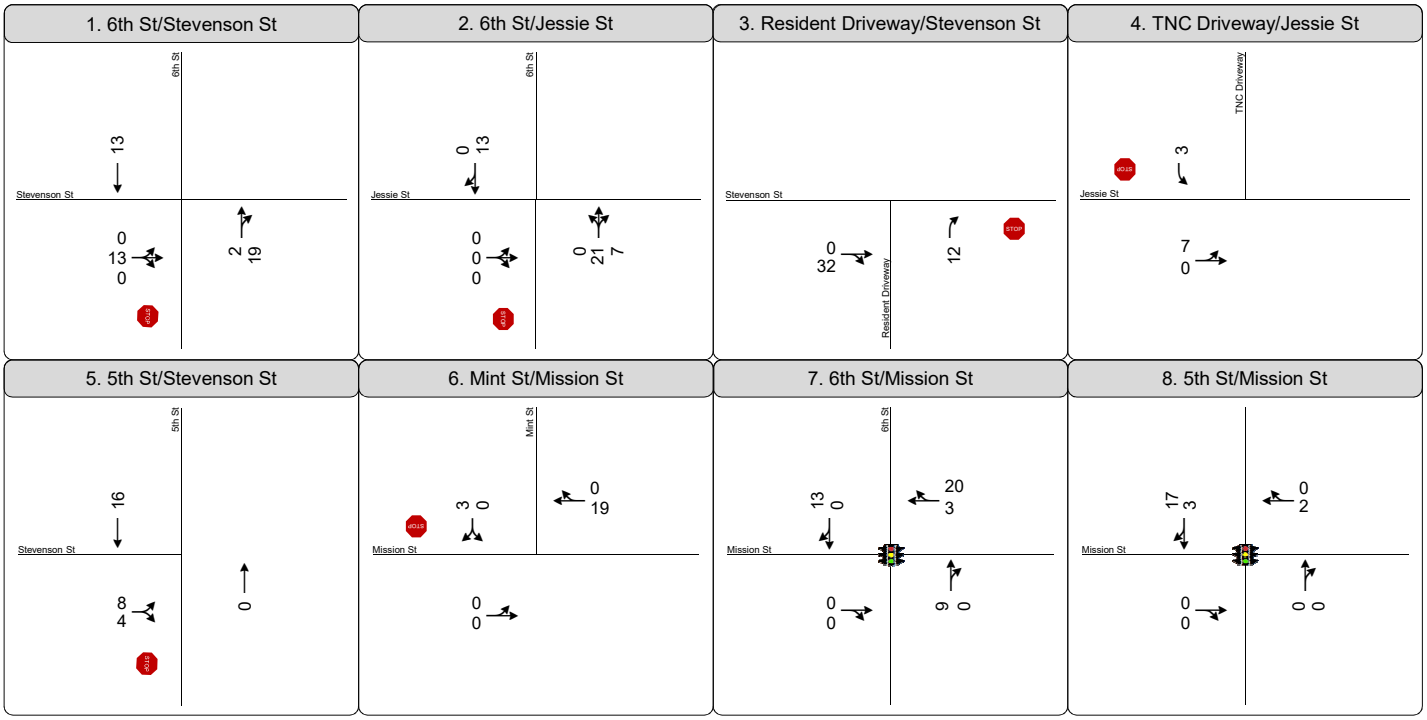


LEGEND

- Study Intersection
- Permitted Movements
- Stop Sign
- Signalized

Figure 1

469 Stevenson -
PM Peak Hour Trip Assignment

Appendix E.5-3

Freight and Passenger Loading Calculations

Use	GSF Quantity	GSF Quantity (Thousands)	Generation Rate (Thousands)	Truck Trip Generation (Daily)	Truck Trip Generation Rate (peak hour of loading)	Truck Trip Generation (peak hour of loading)	Truck Trip Generation Rate (Average generation per hour)	Truck Trip Generation (Average generation per hour)
Retail	4,000	4.00	0.2	0.9	0.0	0.05	0.0	0.04
Residential	460,500	460.50	0.0	13.8	0.0	0.80	0.0	0.64
TOTAL	**464,500**	**465**		**14.7**		**0.85**		**0.68**

Passenger Loading Calculations

x	TIA ID	469 Stevenson		
x	Name			
x	Address			
x	Land Use	Retail	Residential	TOTAL
x	Geography	Place Type 1	Place Type 1	
	PM Peak Hour Person Trips	54	245	299
	Passenger Loading % (placetype 1)	5.50%	8.80%	
x	Pax Loading Instances (person trips*loading %)	3.0	21.6	24.5
	Pax Loading Duration (min)	1	1	1
x	Delivery Spaces Required (PCEs) (loading instances*duration/60)	0.05	0.36	0.41
x	Pax Loading Spaces Required (rounded up)	1	1	2

Appendix E.5-4

Garage Queuing Analysis

M/M/1 queuing analysis for Proposed Project

Arrival Rate	41	per hour
Total Capacity	240	per hour
Average Queue	0	cars

In	33	100%
Out		0%
Total	33	100%

%inbound:

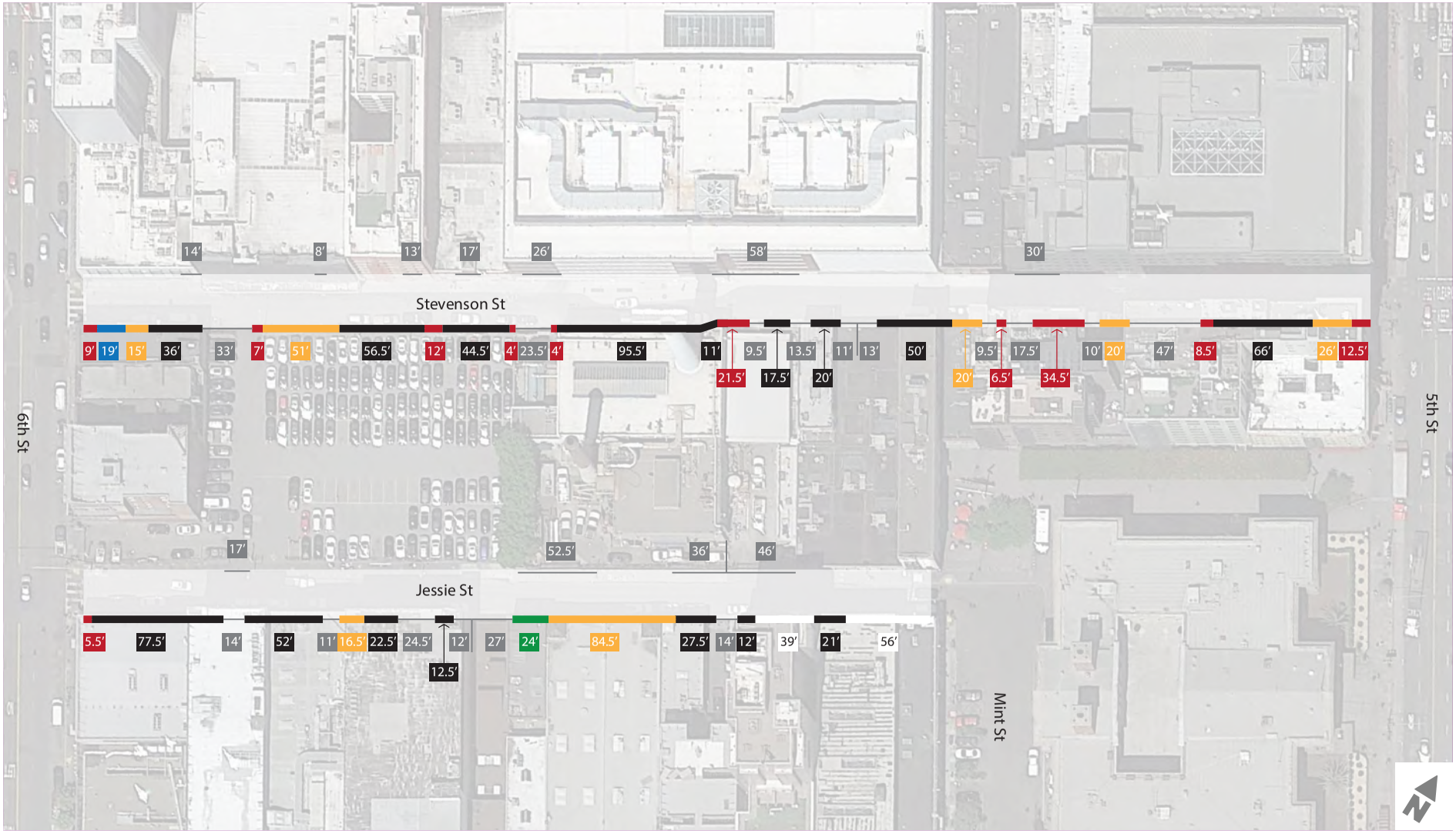
100%

Queue*	Probability	Percentile	Minutes					# Vehicles queued INBOUND vehicles
0	83%	83%	49.8		0.829167	1		0.0
1	14%	97%	8.5		0.829167	0.170833333		1.0
2	2%	100%	1.5		0.829167	0.029184028		2.0
3	0%	100%	0.2		0.829167	0.004985605		3.0
4	0%	100%	0.0		0.829167	0.000851707		4.0
5	0%	100.00%	0.0		0.829167	0.0001455		5.0
6	0%	100%	0.0		0.829167	2.48563E-05		6.0
7	0%	100%	0.0		0.829167	4.24628E-06		7.0
8	0%	100%	0.0		0.829167	7.25406E-07		8.0
9	0%	100%	0.0		0.829167	1.23923E-07		9.0
10	0%	100%	0.0		0.829167	2.11703E-08		10.0
11	0%	100%	0.0		0.829167	3.61659E-09		11.0
12	0%	100%	0.0		0.829167	6.17833E-10		12.0
13	0%	100%	0.0		0.829167	1.05547E-10		13.0
14	0%	100%	0.0		0.829167	1.80309E-11		14.0
15	0%	100%	0.0		0.829167	3.08027E-12		15.0
16	0%	100%	0.0		0.829167	5.26213E-13		16.0
17	0%	100%	0.0		0.829167	8.98948E-14		17.0
18	0%	100%	0.0		0.829167	1.5357E-14		18.0
19	0%	100%	0.0		0.829167	2.62349E-15		19.0
20	0%	100%	0.0		0.829167	4.4818E-16		20.0
21	0%	100%	0.0		0.829167	7.65641E-17		21.0
22	0%	100%	0.0		0.829167	1.30797E-17		22.0
Total	100%		60					

*Number of cars in queue.

Appendix E.5-5

Existing and Proposed Curb Designations



Street Parking

No Parking

Passenger Loading/Unloading

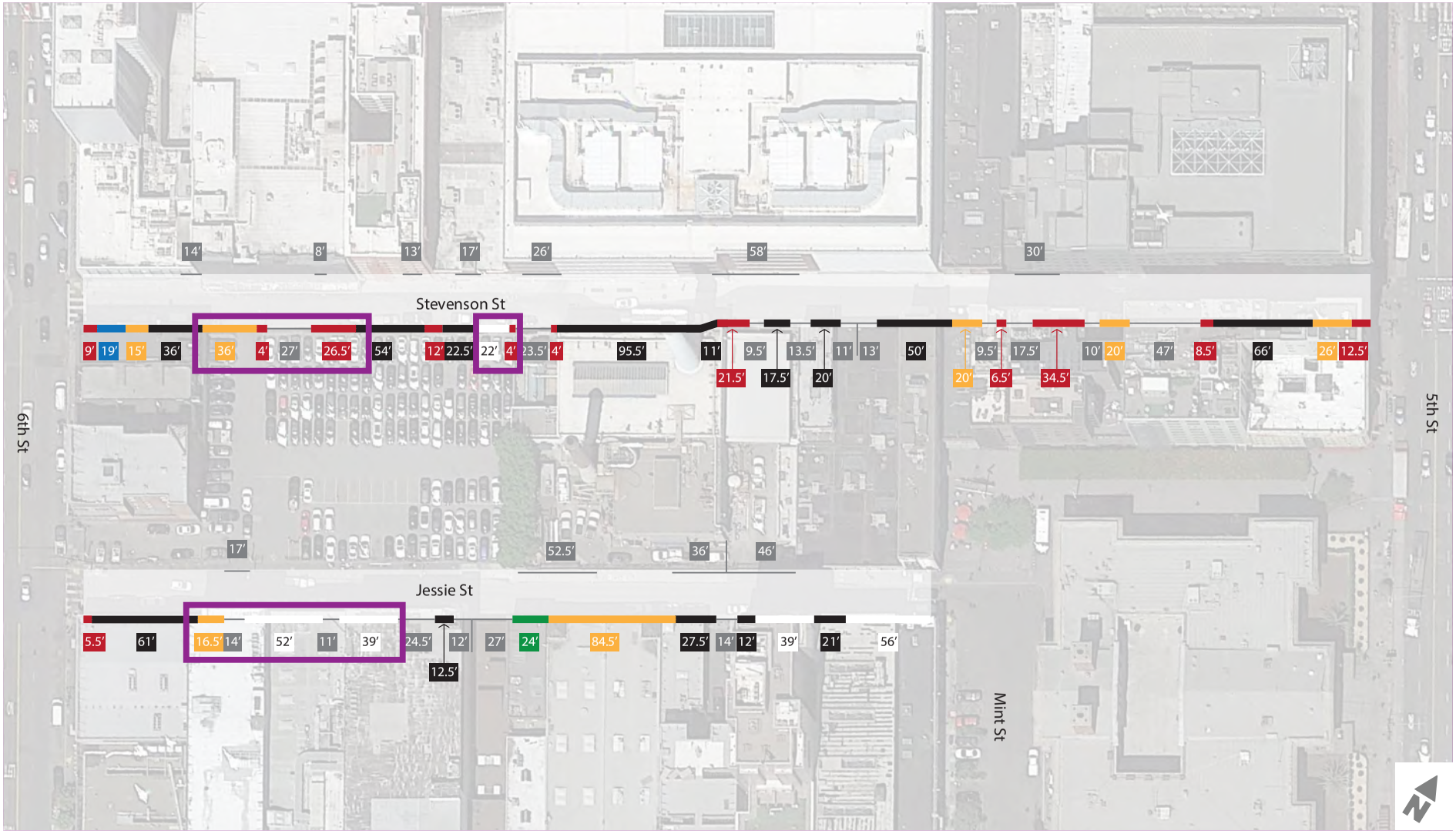
Short-Term Parking
10 minute parking, Mon-Fri, 9am - 6pm

Commercial Loading/Unloading

ADA Parking

Driveway

469 Stevenson Existing Curb Designations



Street Parking

No Parking

Passenger Loading/Unloading

Short-Term Parking
10 minute parking, Mon-Fri, 9am - 6pm

Commercial Loading/Unloading

ADA Parking

Driveway

Project Curb Changes

469 Stevenson Proposed Project Curb Designations

Appendix E.5-6

Volume Summary

Int #	Int Name	Movement	2018 Existing	Project Trips	Existing Plus Project	Baseline	Baseline Plus Project	Cumulative No Project	Cumulative Plus Project
1	6th/Stevenson	NBL	4	0	4	4	4	0	0
		NBT	1051	2	1053	1058	1060	940	942
		NBR	31	19	50	31	50	20	39
		SBL	17	0	17	17	17	60	60
		SBT	732	13	745	732	745	540	553
		SBR	1	0	1	1	1	0	0
		EBL	8	0	8	8	8	30	30
		EBT	9	13	22	9	22	30	43
		EBR	43	0	43	43	43	60	60
		WBL	0	0	0	0	0	0	0
		WBT	0	0	0	0	0	0	0
		WBR	3	0	3	3	3	0	0
2	6th/Jessie	NBL	6	0	6	6	6	0	0
		NBT	1105	21	1126	1112	1133	970	991
		NBR	32	7	39	32	39	30	37
		SBL	29	0	29	29	29	20	20
		SBT	751	13	764	751	764	540	553
		SBR	2	0	2	2	2	0	0
		EBL	2	0	2	2	2	20	20
		EBT	0	0	0	0	0	30	30
		EBR	1	0	1	1	1	20	20
		WBL	0	0	0	0	0	0	0
		WBT	0	0	0	0	0	0	0
		WBR	2	0	2	2	2	0	0
3	Stevenson/Driveway	NBL	1	0	1	1	1	0	0
		NBT	0	0	0	0	0	0	0
		NBR	11	12	12	11	23	20	12
		SBL	0	0	0	0	0	0	0
		SBT	0	0	0	0	0	0	0
		SBR	0	0	0	0	0	0	0
		EBL	0	0	0	0	0	0	0
		EBT	64	0	64	64	64	90	90
		EBR	3	32	32	3	35	20	32
		WBL	0	0	0	0	0	0	0
		WBT	1	0	1	1	1	0	0
		WBR	0	0	0	0	0	0	0
4	Jessie/Driveway	NBL	0	0	0	0	0	0	0
		NBT	0	0	0	0	0	0	0
		NBR	0	0	0	0	0	0	0
		SBL	21	3	3	21	24	30	3
		SBT	0	0	0	0	0	0	0
		SBR	0	0	0	0	0	0	0
		EBL	7	7	7	7	14	10	7
		EBT	66	0	66	66	66	80	80
		EBR	0	0	0	0	0	0	0
		WBL	0	0	0	0	0	0	0
		WBT	0	0	0	0	0	0	0
		WBR	0	0	0	0	0	0	0
5	5th/Stevenson	NBL	3	0	3	3	3	0	0
		NBT	694	0	694	694	694	1180	1180
		NBR	0	0	0	0	0	0	0
		SBL	0	0	0	0	0	0	0
		SBT	692	16	708	696	712	1220	1236
		SBR	1	0	1	1	1	0	0
		EBL	15	8	23	15	23	20	28
		EBT	0	0	0	0	0	0	0
		EBR	83	4	87	83	87	100	104
		WBL	0	0	0	0	0	0	0
		WBT	0	0	0	0	0	0	0
		WBR	0	0	0	0	0	0	0

6	Mission/Mint	NBL	9	0	9	9	9	10	10
		NBT	3	0	3	3	3	10	10
		NBR	12	0	12	12	12	20	20
		SBL	56	0	56	56	56	70	70
		SBT	0	0	0	0	0	0	0
		SBR	74	3	77	74	77	90	93
		EBL	30	0	30	30	30	40	40
		EBT	560	0	560	635	635	920	920
		EBR	0	0	0	0	0	0	0
		WBL	2	0	2	2	2	0	0
		WBT	595	19	614	595	614	710	729
		WBR	15	0	15	15	15	20	20
7	6th/Mission	NBL	2	0	2	2	2	0	0
		NBT	853	9	862	860	869	860	869
		NBR	65	0	65	125	125	140	140
		SBL	1	0	1	1	1	0	0
		SBT	717	0	717	717	717	430	430
		SBR	53	13	66	53	66	50	63
		EBL	2	0	2	2	2	0	0
		EBT	509	0	509	524	524	780	780
		EBR	182	0	182	184	184	160	160
		WBL	9	0	9	9	9	0	0
		WBT	432	3	435	432	435	700	703
		WBR	240	20	260	240	260	130	150
8	5th/Mission	NBL	4	0	4	4	4	0	0
		NBT	632	0	632	632	632	1050	1050
		NBR	152	0	152	152	152	250	250
		SBL	1	0	1	1	1	0	0
		SBT	721	3	724	725	728	1280	1283
		SBR	79	17	96	79	96	90	107
		EBL	4	0	4	4	4	0	0
		EBT	459	0	459	485	485	610	610
		EBR	141	0	141	190	190	390	390
		WBL	1	0	1	1	1	0	0
		WBT	546	2	548	546	548	620	622
		WBR	76	0	76	76	76	130	130
9	6th/Market	NBL	0	0	0	0	0	0	0
		NBT	976	2	978	983	985	1020	1022
		NBR	130	0	130	130	130	0	0
		SBL	132	0	132	132	132	210	210
		SBT	997	13	1010	997	1010	490	503
		SBR	8	0	8	8	8	60	60
		EBL	0	0	0	0	0	0	0
		EBT	170	0	170	170	170	0	0
		EBR	113	0	113	113	113	140	140
		WBL	0	0	0	0	0	0	0
		WBT	148	0	148	148	148	190	190
		WBR	0	0	0	0	0	0	0
10	5th/Market	NBL	2	0	2	2	2	0	0
		NBT	559	8	567	559	567	1150	1158
		NBR	149	0	149	149	149	0	0
		SBL	0	0	0	0	0	0	0
		SBT	695	16	711	699	715	1050	1066
		SBR	23	0	23	23	23	0	0
		EBL	0	0	0	0	0	0	0
		EBT	208	0	208	208	208	40	40
		EBR	83	0	83	83	83	170	170
		WBL	2	0	2	2	2	0	0
		WBT	277	0	277	277	277	60	60
		WBR	51	0	51	51	51	20	20

APPENDIX C: ENERGY CONSUMPTION CALCULATIONS

OFFROAD EQUIPMENT LIST

Phase	Equipment	Quantity	Horsepower	Load Factor	Hours per day	Total Working Days	Total Hours		LPMH	GPH	Total Fuel (gals)
Site Preparation/Demolition	Dump Truck	2	402	0.38	8	20	160		30.92	8.17	2,613
	Excavator	1	158	0.38	8	20	160		12.15	3.21	514
Excavation Shoring	Bore/Drill Rigs	1	221	0.5	8	45	360		22.36	5.91	2,127
	Dumper/Tenders	1	16	0.38	8	45	360		1.23	0.33	117
	Excavator	1	158	0.38	8	45	360		12.15	3.21	1,156
	Skid Steer Loaders	1	65	0.37	8	45	360		4.87	1.29	463
	Tractors/Loaders/Backhoes	1	97	0.37	8	45	360		7.26	1.92	691
	Aerial Lift	1	63	0.31	8	45	360		3.95	1.04	376
	Dump Truck	2	402	0.38	8	45	360		30.92	8.17	5,880
Foundation/Below Grade Construction	Concrete Pump	1	84	0.74	8	45	360	Electric			
	Manlift	1	63	0.31	8	45	360		3.95	1.04	376
	Dump Truck	1	402	0.38	8	45	360		30.92	8.17	2,940
Building Construction	Aerial Lift	1	63	0.31	8	653	5,224		3.95	1.04	5,455
	Cranes	1	231	0.29	7	653	4,571		13.56	3.58	16,371
	Forklift	1	89	0.2	8	653	5,224		3.60	0.95	4,971
	Rough Terrain Forklifts	1	100	0.4	8	653	5,224		8.10	2.14	11,172
	Electric Powered Welders	1			8	653	5,224	Electric			
	Concrete/Industrial Saws	2	81	0.73	8	653	5,224		11.97	3.16	33,029
	Dump Truck	1	402	0.38	8	653	5,224		30.92	8.17	42,665
	Manlift	2	63	0.31	8	653	5,224		3.95	1.04	10,909
	Scissor Lift	3	63	0.31	8	653	5,224		3.95	1.04	16,364
	Welder	1	46	0.45	8	653	5,224		4.19	1.11	5,781
Exterior Finishing	Air Compressors	1	78	0.48	6	306	1,836		7.58	2.00	3,675
	Forklift	1	89	0.2	8	306	2,448		3.60	0.95	2,330
	Manlift	1	63	0.31	8	306	2,448		3.95	1.04	2,556
	Welders	1	46	0.45	8	306	2,448		4.19	1.11	2,709
Sitework/Paving	Cement and Mortar Mixers	1	9	0.56	8	88	704		1.02	0.27	190
	Pavers	1	130	0.42	8	88	704		11.05	2.92	2,055
	Paving Equipment	1	132	0.36	8	88	704		9.62	2.54	1,789
	Pressure Washer	1	13	0.3	8	88	704		0.79	0.21	147
Total Diesel Consumption											**179,419**

Formula:

$$LPMH = (K \times HP \times LF) \div KPL$$

Constants:

Desc	Symbol	Quantity	Units
fuel consumption	K =	0.17	kg/brake hp-hour
weight	KPL =	0.84	kg/liter
	1 Liter =	0.264172	gallons

Notes:
CalEEMod Off-Highway Trucks used for Dump Trucks
Aerial Lift horsepower, load factor and hours of use per day used for Manlifts and Scissor Lifts - Please confirm equipment is equivalent

ONROAD EQUIPMENT LIST

Phase	Category	Vehicle Type	Quantity	Start Date	End Date	Total Working Days	Trip Length	Total trips per Day	Total Trips per Phase	Mileage per Day	Total Mileage per Phase	Fuel Economy	Total Fuel Consumption
Site Preparation/Demolition	Worker	Light-Duty/Passenger Vehicles	6	11/2/2020	11/27/2020	20	10.8	12		130	2,592	6.1	425
	Trucks	Heavy-Duty Diesel	50	11/2/2020	11/27/2020	20	40	50	1000	2,000	40,000	26.2	1,527
Excavation Shoring	Worker	Light-Duty/Passenger Vehicles	20	11/30/2020	1/29/2021	45	10.8	40		432	19,440	6.1	3,187
	Trucks	Heavy-Duty Diesel	70	11/30/2020	1/29/2021	45	40	70	3150	2,800	126,000	26.2	4,809
Foundation/Below Grade Construction	Worker	Light-Duty/Passenger Vehicles	20	2/1/2021	4/1/2021	45	10.8	40		432	19,440	6.1	3,187
	Trucks	Heavy-Duty Diesel	8	2/1/2021	4/1/2021	45	40	8	360	320	14,400	26.2	550
Building Construction	Worker	Light-Duty/Passenger Vehicles	20	4/5/2021	10/4/2023	653	10.8	40		432	282,096	6.1	46,245
	Trucks	Heavy-Duty Diesel	7	4/5/2021	10/4/2023	653	40	7	4571	280	182,840	26.2	6,979
Exterior Finishing	Worker	Light-Duty/Passenger Vehicles	10	7/1/2022	9/1/2023	306	10.8	20		216	66,096	6.1	10,835
	Trucks	Heavy-Duty Diesel	1	7/1/2022	9/1/2023	306	40	1	306	40	12,240	26.2	467
Sitework/Paving	Worker	Light-Duty/Passenger Vehicles	10	7/1/2023	11/1/2023	88	10.8	20		216	19,008	6.1	3,116
	Trucks	Heavy-Duty Diesel	1	7/1/2023	11/1/2023	88	40	1	88	40	3,520	26.2	134
Total Diesel Consumption													**14,466**
Total Gas Consumption													**66,995**

Assumed CalEEMod default trip length for construction worker trips
Assumed 40 miles for hauling (2x the CalEEMod default due to uncertainty of trip destination/origin)

Land Use	Size	Unit	Auto Trip Rate/unit	Total Trips per Day	Daily Vehicle Mileage	Days per Year	Annual VMT	Average Fuel Economy (miles/gallon)	Total Annual Fuel Consumption (gallons)
Retail	3.7	ksf	14.6	54	1.49	365	29,320.36	34.2	857
Residential	467	du	1.24	578	3.57	365	754,548.25	34.2	22,063
							783,869		22,920

Truck Trips

Land Use	Truck Trip Rate/Day	Daily Vehicle Mileage	Days per Year	Annual VMT	Average Fuel Economy (miles/gallon)	Total Annual Fuel Consumption (gallons)
Retail	0.8					
Residential	13.67					
Total	14.47	20	365	105631	6.1	17,317

Daily Vehile Mileage Calculations (SF TIM)

Existing TAZ VMT Per Capita (Residential):	1.9	
Existing TAZ VMT per retail employee (Retail):	7.3	3.56373057

New Residents:	1086
New Employees	11

Residential Vehicle Trips	578
Retail Vehicle Trips	54

EnergyUseLandUseSubType	Size	Title 24 Electricity Energy Intensity (KWhr/size/year)	Nontitle 24 Electricity Energy Intensity (KWhr/size/year)	Lighting Energy Intensity (KWhr/size/year)	Total Electricity Energy Demand (KWhr/size/year)	Total Electricity Demand (KWhr/year)		Title 24 Natural Gas Energy Intensity (KBTU/size/year)	Nontitle 24 Natural Gas Energy Intensity (KBTU/size/year)	Total Natural Gas Energy Demand (KBTU/size/year)	Total Natural Gas Demand (KBTU/year)
Apartments High Rise	467	426.45	3054.1	741.44	4221.99	1,971,669		6115.43	2615	8730.43	4,077,111
Enclosed Parking with Elevator	234	3.92	0.19	1.75	5.86	1,371		0	0	0	0
Strip Mall	4000	2.24	3.36	4.88	10.48	44,016		3.9	0.7	4.6	19,320
car stacker					140	51100					
						2,068,157					4,096,431

Note: The energy calculations included herein reference a trip generation more conservative by 4 total vehicle trips. As such, the energy use presented herein is more conservative.

APPENDIX B AIR QUALITY TECHNICAL REPORT

AIR QUALITY TECHNICAL APPENDIX

469 STEVENSON STREET PROJECT
SAN FRANCISCO CALIFORNIA

February 29, 2020

Prepared for:

City and County of San Francisco
Planning Department
1650 Mission Street #400
San Francisco, California 94103

Prepared by:

Stantec Consulting Services Inc.
1340 Treat Boulevard, Suite 300
Walnut Creek, California 94597

Criteria Air Pollutant and Health Risk Assessment Scope of Work

1 Project Description

The proposed project is located within an air pollution exposure zone (APEZ), which is an area designated by the San Francisco Department of Public Health (DPH) and San Francisco Planning Department (SF Planning) as having poor air quality (SF DPH and SF Planning 2014).

The project site is a through lot located at 469 Stevenson Street in the South of Market neighborhood of San Francisco (Assessor's Block 3704, Lot 45) (Figure 1). The project site is approximately 28,790 square feet (0.66 acre) and is currently developed as a surface parking lot with 176 parking spaces.

The project sponsor, BUILD, is proposing to demolish the existing surface parking lot and construct a new 27-story mixed-use building that is approximately 274 feet tall (with an additional 10 feet for rooftop mechanical equipment). The proposed project would total approximately 535,000[1] gross square feet (gsf) and include 495 dwelling units, approximately 4,000 square feet of commercial retail use on the ground floor, and approximately 25,000 square feet of private and common open space.[2] The proposed 495 dwelling units consisting of 192 studios, 33 junior one-bedroom units, 116 one-bedroom units, 96 two-bedroom units, 50 three-bedroom units, and 8 five-bedroom units would be available to rent. The proposed project would use the Individually Requested State Density Bonus Program[3] and provide affordable housing units onsite.

The proposed project would provide three below grade parking levels with 178 vehicle parking spaces, 200 class 1[4] bicycle parking spaces, and two service delivery loading spaces. Additionally, one on-site loading space would be located on the ground floor. Twenty-seven class 2[5] bicycle parking spaces would be placed along Jessie Street.

The proposed project would excavate 55,850 cubic yards of soil at the project site. The proposed project is anticipated to be constructed on a mat foundation and no pile driving or piers are proposed or required. Project construction would span approximately 36 months.

2 Project Location

The project site is a rectangular parcel of approximately 28,790 GSF (Figure 1). It is located along Stevenson Street and Jessie Street within the block between 6th Street and 5th Street. The existing site is level, largely paved and surrounded by a chain link fence. The property is currently used as a surface parking lot.

[1] All numbers are rounded to the nearest thousand or hundred thousand.

[2] Since publication of the NOP and initial study on October 2, 2019, the project sponsor has made a few changes to the project description. These changes have been incorporated into Chapter 2, Project Description of the EIR, and the analysis in Chapter 4, Environmental Setting and Impacts, to evaluate potential impacts to air quality. This report includes updated analyses for air quality impacts.

[3] City of San Francisco Planning Department, Individually Requested State Density Bonus Program, Informational and Supplemental Application Packet. http://forms.sfplanning.org/IndividuallyRequestedState_SupplementalApplication.pdf. Accessed September 18, 2019.

[4] Class 1 bicycle parking space(s) are spaces in secure, weather-protected facilities intended for use as long-term, overnight, and work-day bicycle storage by dwelling unit residents, non-residential occupants, and employees.

[5] Class 2 bicycle parking space(s) are bicycle racks located in a publicly-accessible, highly visible location intended for transient or short-term use by visitors, guests, and patrons to the building or use.

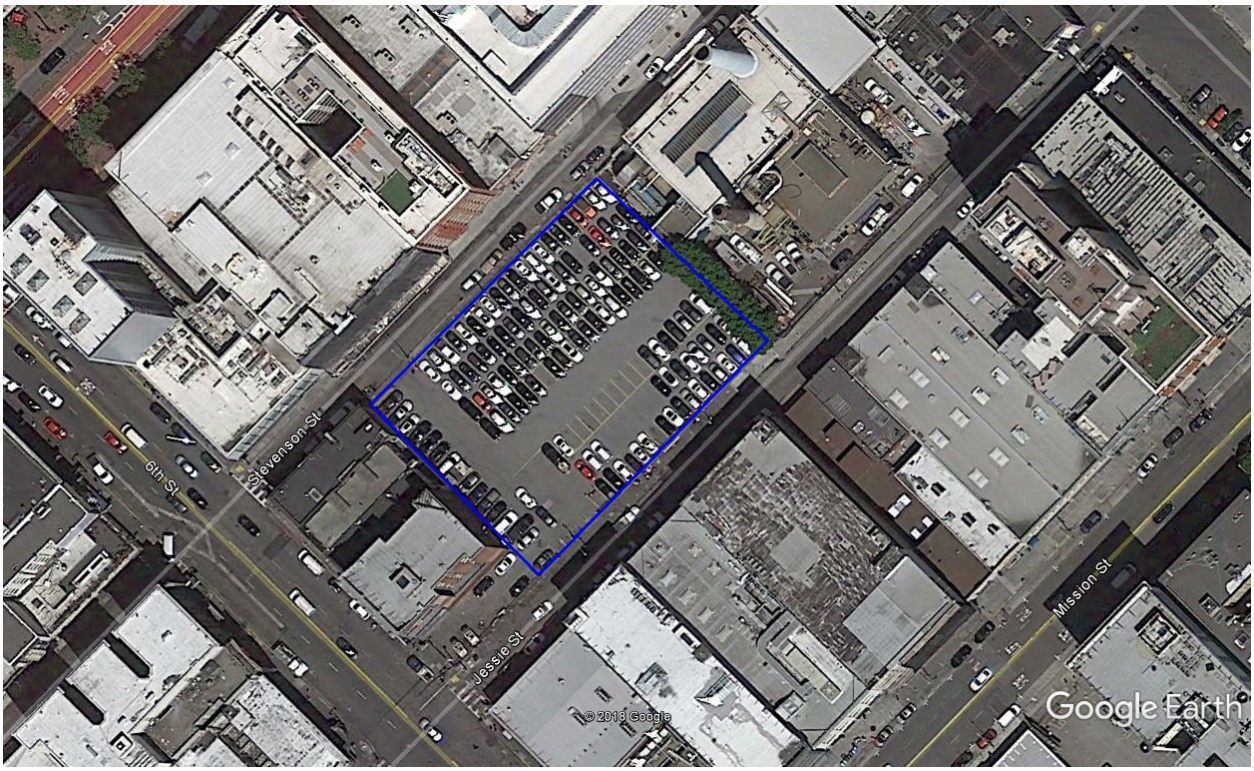


Figure 1 - Project Location (site outlined in blue)

3 Scope of Work Overview

At the request of the San Francisco Planning Department (SF Planning), Stantec will prepared an Air Quality Technical Appendix (AQTA) to analyze criteria air pollutants (CAPs) and toxic air contaminants (TACs), as well as local health impacts associated with the construction and operation of the Project. This analysis is being performed to support the Project's California Environmental Quality Act (CEQA) documentation and per the request of the San Francisco Planning Department. This report will comprise the complete Health Risk Assessment (HRA) documentation to satisfy San Francisco Planning Department requirements for CEQA analyses.

3.1 Construction and Operation Evaluation:

The purpose of the air quality analysis is to assess potential criteria air pollutant and health impacts that would result from construction and operation of the proposed project, consistent with guidelines and methodologies from the BAAQMD, California Air Resources Board (ARB), California Office of Environmental Health Hazard Assessment (OEHHA), and the US Environmental Protection Agency (USEPA). Consistent with recommendations in those guidelines, the HRA will evaluate the estimated excess lifetime cancer risk and particulate matter less than 2.5 microns in aerodynamic diameter (PM2.5) concentrations associated with emissions that would be emitted by on-site construction activities and vehicles associated with hauling, and toxic air contaminants (TACs) associated with the exhaust from diesel and gasoline emitted from vehicles associated with operational traffic, as well as operational emissions from the emergency backup diesel generator. The San Francisco City-wide HRA evaluates the existing cancer risks and PM2.5 concentrations from existing known sources of air pollution as part of the development of a Community Risk Reduction Plan (CRRP). The database developed for that effort is referred to as the CRRP-HRA. The modeling is documented in The San Francisco Community Risk Reduction Plan: Technical Support Documentation. In accordance with CEQA requirements and consistent with the CRRP-HRA, which was developed in consultation with the BAAQMD, the AQTA will evaluate:

1. Mass emissions of CAPs from both construction (includes on-site equipment and off-site traffic generated from construction) and operational sources (including stationary sources).

2. Project-level and Existing Plus Project health risk assessment of cancer risk and PM2.5 concentrations from construction and operational emissions on off-site populations, and operational emissions only for on-site populations (since these populations would not be exposed to the project's construction emissions), including residents and children that may be present. Project impacts will be added to existing background impacts from the CRRP-HRA.

3. A cumulative HRA of cancer risk and PM2.5 concentrations (to both on-site and off-site Project maximum exposed individual sensitive receptors (MEISRs) resulting from other sources of stationary, area, and mobile emissions as calculated in the CRRP-HRA for the horizon year determined appropriate by Environmental Planning, in addition to health impacts from the Proposed Project's construction and operation. This analysis will also include quantitative information on other nearby cumulative projects, not already included in the CRRP-HRA, where such information exists. Where quantitative information does not exist, a qualitative discussion of the additional health impact from cumulative projects will be provided.

4 Methodology Memorandum

The Project would generate off-road and traffic-related construction emissions as well as operational emissions associated with the testing of the project's emergency back-up diesel generator and operational traffic.

Prior to initiating modeling, Stantec will provide the San Francisco Planning Department with the HRA Scope and Methodology Memorandum for review and approval. The methodology memorandum will describe the emissions sources that will be included in the analysis, the methodology for quantifying emissions, the methodology for estimating air concentrations (including, chemical selection, sources to be modeled, dispersion modeling parameters), and risk characterization methods. The methodology memorandum will also provide information that will be used for the cumulative analysis. Stantec assumes that two administrative drafts and a final draft will be provided to the San Francisco Planning Department.

5 Results From Project Analysis

Stantec will provide modelling results analyzing the project's CAP emissions and health risks (cancer risk and PM 2.5 concentrations) at on-site and off-site sensitive receptor locations. The Project level analysis will consist of the following tables:

- Construction criteria air pollutant emissions in average lbs/day
- Operational criteria air pollutant emissions by operational category (and total operational emissions) in both average lbs/day and maximum annual emissions in tons/year.
- Existing+ Project PM2.5 emissions and cancer risk at the offsite MEISR. This table would include existing PM2.5 concentrations and cancer risk values at the offsite MEISR as well as PM2.5 concentrations from construction or operation (the higher of the two) and construction and operational cancer risk.
- Existing+ Project PM2.5 emissions and cancer risk at the onsite MEISR. This table would include existing PM2.5 concentrations and cancer risk values at the onsite MEISR as well as PM2.5 concentrations and cancer risk from project operations.

6 Emissions Reduction Measures

Stantec will meet with Planning and the Project sponsor team to identify two emissions reduction scenarios. Stantec will then quantitatively assess the effectiveness of both emissions reduction scenarios and present detailed tables similar to those listed in section 5, above, for each emissions reduction scenario.

7 Cumulative Analysis

Stantec will conduct a cumulative health risk analysis that consists of the following:

- Existing or cumulative horizon year background (as determined by Planning) health risks (PM2.5 concentration and cancer risk) at the offsite and onsite MEISRs (from the CRRP-HRA database)
- Project health risks at the offsite and onsite MEISRs
- Health risks from other cumulative projects within 1000 feet of the offsite and onsite MEISRs

Stantec will identify cumulative projects within 1,000 feet of the offsite and onsite MEISRs provide those to Planning. Planning will confirm the list of cumulative projects and provide quantitative health risk information from cumulative projects where that information exists. Stantec will then provide cumulative health risk tables consisting of the following:

- Cumulative PM2.5 emissions and cancer risk at the offsite MEISR. This table would include existing or cumulative horizon year PM2.5 concentrations and cancer risk values at the offsite MEISR as well as PM2.5 concentrations from construction or operation (the higher of the two) and construction and operational cancer risk. This table will also include quantitative health risk information from cumulative projects where such information exists.
- Cumulative PM2.5 emissions and cancer risk at the onsite MEISR. This table would include existing or cumulative horizon year PM2.5 concentrations and cancer risk values at the onsite MEISR as well as PM2.5 concentrations and cancer risk from project operations. This table will also include quantitative health risk information from cumulative projects where such information exists.

Within the EIR, Stantec will also provide a qualitative discussion of cumulative health risks from projects where quantitative information does not exist.

8 Uncertainties

Stantec will provide a summary of the modeling uncertainties to be included in the Air Quality Technical Appendix (AQTA).

9 Coordination with San Francisco Planning

Following approval of the HRA methodology memorandum and after obtaining necessary construction information from the project sponsor, Stantec will prepare CAP, DPM, PM2.5 and TAC emissions inventories for construction and operational emissions, conduct air dispersion modeling and health risk characterization. Preliminary CAP and health risk results will be presented to Planning and the project sponsor to determine: 1) whether any construction-related assumptions need to be refined, and 2) to identify two emissions control scenarios. Stantec will then conduct revised modeling, if required, and at a subsequent meeting, present revised CAP and health risk results. The health risk results will be presented for the proposed project, assuming uncontrolled emissions, and results of the two controlled scenarios will be presented. At this second meeting Stantec will also present the controlled and uncontrolled results for the cumulative scenario.

10 Air Quality Technical Appendix

The AQTA will include detail description of the analysis conducted. The AQTA will consist of the following: this scope of work, the HRA methodology memorandum, detailed results tables for the Project (see section 5, above), a description of the two emissions reduction scenarios and their effectiveness (see section 6, above), cumulative health risk tables (see section 7, above), and a summary of the modeling uncertainties. The AQTA will also include maps of the receptor and source placement within a ¼ mile and isopleth results of the Project analysis, and any modeling input and output data.

The health risk results will also be provided to SF Planning in a format that can be utilized with the City's Geodatabase (GIS shapefile and all excel-based information).

Document Production

Deliverables associated with the Project are outlined in Table 1: Summary of Initial Study Deliverables, below.

Table 1: Summary of AQTA Deliverables

HRA DELIVERABLE	COPIES
Administrative Draft #1 Air Quality Technical Appendix Scope and Methodology Memorandum	one hardcopy and digital copy (MS Word and PDF).
Administrative Draft #2 Air Quality Technical Appendix Scope and Methodology Memorandum	one hardcopy and digital copy (MS Word and PDF).
Final Air Quality Technical Appendix Scope and Methodology Memorandum	one hardcopy and digital copy (MS Word and PDF).
Preliminary draft Air Quality Technical Appendix results	electronic
Preliminary draft Air Quality Technical Appendix results for the Project's control scenarios	electronic
Administrative Draft #1 Air Quality Technical Appendix	one hardcopy and digital copy (MS Word and PDF).
Administrative Draft #2 Air Quality Technical Appendix	one hardcopy and digital copy (MS Word and PDF).
Final Air Quality Technical Appendix	one hard copy and one digital copy (MS Word and PDF)
Notes: Stantec has the ability to post the above listed documents on a file-sharing FTP site for ease of peer-review. All work products will be prepared in accordance with CEQA, CEQA Guidelines, the San Francisco Municipal Code, and San Francisco Environmental Review Guidelines.	

Assumptions

- Stantec assumes two controlled-scenarios and one uncontrolled scenario.
- Stantec will work with the San Francisco Planning Department to determine the controls that should be implemented
- Stantec will not perform any modeling until the HRA Scope and Methodology Memorandum is approved by San Francisco Planning Department

HRA Methodology Memo

469 STEVENSON STREET PROJECT
SAN FRANCISCO CALIFORNIA

February 21, 2020

Prepared for:

City and County of San Francisco
Planning Department
1650 Mission Street #400
San Francisco, California 94103

Prepared by:

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This document entitled HRA Methodology Memorandum - 469 Stevenson was prepared by Stantec Consulting Services Inc. ("Stantec") for the account of City and County of San Francisco (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

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Acronyms and Abbreviations

AERMOD	USEPA's atmospheric dispersion modeling system
APEZ	Air Pollution Exposure Zone
ARB	California Air Resources Board
ASF	Age Sensitivity Factors
BAAQMD	Bay Area Air Quality Management District
Cal/EPA	California Environmental Protection Agency
CalEEMod®	California Emissions Estimator Model
CAP	Criteria Air Pollutant
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CI	Compression Ignition
CPF	Cancer Potency Factor
CRRP	Community Risk Reduction Plan
DPH	(San Francisco) Department of Public Health
DPM	Diesel Particulate Matter
g/s	Grams per Second
GIS	Geographic Information Systems
HRA	Health Risk Assessment
lb/hr	Pounds per Hour
MEISR	Maximally Exposed Individual Sensitive Receptor
OEHHA	California Office of Environmental Health Hazard Assessment
PM	Particulate Matter
PM10	Respirable Particulate Matter Less than 10 Micrometers in Aerodynamic Diameter
PM2.5	Respirable Particulate Matter Less than 2.5 Micrometers in Aerodynamic Diameter
proposed project	469 Stevenson Street
SF	San Francisco
SFEP	San Francisco Planning Department's Environmental Planning
TAC	Toxic Air Contaminant
TOG	Total Organic Gas
USEPA	United States Environmental Protection Agency
VDECS	Verified Diesel Emissions Control Strategy
VMT	Vehicle Miles Traveled
$\mu g/m^3$	Microgram per Cubic Meter

1.0 INTRODUCTION

At the request of the San Francisco Planning Department, Stantec will conduct a California Environmental Quality Act (CEQA) analysis of local air quality and health impacts associated with the construction and operation of the proposed building at 469 Stevenson Street (referred to hereafter as "the proposed project") at future on-site (residential) and adjacent off-site sensitive receptors. This Air Quality and Health Risk Assessment (HRA) Methodology document describes the approach for evaluation of air quality and health impacts from construction and operational sources, existing sources, and cumulative sources at modeled sensitive receptors. This analysis will be performed to support the proposed project's CEQA documentation.

1.1 PROJECT UNDERSTANDING

The proposed project is located within an air pollution exposure zone (APEZ), which is an area designated by the San Francisco Department of Public Health (DPH) and San Francisco Planning Department (SF Planning) as having poor air quality (SF DPH and SF Planning 2014).

The project site is a through lot located at 469 Stevenson Street in the South of Market neighborhood of San Francisco (Assessor's Block 3704, Lot 45) (Figure 1). The project site is approximately 28,790 square feet (0.66 acre) and is currently developed as a surface parking lot with 176 parking spaces.

The project sponsor, BUILD, is proposing to demolish the existing surface parking lot and construct a new 27-story mixed-use building that is approximately 274 feet tall (with an additional 10 feet for rooftop mechanical equipment). The proposed project would total approximately 535,000[1] gross square feet (gsf) and include 495 dwelling units, approximately 4,000 square feet of commercial retail use on the ground floor, and approximately 25,000 square feet of private and common open space.[2] The proposed 495 dwelling units consisting of 192 studios, 33 junior one-bedroom units, 116 one-bedroom units, 96 two-bedroom units, 50 three-bedroom units, and 8 five-bedroom units would be available to rent. The proposed project would use the Individually Requested State Density Bonus Program[3] and provide affordable housing units onsite.

The proposed project would provide three below grade parking levels with 178 vehicle parking spaces, 200 class 1[4] bicycle parking spaces, and two service delivery loading spaces. Additionally, one on-site loading space would be located on the ground floor. Twenty-seven class 2[5] bicycle parking spaces would be placed along Jessie Street.

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[1] All numbers are rounded to the nearest thousand or hundred thousand.

[2] Since publication of the NOP and initial study on October 2, 2019, the project sponsor has made a few changes to the project description. These changes have been incorporated into Chapter 2, Project Description of the EIR, and the analysis in Chapter 4, Environmental Setting and Impacts, to evaluate potential impacts to air quality.

[3] City of San Francisco Planning Department, Individually Requested State Density Bonus Program, Informational and Supplemental Application Packet. http://forms.sfplanning.org/IndividuallyRequestedState_SupplementalApplication.pdf. Accessed September 18, 2019.

[4] Class 1 bicycle parking space(s) are spaces in secure, weather-protected facilities intended for use as long-term, overnight, and work-day bicycle storage by dwelling unit residents, non-residential occupants, and employees.

[5] Class 2 bicycle parking space(s) are bicycle racks located in a publicly-accessible, highly visible location intended for transient or short-term use by visitors, guests, and patrons to the building or use.

The proposed project would excavate 55,850 cubic yards of soil at the project site. The proposed project is anticipated to be constructed on a mat foundation and no pile driving or piers are proposed or required. Project construction would span approximately 36 months.

1.2 OBJECTIVE AND METHODOLOGY

The purpose of the air quality analysis is to assess criteria air pollutant (CAP) and potential health risks and hazards that would result from construction and operation of the proposed project consistent with guidelines and methodologies from air quality agencies, specifically, the Bay Area Air Quality Management District (BAAQMD), the California Air Resources Board (ARB), the California Office of Environmental Health Hazard Assessment (OEHHA), and the United States Environmental Protection Agency (USEPA). The CAP methodology and analysis will be consistent with BAAQMD's guidance in its CEQA Air Quality Guidelines. The CAP analysis will estimate emissions of oxides of nitrogen (NOx), reactive organic gases (ROG), particulate matter 10 microns in aerodynamic diameter (PM10), particulate matter 2.5 microns in aerodynamic diameter (PM2.5).The HRA will be consistent with BAAQMD, ARB, and OEHHA guidelines and will evaluate the estimated excess lifetime cancer risk and fine particulate matter (PM) concentration from diesel particulate matter (DPM), total organic gases (TOG), and PM2.5 concentrations associated with exhaust that would be emitted by construction and operational emissions. Emission sources from the proposed project that will be evaluated in the health risk assessment include one emergency diesel generator, diesel construction equipment, and Project-related traffic.

In accordance with CEQA requirements (BAAQMD 2017) and consistent with the Community Risk Reduction Plan – Health Risk Assessment (CRRP-HRA), which was developed in consultation with the BAAQMD, the proposed air quality analysis will include evaluation of a:

1. Project-level CAP emissions from construction and operations
2. Project-level health risk assessment of cancer risk and PM2.5 concentrations from construction and operational emissions on on-site (operations only) and off-site (construction and operations) populations, assuming proposed project buildout in 2024;
3. Cancer riskand PM2.5 concentrations from existing emissions sources (from the CRRP-HRA);
4. In addition, a cumulative HRA of cancer risk and PM2.5 concentrations under either existing background concentrations or future 2040 background conditions (to both future on-site and off-site receptors) resulting from other sources not included in the CRRP-HRA. This evaluation will include the impacts from nearby cumulative projects.

1.3 DOCUMENT ORGANIZATION

This technical report is divided into six sections as follows:

Section 1.0 – Introduction: describes the purpose and scope of the air quality analysis, the objectives and methodology used, and outlines the document organization.

Section 2.0 – Emission Estimates: describes the methods used to estimate criteria air pollutants (CAPs) and toxic air contaminant (TAC) emissions from the proposed project.

Section 3.0 – Estimated Air Concentrations: discusses the air dispersion modeling, the selection of the dispersion models, the data to be used in the dispersion models (e.g., terrain, meteorology, source characterization), and the identification of receptor locations evaluated in the HRA.

Section 4.0 – Risk Characterization Methods: provides an overview of the methodology for conducting the HRA.

Section 5.0 –Cumulative Analysis: summarizes the approach to be used in the HRA cumulative analysis.

Section 6.0 – References: includes a listing of all references cited in this report.

2.0 EMISSION ESTIMATES

This memorandum summarizes the methodology used to estimate criteria air pollutant (CAP) emissions from project operational sources, which will be used to estimate TAC emissions. Methodologies used to calculate construction CAP emissions and construction and operational TAC emissions are also summarized below.

2.1 CALCULATION METHODOLOGIES FOR CONSTRUCTION EMISSION SOURCES

2.1.1 Construction Equipment Emissions Estimates

Project-specific construction equipment inventories that include details on the type, quantity, construction schedule and hours of operation anticipated for each piece of equipment for each construction phase will be used to estimate construction emissions. Because there is typically a delay between new emission factors being developed and incorporated into air quality models, California Emissions Estimator Model (CalEEMod®) has not been updated to incorporate the latest ARB OFFROAD2017 and ARB's EMission FACtor (EMFAC) 2017 emission factors. For the diesel fueled equipment, Stantec will use methodologies consistent with California Emissions Estimator Model (CalEEMod®) to estimate equipment quantities and will create spreadsheets incorporating ARB's emission factors and load factors from OFFROAD2017 to estimate construction emissions and EMFAC2017 to estimate on-road mobile source emissions. Where project-specific equipment information is not available, CalEEMod® defaults will be used to inform equipment quantities. All DPM emissions will be conservatively assumed to be equal to Respirable Particulate Matter Less than 10 Micrometers in Aerodynamic Diameter (PM10) and Respirable Particulate Matter Less than 2.5 Micrometers in Aerodynamic Diameter (PM2.5) emissions from diesel equipment. The health risk analysis will also include PM2.5 from break wear and tire wear. The methodology used to calculate emissions from off-road equipment is presented in **Table 1**.

Emissions without control measures (uncontrolled emissions) will be calculated assuming fleet average equipment, meaning the emission factors used reflect the fleet predicted to be in use in the OFFROAD2017 model. Uncontrolled emissions are also based on project-specific estimates of equipment usage, fuel type, and construction trip generation. A scenario incorporating control measures will also be calculated if control measures are deemed necessary based on the results of the CAP emissions analysis or the health risk analysis. If determined necessary, two controlled scenarios will be evaluated, and those control scenarios will be developed based on consultation with SFEP and the Project Sponsor.

2.1.2 Construction Haul Truck Emissions Estimates

CalEEMod® estimates worker, vendor, and demolition hauling trip generation rates for construction of the proposed project. The estimate of the number of hauling trips for off-haul will be based on the total off-haul amount in cubic yards for the proposed project. On-road haul truck emissions will be calculated using the total number of trucks estimated by CalEEMod®, model based off of information provided by the Project Sponsor for material and soil import/export and emission factors from ARB's EMFAC2017 model. The default truck trip length in CalEEMod® was revised from 20 miles to 40 miles because final locations for material and soil import/export have not been determined and a 40-mile trip length would provide a conservative estimate for sources within the region. The default trip lengths in CalEEMod® are used for worker and vendor trips. For worker trips a 10.8-mile trip length is used based on the default worker trip length from CalEEMod®. For vendor trips a 7.3-mile trip length is used based on the regional default vendor trip length from CalEEMod®. The worker fleet is assumed to be 50% Light- Duty Automobiles, 25% Light-Duty Trucks and 25% Light Duty Trucks in CalEEMod®. Likewise, the vendor fleet is assumed to be 50% Medium Heavy-Duty Trucks and 50% Heavy-Heavy Duty Trucks (HHDT) in CalEEMod®. Hauling trips are assumed to be 100% HHDT in CalEEMod®. The emission factors used for construction of the proposed project cover the years 2021 through 2024, the anticipated years of construction.

On-road emissions will be calculated using the emission factors for running emissions of criteria pollutants in EMFAC2017, the ARB Emission Factors model for on-road emissions. EMFAC2017 includes the latest data on California's car and truck fleets and travel activity. New forecasting methods have been incorporated for developing vehicle age distributions and estimating vehicle miles traveled. The model also reflects the emissions benefits of Federal and California recent rulemakings such as Federal Phase 2 Greenhouse Gas Standards. The model also includes updates to truck emission factors based on the latest test data. For the HRA, Stantec will include DPM and PM2.5 emissions from haul truck activity (only) within 1 kilometer of the project site. Stantec assumes all haul trucks are diesel-fueled for the health risk assessment.

Emissions reported by the model will be converted to units of grams of pollutant emitted per vehicle mile traveled (VMT) or trip using the daily VMT or trips. The methodology used to calculate emissions is presented in **Table 1**.

2.2 CALCULATION METHODOLOGIES FOR OPERATIONAL EMISSIONS

2.2.1 Stationary Sources

The proposed project would include one new 750 kw, 480 V emergency diesel generator. This stationary source would be permitted with the BAAQMD and is expected to comply with applicable Best Available Control Technology and Best Available Control Technology for Toxics requirements (BAAQMD 2010). This project proposes Tier 2 engines equipped with an ARB Level 3 VDECS.

It is conservatively assumed that the proposed project would include a fire pump and that a second generator, located with the other diesel generator, would be required to provide emergency power to the fire pump. As such, Stantec will model this second generator using the same criteria as above.

The California Airborne Toxic Control Measure for Stationary Compression Ignition (CI) Engines (17 California Code of Regulations [CCR] 93115.6(3)(1)(C)) and BAAQMD Rule 9-8-330.3 restrict non-emergency use of emergency standby diesel-fueled CI engines to a maximum of 50 hours per year (CCR 2011; BAAQMD 2007); therefore, this analysis will assume that the emergency diesel generator will operate 50 hours per year.

For the emergency diesel generator, Stantec will model CAPs and the TACs evaluated will be DPM and PM2.5. Stantec will conservatively assume all exhaust PM10 from the emergency generator is DPM. Emissions will be calculated using the equation shown in **Table 1**.

Adjacent Permitted Stationary Sources

Clearway Energy, Inc. (formerly NRG Yield, Inc) owns and operates the Energy Center San Francisco, which supplies heating services to buildings in a two-square-mile area of the central business district of San Francisco, California. Station T located at 460 Jessie Street, and adjacent to the project site's eastern property line, houses six boilers: two of which produce 55,000 pounds per hour (lb/hr) of steam; two produce 100,000 lb/hr; one produces 50,000 lb/hr; and one produces 82,000 lb/hr. All boilers are fueled 100 percent by natural gas; however, No. 2 diesel is available as a backup fuel on some units. It is assumed that the emissions from Station T are included in the City-wide CRRP HRA and are part of the existing health risk. The inclusion of Station T in the CRRP-HRA will be confirmed.

2.2.2 Project Traffic (Buildout Year 2024)

Vehicles on the roadway emit CAPs and TACs from the combustion of fuel and will be evaluated in the risk evaluation for on-site and off-site sensitive receptors. Project traffic would be based off the traffic impact study prepared by the transportation consultant Fehr & Peers and will include retail trips, residential trips as well as service vehicle and vendor trips. Construction vehicle traffic are included in Section 2.1.1 above. Stantec will model TAC emissions from project traffic sources (including DPM and Gasoline/Diesel Total Organic Gas [TOG] emissions) based on information provided from the transportation consultant. The operational on-road mobile emissions calculation methodology is

presented in **Table 1**. Vehicle miles traveled will be based off of the TAZ-level data for the project site for the various uses.

3.0 ESTIMATED AIR CONCENTRATIONS

Consistent with the CRRP-HRA, the air toxics analysis will evaluate health risks and PM2.5 concentrations resulting from the proposed project upon the surrounding community. For the proposed project, this would include operational emissions starting in the proposed project build-out year and construction emissions occurring prior to the project build out year. The methodologies used to evaluate emissions from the proposed project are based on the most recent BAAQMD CEQA Guidelines (BAAQMD 2012, 2017) and the most recent Air Toxics Hot Spots Program Risk Assessment Guidelines (OEHHA 2015).

3.1 CHEMICAL SELECTION

The cancer risk analysis in the HRA for the proposed project is based on DPM concentrations from construction on- and off-road equipment and the emergency diesel generator, including diesel vehicles. Diesel exhaust, a complex mixture that includes hundreds of individual constituents (California Environmental Protection Agency [Cal/EPA] 1998), is identified by the State of California as a known carcinogen (Cal/EPA 2016). Under California regulatory guidelines, DPM is used as a surrogate measure of exposure for the mixture of chemicals that make up diesel exhaust as a whole. Cal/EPA and other proponents of using the surrogate approach to quantifying cancer risks associated with the diesel mixture indicate that this method is preferable to use of a component-based approach. A component-based approach involves estimating risks for each of the individual components of a mixture. Critics of the component-based approach believe it will underestimate the risks associated with diesel as a whole mixture because the identity of all chemicals in the mixture may not be known and/or exposure and health effects information for all chemicals identified within the mixture may not be available. Furthermore, Cal/EPA has concluded that “potential cancer risk from inhalation exposure to whole diesel exhaust will outweigh the multi-pathway cancer risk from the speciated components” (OEHHA 2003).

3.2 SOURCES

As discussed in the next section, concentrations of TACs from the proposed project emergency diesel generator, project traffic and construction equipment emissions will be estimated using the USEPA’s atmospheric dispersion modeling system (AERMOD) model.

3.3 AERMOD MODELING

The most recent version of the American Meteorological Society/Environmental Protection Agency regulatory air dispersion model (AERMOD Version 18081) will be used to evaluate ambient air concentrations of DPM, PM2.5, and TOG at off-site and on-site (from operational sources only) receptors (USEPA 2015). For each receptor location, the model generates air concentrations (or air dispersion factors as unit emissions will be modeled) that result from emissions from multiple sources.

Air dispersion models such as AERMOD require a variety of inputs such as source parameters, meteorological parameters, topography information, and receptor parameters. When site-specific information is unknown, default parameter sets that are designed to produce conservative (i.e., overestimates of) air concentrations will be used (USEPA 2015).

Stantec will use AERMOD to model the dispersion of emissions occurring along construction roadway routes, within construction areas, and emissions from project traffic, and the emergency diesel generator for the CEQA HRA to be consistent with the CRRP-HRA methodology.

3.3.1 Meteorological data

Air dispersion modeling applications require the use of meteorological data that ideally are spatially and temporally representative of conditions in the immediate vicinity of the site under consideration. For this HRA, BAAQMD's Mission Bay meteorological data for the year 2008 (the most recently available data set) will be used, which aligns with the San Francisco CRRP-HRA Methodology (BAAQMD, SF DPH & SF Planning 2012). BAAQMD no longer makes this data available on-line, therefore the meteorological data will need to be requested from BAAQMD.

3.3.2 Terrain considerations

Elevation and land use data will be imported from the National Elevation Dataset maintained by the United States Geological Survey (2015). An important consideration in an air dispersion modeling analysis is the selection of whether or not to model an urban area. Due to the urban nature of San Francisco, the project site will be modeled with the urban population of 884,363. This population is the 2017 estimate by the US Census Bureau.

3.3.3 Emission rates

Emissions will be modeled using the χ/Q ("chi over Q") method, such that each source has a unit emission rate (i.e., one gram per second [g/s]), and the model estimates dispersion factors (with units of micrograms per cubic meter [$\mu g/m^3$]/[g/s]). Actual emissions will be multiplied by the dispersion factors to obtain concentrations.

For annual average ambient air concentrations, the estimated annual average dispersion factors are multiplied by the annual average emission rates. The emission rates will vary day to day, with some days having no emissions. For simplicity, the model will assume a constant emission rate during the entire year.

3.3.4 Source parameters

Source location and parameters (see **Table 2**) are necessary to model the dispersion of air emissions.

For the onsite construction source, consistent with CRRP-HRA methodology, an area source encompassing the entire project site will be modeled. The release height will be set to five meters and because the area source represents construction equipment for which turbulent mixing would occur at release, the optional initial vertical dimension will be used and set to 1.4 meters. Construction sources will

be modeled from 7 am-8 pm based on data from the construction project manager. It is likely that some nighttime work will be required. Depending on the time of year of construction and weather patterns, emissions may disperse more rapidly if the upper atmosphere is cooler than the ground-level and may be more concentrated if the reverse is true. Neither situation would result in a discernible effect on the overall annual average risk results due to the limited amount of nighttime construction.

On-road construction vehicles will be modeled as a series of adjacent volume sources. The spacing of the sources and the initial horizontal dimensions will vary according to the roadway dimensions. The release height and initial vertical dimension will be modeled using 2.5 meters and 2.3 meters, respectively. On-road construction vehicles will be modeled within 1,000 meters of the project site.

Project traffic emissions will also be modeled as adjacent volume sources with spacing of the sources and the initial horizontal dimensions varying with roadway width. The release height and initial vertical dimension will also be identical to the on-road construction vehicles, however, for operational traffic, two vehicle classes will be modeled. Light- and heavy-duty vehicles will be assigned different diurnal traffic patterns in the models based on the methodology outlined in the CRRP-HRA. Project traffic emissions will be modeled up to 1,000 meters from the project site, based on data to be provided by Fehr & Peers.

The emergency diesel generator will be modeled as a point source, with a release height of 3.66 meters, a stack exit temperature of 739.8 Kelvin, a stack exit velocity of 45.3 meters per second, and a stack diameter of 0.183 meters, consistent with the CRRP-HRA Methodology (BAAQMD, SF DPH & SF Planning 2012). If actual stack parameters are available for the proposed generator, the actual parameters will be used preferentially over the CRRP-HRA parameters. Building downwash (the wake effects caused by air flow around buildings) caused by the Project buildings, as well as neighboring buildings, will not be accounted for in the operational modeling, consistent with CRRP Methodology. Factoring in building downwash would result in a lower impact estimate downwind and overestimate the localized concentrations thus it is not included in the modeling.

3.3.5 Receptors

In order to evaluate health impacts to on-site and off-site receptors, receptors will be placed at locations collocated with the receptors used in the CRRP-HRA and within 1,000 meters of the Project site (see **Figure 3** for project boundary and modeling extent). Receptors will be modeled at a height of 1.8 meters above terrain height, a default breathing height for ground-floor receptors, consistent with the CRRP-HRA analysis. As discussed previously, maximum average annual dispersion factors will be estimated for each receptor location. Sensitive receptor locations will include residential areas, day cares, schools (for children under 16 years of age), nursing homes, and hospitals. Sensitive receptors will be identified based on a review of Google Earth. The Maximally Exposed Individual Receptor (MEIR) will be identified and confirmed that they are the nearest sensitive receptor. **Figure 4** shows the on-site and nearest off-site sensitive receptors.

4.0 RISK CHARACTERIZATION METHODS

In February 2015, OEHHA released the updated Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (OEHHA 2015), which combines information from previously-released and adopted technical support documents to delineate OEHHA's revised risk assessment methodologies based on current science. This updated Guidance Manual supersedes the 2003 Hot Spots Guidance Manual (OEHHA 2003) that previously provided methodologies for conducting HRAs under the Air Toxics Hot Spots Program (AB2588). The BAAQMD issued Health Risk Assessment Guidelines in 2016 incorporating recommendations from the OEHHA 2015 Guidance Manual. This evaluation will use the OEHHA 2015 and BAAQMD 2016 guidance; details of this methodology are discussed below.

4.1 PROJECT SOURCES EVALUATED

As discussed in Section 1.2, Stantec will evaluate excess lifetime cancer risk and PM2.5 concentration for future on-site and off-site sensitive receptor exposure to emissions from proposed project construction and operation. The health risks from construction activity (construction equipment and nearby off-site haul trucks) as well as operational emergency diesel generator and Project traffic will be calculated using the methodology explained in the following sections.

4.2 EXPOSURE ASSESSMENT

Stantec will model all existing CRRP-HRA grid (20-meter spacing) receptors within one kilometer of the project boundary as well as residential receptors living on-site at the proposed project.

Potentially Exposed Populations: This analysis will evaluate off-site resident children commencing at the time of proposed project construction as well as off-site and on-site 30-year residents commencing at the time of proposed project operations based on OEHHA 2015 Hot Spots Guidelines. A conservative approach of considering all off-site sensitive receptors as residential receptors will be used in this analysis. Residential exposure assumptions are more conservative than those made for other sensitive receptor types as residential uses have the longest exposure duration, the highest breathing rate by applicable age group, and the highest exposure frequency and exposure time.

Exposure Assumptions: The exposure parameters used to estimate excess lifetime cancer risks for all potentially exposed populations for the construction and operation evaluations for this analysis will be obtained using risk assessment guidelines from OEHHA (2015) and BAAQMD (2016). **Table 3** shows the proposed exposure parameters that will be used for the HRA.

The chemical intake or dose is estimated by multiplying the inhalation intake factor, IF_{inh}, by the chemical concentration in air, C_i. When coupled with the chemical concentration, this calculation is mathematically equivalent to the dose algorithm given in the current OEHHA Hot Spots guidance (OEHHA 2015). The intake factor is calculated as follows:

$$IF_{inh} = \underline{DBR * FAH * EF * ED * CF}$$

AT

Where:

IF_{inh}	=	Intake Factor for Inhalation (m^3/kg-day)
DBR	=	Daily Breathing Rate (L/kg-day)
FAH	=	Frequency of Time at Home (unitless)
EF	=	Exposure Frequency (days/year)
ED	=	Exposure Duration (years)
AT	=	Averaging Time (days)
CF	=	Conversion Factor, 0.001 (m^3/L)

4.2.1 Toxicity Assessment

The toxicity assessment characterizes the relationship between the magnitude of exposure and the nature and magnitude of adverse health effects that may result from such exposure. For purposes of calculating exposure criteria to be used in risk assessments, adverse health effects are classified into two broad categories – cancer and non-cancer endpoints. Toxicity values that are used to estimate the likelihood of adverse effects occurring in humans at different exposure levels are identified as part of the toxicity assessment component of a risk assessment.

Stantec will use the Cal/EPA-approved (2016) inhalation cancer potency factor (CPF) for DPM and speciated TOG to evaluate TAC emissions emitted from non-diesel-fueled construction emissions sources, operational project vehicle traffic, and the operational emergency diesel generator. **Table 4** shows the CPFs for DPM and speciated TOG that will be used for the HRA.

4.2.2 Age Sensitivity Factors

The estimated excess lifetime cancer risks for a resident will be adjusted using age sensitivity factors (ASFs) that account for an “anticipated special sensitivity to carcinogens” of infants and children as recommended in the OEHHA Technical Support Document (OEHHA 2009) and OEHHA guidance (2015). Cancer risk estimates will be weighted by a factor of 10 for exposures that occur from the third trimester of pregnancy to two years of age and by a factor of three for exposures that occur from two years through 15 years of age. No weighting factor (i.e., an ASF of one, which is equivalent to no adjustment) is applied to ages 16 and older. **Table 5** presents the ASF values that will be used for the HRA.

4.3 RISK CHARACTERIZATION

4.3.1 Estimation of Cancer Risks

Excess lifetime cancer risks are estimated as the upper-bound incremental probability that an individual will develop cancer over a lifetime as a direct result of exposure to potential carcinogens. The cancer risk attributed to a chemical is calculated by multiplying the chemical intake or dose at the human exchange boundaries (e.g., lungs) by the chemical-specific CPF.

The equation used to calculate the potential excess lifetime cancer risk for the inhalation pathway is as follows:

$$Risk_{inh} = C_i \times CF \times IF_{inh} \times CPF \times ASF$$

Where:

$Risk_{inh}$	=	Cancer risk; the incremental probability of an individual developing cancer as a result of inhalation exposure to a particular potential carcinogen (unitless)
C_i	=	Annual average air concentration for $chemical_i$ ($\mu g/m^3$)
CF	=	Conversion factor (mg/µg)
IF_{inh}	=	Intake factor for inhalation (m^3/kg-day)
CPF_i	=	Cancer potency factor for $chemical_i$ (mg chemical/kg body weight-day)$^{-1}$
ASF	=	Age sensitivity factor (unitless)

5.0 EXISTING PLUS PROJECT ANALYSIS

The CRRP-HRA contains existing cancer risk and $PM_{2.5}$ concentrations for all receptor points modeled in the CRRP-HRA database. This will enable the existing plus project and cumulative analysis to be as accurate as possible given publicly available data. Stantec will present tables showing the existing plus project cancer risk and $PM_{2.5}$ concentrations at the off-site and on-site MEISRs.

6.0 CONTROL MEASURES

Stantec will coordinate with SFEP and the Project Sponsor to identify two control scenarios. Stantec will quantitatively evaluate the effectiveness of the control scenarios and document the methodology used to quantitatively evaluate the control scenarios.

7.0 CUMULATIVE ANALYSIS

Stantec will also calculate the cumulative cancer risk and PM2.5 concentrations from the proposed project, existing sources and the cancer risk and PM2.5 concentration from cumulative projects not included in the CRRP-HRA database. Once the onsite and off-site MEISRs are known, Stantec will coordinate with SFEP to identify cumulative projects within 1,000 feet of each MEISR. SFEP will provide quantitative health risk information for cumulative projects where such information exists. Where no quantitative health risk information from cumulative projects exist, Stantec will include a qualitative discussion of nearby projects (within 1,000 feet of the MEISRs) and their likely impact on the MEISR as part of the cumulative analysis in the air quality technical appendix and the environmental document. Stantec assumes no additional modeling will be required in the cumulative analysis.

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APPENDIX A

Tables

Appendix A

Table 1 Emissions Calculations Methodology

Type	Source	Methodology and Formula	**Reference**
Construction Equipment	Off-Road Equipment[1]	$E_C = \Sigma(EF_C * HP * LF * Hr * C)$	ARB/USEPA Engine Standards USEPA NONROAD
Construction On-Road Mobile Sources[2]	Exhaust – Running	$E_R = \Sigma(EF_R * VMT * C)$, where VMT = Trip Length * Trip Number	EMFAC2017
	Exhaust - Idling	$E_I = \Sigma(EF_I * \text{Trip Number})$	EMFAC2017
Operational On-Road Mobile Sources[3]	Running Exhaust	$E_R = \Sigma(EF_R * VMT * C)$, where VMT = Roadway Link Length * Vehicle Counts	EMFAC2017
	Brake wear and Tire wear	$E_{BW,TW} = \Sigma(EF_{BW,TW} * VMT * C)$, where VMT = Roadway Link Length * Vehicle Counts	EMFAC2017
	Running Loss	$E_{RL} = \Sigma(EF_{RL} * VMT * C)$, where VMT = Roadway Link Length * Vehicle Counts	EMFAC2017
Operation	Generators[4]	$E = EF * HP * Hr$	ARB/USEPA Off-Road Engine Standards

Notes:

1. Ec: off-road equipment exhaust emissions (lb).
   EFc: emission factor (g/hp-hr). Methodologies consistent with CalEEMod 2016.3.2 will be used to derive emission factors from OFFROAD2017 default emission factors.
   HP: equipment horsepower. OFFROAD2017.
   LF: equipment load factor. OFFROAD2017.
   Hr: equipment hours.
   C: unit conversion factor.

2. On-road construction mobile sources include all diesel truck trips. Emissions associated with construction mobile sources were calculated using the following formulas.

   E_R: running exhaust emissions (lb).
   EF_R: running emission factor (g/mile). From EMFAC2017. EMFAC reports emissions in tons/day and VMT in miles/day. The emission factor is calculated as the quotient of those outputs. The calculation assumes all material transporting and soil hauling trucks are heavy-heavy duty trucks.

   For diesel trucks: EF_R = EFHHDT, where, EFHHDT is the emission factor for heavy-heavy duty trucks (T7 single construction) (g/mile). From EMFAC2017.
   VMT: vehicle miles traveled
   C: unit conversion factor.
   Trip Length: The one-way trip length as calculated based on the truck route.
   Trip Number: CalEEMod will be used to provide the number of trips for concrete, delivery, and haul trucks.

   E_I: vehicle idling emissions (lb).
   EF_I: vehicle idling emission factor (g/trip). From EMFAC2017. EMFAC reports emissions in g/hr. The emission factor is calculated as the quotient of those outputs. This method of calculating the emission factor assumes an average idling time per trip.
   C: unit conversion factor.

3. On-road operational mobile sources include all project-related traffic. Emissions associated with operational mobile sources were calculated using the following formulas.

   ER: running exhaust emissions (lb).
   EFR: running emission factor (g/mile). From EMFAC2017. EMFAC reports emissions in tons/day and VMT in miles/day. The emission factor is calculated as the quotient of those outputs. Running exhaust emissions are estimated for PM10 from diesel-fueled vehicles (DPM), TOG from gasoline-fueled vehicles, and PM2.5 from all vehicles.

   $E_{BW,TW:}$ vehicle brake wear and tire wear emissions (lb).
   EFBW, TW: vehicle brake wear and tire wear emission factor (g/mile) from EMFAC2017. EMFAC reports emissions in tons/day and VMT in miles/day. The emission factor is calculated as the quotient of those outputs. Brake wear and tire wear emissions are estimated for PM2.5 from all vehicles.

   E_R: running loss emissions (lb).
   EF_{RL}: running loss emission factor (g/mile) from EMFAC2017. EMFAC reports emissions in tons/day and VMT in miles/day. The emission factor is calculated as the quotient of those outputs. Running loss emissions are estimated for non-diesel TOG emissions only.

   VMT: vehicle miles traveled
   C: unit conversion factor.

4. E: generator engine emissions
   EF: compression-ignition (diesel) engine emission factor. ARB/USEPA engine PM standard based on engine tier will be used.

   HP: generator horsepower.
   Hr: generator hours. If hours are not known, will assume 50 hours of operation annually as a conservative assumption, as required by BAAQMD permitting requirements. The Air Toxics Control Measure (ACTM) for Stationary Toxic Compression Ignition Engines (Section 93115, Title 17, California Code of Regulations (CCR) limits maintenance and testing for nonemergency use to 50 hours for engines that emit less than 0.15 grams per break horsepower-hour (g/bhp/hr).

Abbreviations:

ARB - California Air Resources Board
BAAQMD - Bay Area Air Quality Management District
bhp - break horsepower-hour
CalEEMod - CALifornia Emissions Estimator MODel
EF - Emission Factor
EMFAC - EMission FACtor Model
EP - Environmental Planning
g - gram
HP - Horsepower
lb - pound
LF - Load Factor
mi - mile
USEPA - United States Environmental Protection Agency
VMT - vehicle miles traveled

Reference:

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Table 2 Modeling Parameters for Construction and Operation

Period	Source	Source Type[1]	Source Dimension	Number of Sources[2]	Release Height[3,4]	Exit Temperature[4]	Exit Velocity[4]	Exit Diameter[4]	Initial Vertical Dimension[5]	Initial Lateral Dimension[6]
			[m]		[m]	[K]	[m/s]	[m]	[m]	[m]
Construction	Construction Equipment	Area	Project Area	1	5				1.4	
Construction	On-Road Trucks	Volume	Variable	---	2.5				2.3	Variable
Construction	On-Road Light-Duty Vehicles	Volume	Variable	----	2.5				2.3	Variable
Construction	On-Road Heavy-Duty Vehicles	Volume	Variable	----	2.5				2.3	Variable
Operational	Emergency Generators	Point	Variable	1	3.66	739.8	45.3	0.183		

1. Due to lack of specific instructions on modeling of construction emissions from BAAQMD, Stantec will use methodology from the CRRP-HRA (BAAQMD 2012) when setting up the model. According to the CRRP-HRA methodology, construction sources were modeled as area sources.
2. The number of on-road sources is based on the geometry of the truck or traffic routes.
3. According to the CRRP-HRA methodology, release height of the modeled volume sources representing construction equipment was set to 5 meters. The emergency generators were modeled with default stack parameters consistent with the CRRP-HRA Methodology.
4. Source parameters for the generator are based on median generator data in STI, 2011.
5. According to the CRRP-HRA methodology, initial vertical dimension of the modeled construction equipment volume sources was set to 1.4 meters.
6. According to USEPA ISC3 User's Guide Volume II, initial lateral dimension of single volume sources is length of side divided by 4.3. For a line source modeled as adjacent volume sources, the initial lateral dimension is the length of the side divided by 2.15.
7. Although operational light- and heavy-duty vehicles have identical release parameters, the two sources will be distinguished with different diurnal traffic patterns within the models.
8. Shaded cells indicate that those parameters are not applicable.

Abbreviations:
BAAQMD - Bay Area Air Quality Management District
g - gram
hp - horsepower
ISC - Industrial Source Complex Model
K - Kelvin
m - meter
s - second
SCAQMD - South Coast Air Quality Management District
STI - Sonoma Technology, Inc.
USEPA - United States Environmental Protection Agency

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Table 3 Exposure Parameters

Receptor Type	Period	Receptor Age Group	Exposure Parameters					
			Daily Breathing Rate (DBR)1 [L/kg-day]	Exposure Duration (ED)2 [years]	Fraction of Time at Home (FAH)3 [unitless]	Exposure Frequency (EF)4 [days/year]	Averaging Time (AT) [days]	Intake Factor, Inhalation (IFinh) [m3/kg-day]
Off-Site Resident	Construction and Operation	3rd Trimester	361	0.25	1.0	350	25550	0.0012
		Age 0-<2 Years	1090	2.0	1.0			0.030
		Age 2-<9 Years	631	0.38	1.0			0.0033
On- and Off-Site Resident	Operation	3rd Trimester	361	0.25	1.0	350	25550	0.0012
		Age 0-<2 Years	1090	2.0	1.0			0.030
		Age 2-<16 Years	572	14	1.0			0.11
		Age 16-30 Years	261	14	0.73			0.037

1. Daily breathing rates reflect default breathing rates from OEHHA 2015 and BAAQMD 2016 as follows:
   Resident: 95th percentile 24-hour daily breathing rate for 3rd trimester and age 0-<2 years; 80th percentile for age 2-<9, 2-<16, and 16-30 years (per BAAQMD 2016 guidance).
2. The exposure duration for residents during construction reflects the proposed construction schedule of approximately 2.63 years; the exposure duration for operation reflects the default residential exposure duration from OEHHA 2015.
3. For residents, fraction of time spent at home is conservatively assumed to be 1 (i.e. 24 hours/day) for age groups from the third trimester to less than 16 years old. Based on the OEHHA 2015 Guidance, the age group 16 to 30 years old is estimated to be at school or work for 6.5 hours of the day. Therefore, the fraction of time spent at home is assumed to be 0.73 (17.5 hours/24 hours per day).
4. Residential exposure frequency reflects default exposure frequency from OEHHA 2015.

Calculation:
IFinh = DBR * FAH * EF * ED * CF / AT
CF = 0.001 (m3/L)

Abbreviations:
AT - averaging time
BAAQMD - Bay Area Air Quality Management District
DBR - daily breathing rate
ED - exposure duration
EF - exposure frequency
FAH - fraction of time at home
IF_{inh} - intake factor
kg - kilogram
L - liter
m^3 - cubic meter
OEHHA - Office of Environmental Health Hazard Assessment

References:
BAAQMD. 2016. Air Toxics NSR Program Health Risk Assessment (HRA) Guidelines. January.

Table 4 Carcinogenic Toxicity Values

Source	Chemical	CAS Number	Cancer Potency Factor [mg/kg-day]$^{-1}$
Construction Sources and Emergency Generators	Diesel PM	9901	1.1
Operational Traffic	Acetaldehyde	75-07-0	0.01
	Benzene	71-43-2	0.1
	1,3-Butadiene	106-99-0	0.6
	Ethylbenzene	100-41-4	0.0087
	Formaldehyde	50-00-0	0.021
	Naphthalene	91-20-3	0.12

Abbreviations:
ARB - Air Resources Board
Cal/EPA - California Environmental Protection Agency
CAS - chemical abstract services
mg/kg-day - milligrams per kilogram per day

Reference:
Cal/EPA. 2016. OEHHA/ARB Consolidated Table of Approved Risk Assessment Health Values. March.
Available at: http://www.arb.ca.gov/toxics/healthval/contable.pdf.

Table 5 Age Sensitivity Factors

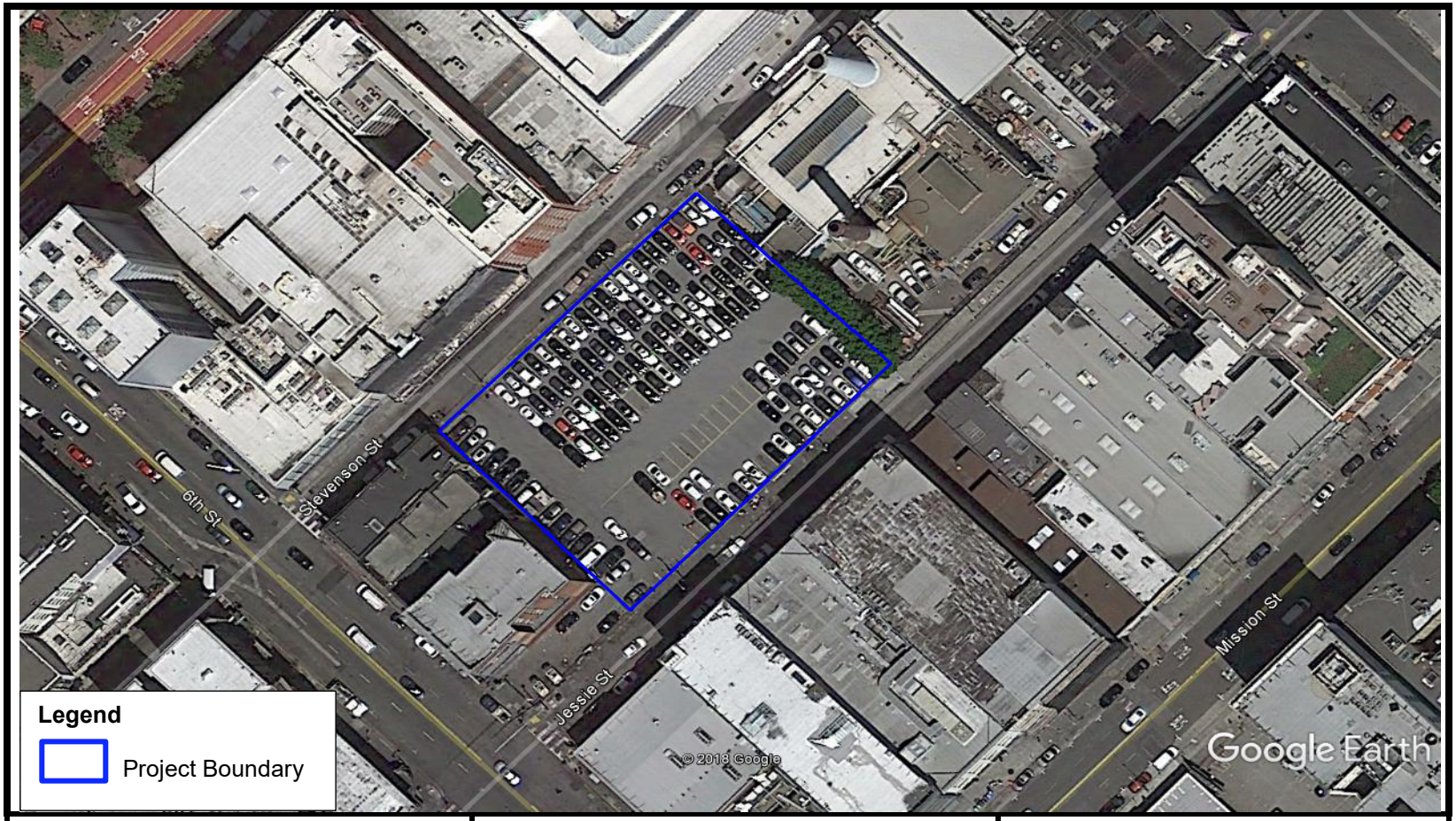
Receptor Type	Period	Receptor Age Group[1]	Value[2]
All Receptors	Construction and Operation	3rd Trimester	10
		Age 0-<2 Years	10
		Age 2-<9 Years	3
		Age 2-<16 Years	3
		Age 16-30 Years	1

Notes:
1 Age sensitivity factors are applicable for the age groups relevant to each receptor type listed in Table 3 Exposure Parameters.
2 Age sensitivity factors are unitless.

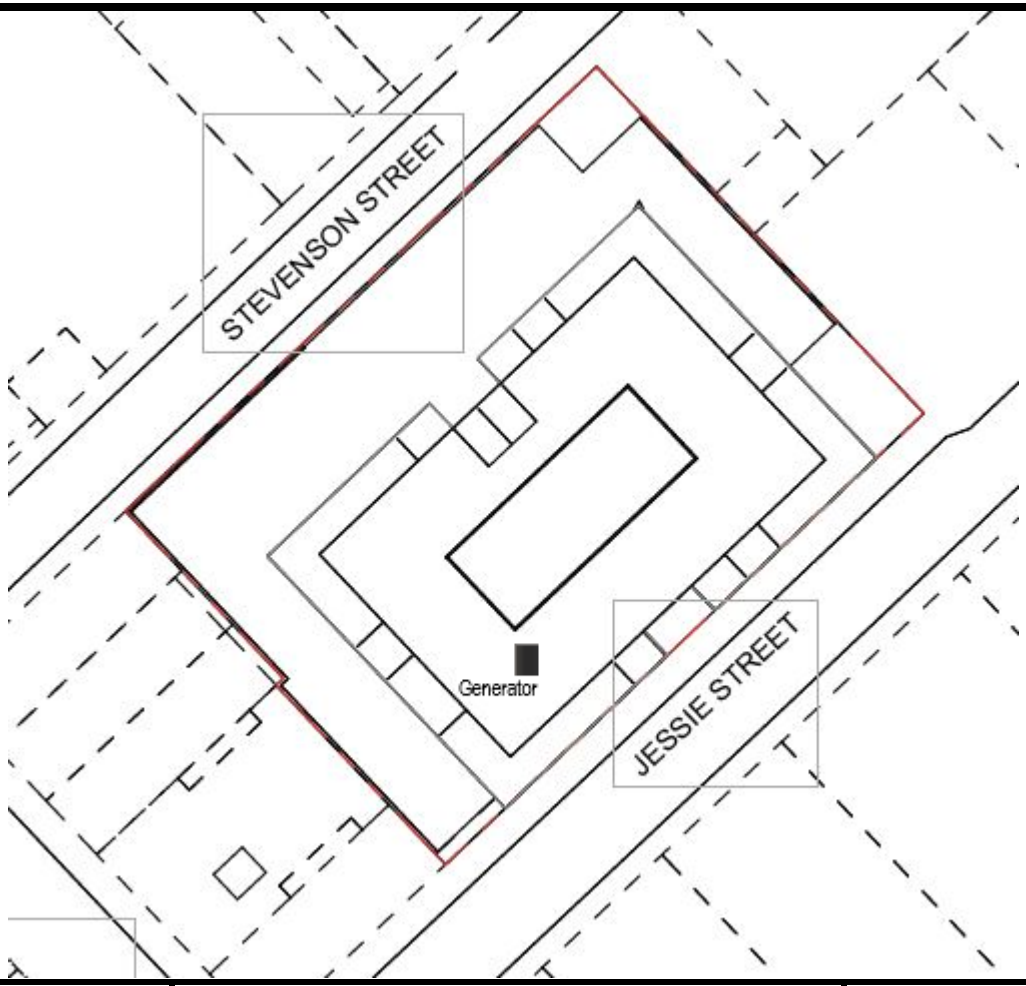
Abbreviation:
ASF - Age sensitivity factor

APPENDIX B

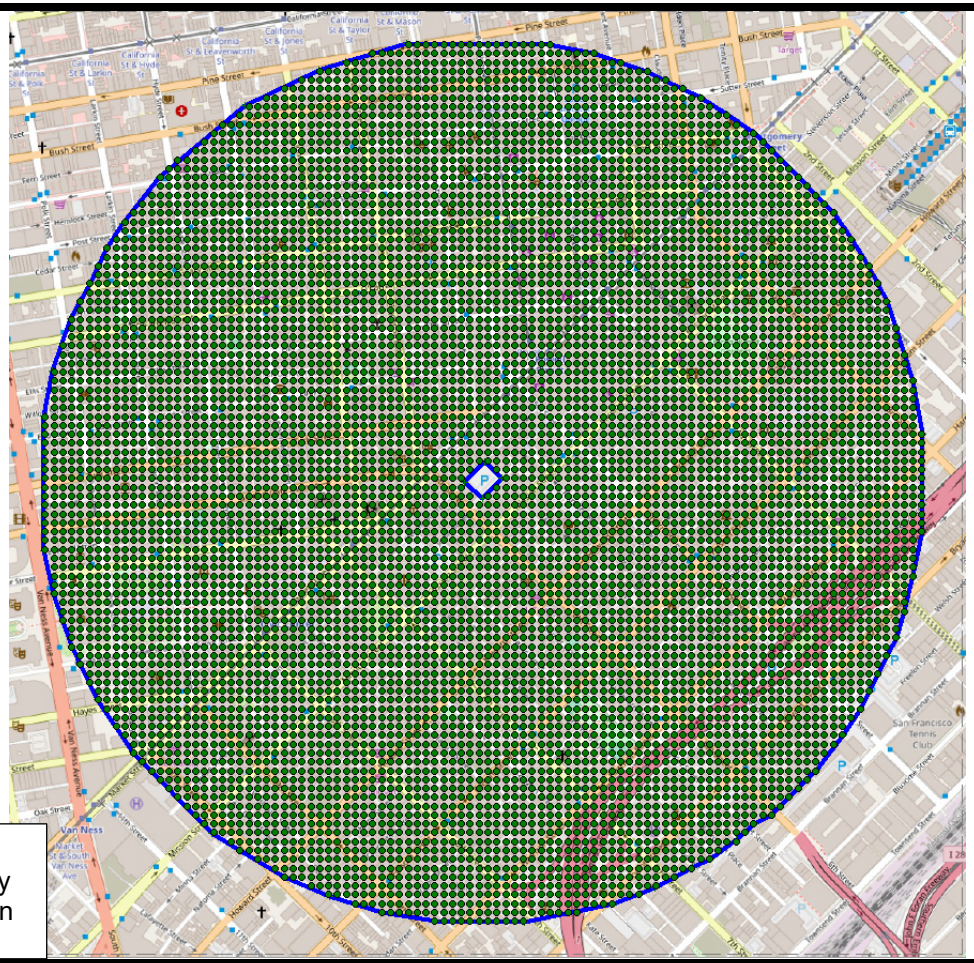
Figures



Stantec	**Project Location** 469 Stevenson Street San Francisco, California	**Figure 1**
DRAFTED BY: LV DATE: 2/4/19		



Stantec	**Proposed Project Layout** 469 Stevenson Street San Francisco, California	**Figure 2**
DATE: 2/4/19		Note: Generator is on ground floor between retail and lounge area



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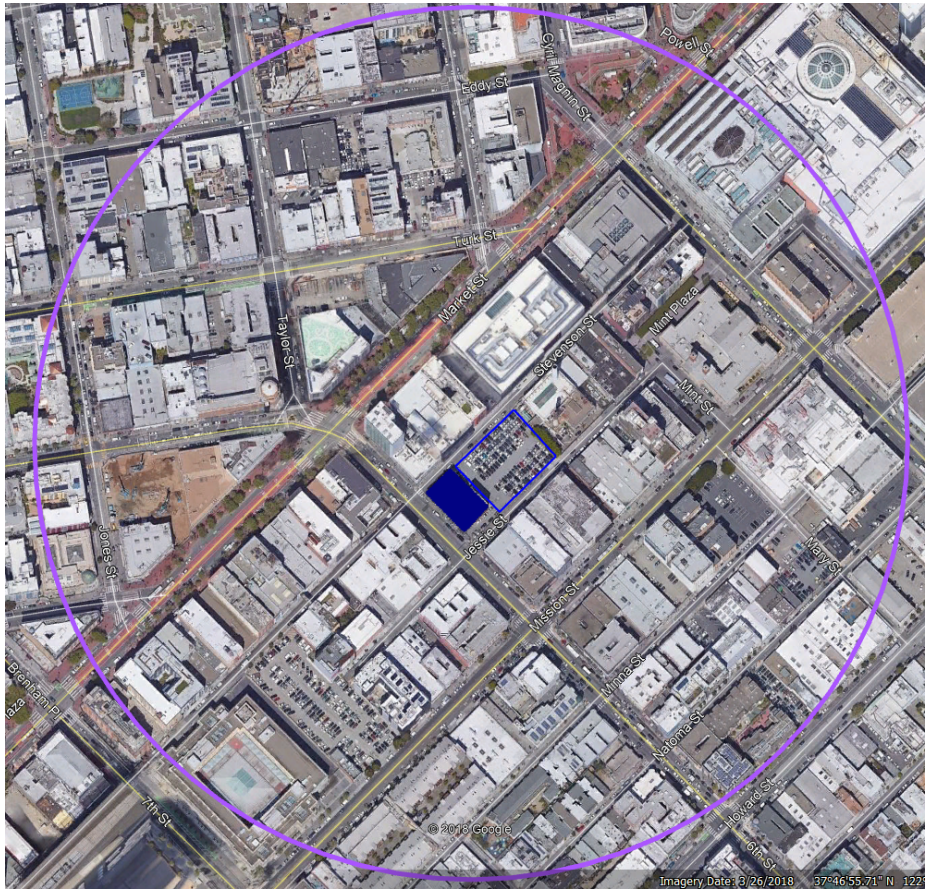
DRAFTED BY: EN

DATE: 4/5/19

Project Boundary and Construction Modeling Extent

469 Stevenson Street
San Francisco, California

Figure 3



Legend

- Project Boundary
- 1000m Buffer
- On-site and Nearest Off-site Sensitive Receptors

Stantec

DRAFTED BY: LV

DATE: 2/4/19

On-Site and Nearest Off-Site Sensitive Receptor Locations

469 Stevenson Street

San Francisco, California

Figure 4

Air Quality Results Memorandum for 469 Stevenson Street Project

February 28, 2020

Prepared for:

City and County of San Francisco
Planning Department
1650 Mission Street #400
San Francisco, California 94103

Prepared by:

Stantec Consulting Services Inc.
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AIR QUALITY RESULTS MEMORANDUM FOR 469 STEVENSON STREET PROJECT

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Stantec

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Acronyms and Abbreviations

µg/m^3	micrograms per cubic meter
APEZ	air pollution exposure zone
BAAQMD	Bay Area Air Quality Management District
CalEEMod™	California Emissions Estimator Model
CAP	criteria air pollutant
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
DPH	San Francisco Department of Public Health
gsf	gross square feet
HRA	Health Risk Assessment
lbs/day	pounds per day
lbs/year	pounds per year
MEISR	Maximally Exposed Individual Sensitive Receptor
N/A	Not applicable, construction would be completed by first occupancy
NO_X	nitrogen oxide
OEHHA	California Office of Environmental Health Hazard Assessment
PM	Particulate Matter
PM10	Respirable Particulate Matter Less than 10 Micrometers in Aerodynamic Diameter
PM2.5	Respirable Particulate Matter Less than 2.5 Micrometers in Aerodynamic Diameter
proposed project	469 Stevenson Street Project
ROG	reactive organic gas
sf	square feet
SF Planning	San Francisco Planning Department
Stantec	Stantec Consulting Services Inc.
TAC	toxic air contaminant
tons/year	tons per year
UTM	Universal Transverse Mercator

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1.0 INTRODUCTION

At the request of the San Francisco Planning Department, Stantec Consulting Services Inc. (Stantec) conducted a California Environmental Quality Act (CEQA) analysis of local air quality and health impacts associated with the construction and operation of the proposed building at 469 Stevenson Street (referred to hereafter as the proposed project) at adjacent sensitive receptors. The Air Quality and Health Risk Assessment (HRA) Methodology document describes the approach for evaluation of air quality and health impacts from construction and operational sources, existing sources, and cumulative sources at modeled sensitive receptors. This analysis was performed to support the proposed project's CEQA documentation.

1.1 PROJECT UNDERSTANDING

The proposed project is located within an air pollution exposure zone (APEZ), which is an area designated by the San Francisco Department of Public Health (DPH) and San Francisco Planning Department (SF Planning) as having poor air quality (SF DPH and SF Planning 2014).

The project site is a through lot located at 469 Stevenson Street in the South of Market neighborhood of San Francisco (Assessor's Block 3704, Lot 45) (Figure 1). The project site is approximately 28,790 square feet (0.66 acre) and is currently developed as a surface parking lot with 176 parking spaces.

The project sponsor, BUILD, is proposing to demolish the existing surface parking lot and construct a new 27-story mixed-use building that is approximately 274 feet tall (with an additional 10 feet for rooftop mechanical equipment). The proposed project would total approximately 535,000[1] gross square feet (gsf) and include 495 dwelling units, approximately 4,000 square feet of commercial retail use on the ground floor, and approximately 25,000 square feet of private and common open space.[2] The proposed 495 dwelling units consisting of 192 studios, 33 junior one-bedroom units, 116 one-bedroom units, 96 two-bedroom units, 50 three-bedroom units, and 8 five-bedroom units would be available to rent. The proposed project would use the Individually Requested State Density Bonus Program[3] and provide affordable housing units onsite.

The proposed project would provide three below grade parking levels with 178 vehicle parking spaces, 200 class 1[4] bicycle parking spaces, and two service delivery loading spaces. Additionally, one on-site

[1] All numbers are rounded to the nearest thousand or hundred thousand.
[2] Since publication of the NOP and initial study on October 2, 2019, the project sponsor has made a few changes to the project description. These changes have been incorporated into Chapter 2, Project Description of the EIR, and the analysis in Chapter 4, Environmental Setting and Impacts, to evaluate potential impacts to air quality. This report includes updated analyses for air quality impacts.
[3] City of San Francisco Planning Department, Individually Requested State Density Bonus Program, Informational and Supplemental Application Packet. http://forms.sfplanning.org/IndividuallyRequestedState_SupplementalApplication.pdf. Accessed September 18, 2019.
[4] Class 1 bicycle parking space(s) are spaces in secure, weather-protected facilities intended for use as long-term, overnight, and work-day bicycle storage by dwelling unit residents, non-residential occupants, and employees.

loading space would be located on the ground floor. Twenty-seven class 2[5] bicycle parking spaces would be placed along Jessie Street.

The proposed project would excavate 55,850 cubic yards of soil at the project site. The proposed project is anticipated to be constructed on a mat foundation and no pile driving or piers are proposed or required. Project construction would span approximately 36 months.

The proposed project site plan is shown in Figure 2 on page 9.

Criteria air pollutant (CAP) emissions were estimated using emission factors from the California Air Resources Board's (CARB's) OFFROAD2017 and EMFAC2017 models for on-road and off-road mobile sources. The following assumptions were used to prepare the CAP emissions estimates.

Table 1. Construction Schedule

Phase	Start Date	End Date	Total Work Days
Site Preparation/Demolition	11/1/2021	11/26/2021	20
Excavation/Shoring	11/29/2021	1/28/2022	45
Foundation/Below-Grade Construction	1/31/2022	4/1/2022	45
Building Construction	4/4/2022	10/2/2024	653
Exterior Finishing	6/5/2023	8/5/2024	306
Site Work/Paving	6/3/2024	10/2/2024	88

Source: Project Sponsor, personal communication, August 2019

[5] Class 2 bicycle parking space(s) are bicycle racks located in a publicly-accessible, highly visible location intended for transient or short-term use by visitors, guests, and patrons to the building or use.

Table 2. On-road Construction Vehicles

Phase	Year	Vehicle Type	Quantity per day	Daily Vehicle Mileage Per Vehicle	Total Days
Site Preparation/Demolition	2021	Worker	12	10.8	20
		Trucks	50	40	20
Excavation/Shoring	2021	Worker	40	10.8	45
		Trucks	70	40	45
Foundation/Below-Grade Construction	2022	Worker	40	10.8	45
		Trucks	8	40	45
Building Construction	2022	Worker	380	10.8	205
		Trucks	6.72	40	205
Building Construction	2023	Worker	380	10.8	252
		Trucks	6.72	40	252
Exterior Finishing	2023	Worker	380	10.8	148
		Trucks	6.72	40	148
Building Construction	2024	Worker	380	10.8	196
		Trucks	6.72	40	196
Exterior Finishing	2024	Worker	76	10.8	158
		Trucks	0	40	158
Site Work/Paving	2024	Worker	30	10.8	88
		Trucks	0	40	88

Source: Project Sponsor, personal communication, August 2019

Table 3. Off-road Construction Equipment

Phase	Equipment	Quantity	HP	LF	Hours per day
Site Preparation/Demolition	Dump Truck	2	402	0.38	8
	Excavator	1	158	0.38	8
Excavation Shoring	Bore/Drill Rigs	1	225	0.5	8
	Dumper/Tenders	1	97	0.38	8
	Excavator	1	158	0.38	8
	Skid Steer Loaders	1	97	0.37	8
	Tractors/Loaders/Backhoes	1	97	0.37	8
	Aerial Lift	1	63	0.31	8
	Off-Highway Trucks	2	402	0.38	5
Foundation/Below Grade Construction	Manlift	1	63	0.31	8
	Off-Highway Truck	1	402	0.38	5
Building Construction	Aerial Lift, Manlifts, Scissor Lift	6	63	0.31	8
	Cranes	1	231	0.29	7
	Forklift	1	89	0.2	8
	Rough Terrain Forklifts	1	89	0.4	8
	Electric Powered Welders	1	50	N/A	8
	Off-Highway Truck	1	402	0.38	5
	Welders	3	46	0.45	8
Exterior Finishing	Air Compressors	1	78	0.48	6
	Forklift	1	89	0.2	8
	Manlift	1	63	0.31	8
	Welders	1	46	0.45	8
Site Work/Paving	Cement and Mortar Mixers	1	9	0.56	8
	Pavers	1	125	0.42	8
	Paving Equipment	1	130	0.36	8
	Pressure Washer	1	13	0.3	8

Notes:

Based on fleet average emission factors for the year 2021 and assumed to remain consistent for post-2021 years.

HP = horsepower

LF = load factor

The California Emissions Estimator Model (CalEEMod™) was used to provide the emissions estimates from off-gassing from architectural coatings and for area and energy sources.

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469 Stevenson Street Project

Case No. 2017-014833ENV

Figure 1: Project Site Location

Air Quality Technical Report

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

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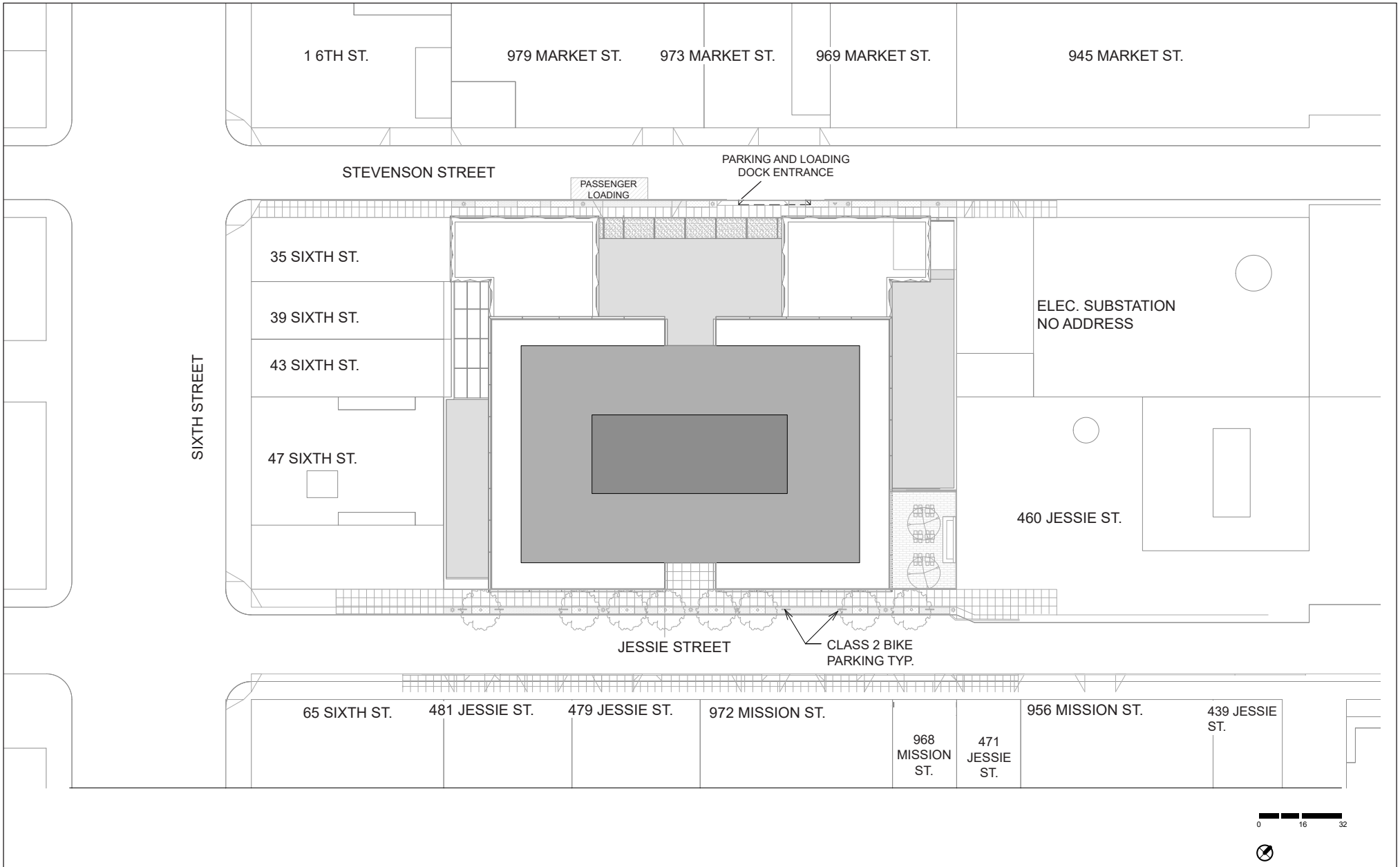

Source: Solomon Cordwell Buenz 2019

469 Stevenson Street Project

Case No. 2017-014833ENV

Figure 2: Proposed Project Site Plan

Air Quality Technical Report

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2.0 MODELING RESULTS

This section presents the proposed project's CAP emissions as well as project impact results for onsite and offsite residents. Because the proposed project is located within an APEZ and construction emissions would exacerbate health risk impacts and $PM_{2.5}$ concentrations, control measures were also considered for the proposed project. Two control scenarios are evaluated in this analysis and are briefly described below. Emission calculations and methodologies are provided in the HRA Methodology Memo.

- Control Scenario 1: This scenario would use a Tier IV drill rig and Tier IV excavator. The remaining off-road construction equipment is assumed to be fleet average equipment based on the construction year of 2021.
- Control Scenario 2: This scenario would use Tier IV equipment for all off-road construction equipment.

2.1 CRITERIA AIR POLLUTANT EMISSIONS

2.1.1 Construction

Table 4 summarizes the proposed project's average daily uncontrolled construction CAP emissions (i.e., emissions without control measures).

Table 4. Total Criteria Air Pollutant Construction Emissions – Uncontrolled[1]

Year	Annual Emissions (lbs/year)				
	Source	**ROG**	**NO_X**	**PM_{10}[2]**	**$PM_{2.5}$[3]**
2021	Off-road	34.34	337.01	13.75	12.65
	On-road	55.44	1583.43	60.62	35.54
2021 Subtotal		**89.78**	**1920.44**	**74.37**	**48.18**
2022	Off-road	314.60	2688.62	170.43	156.80
	On-road	40.23	749.10	111.91	0.00
2022 Subtotal		**354.83**	**3437.72**	**282.35**	**156.80**
2023	Off-road	461.27	3789.04	236.08	217.19
	On-road	68.43	1190.18	204.63	91.14
	Architectural Coating	1430.60	0.00	0.00	0.00
2023 Subtotal		**1960.31**	**4979.22**	**440.70**	**308.33**
2024	Off-road	404.86	3320.94	202.74	186.52
	On-road	36.69	599.19	116.34	51.28
	Architectural Coating	6499.20	0.00	0.00	0.00
2024 Subtotal		**6940.76**	**3920.13**	**319.08**	**237.80**
Grand Total		**9345.68**	**14257.52**	**1116.50**	**751.11**
Average Daily Emissions[4]		**12.25**	**18.69**	**1.46**	**0.98**

Notes:
1.Based on fleet average emission factors for year 2021 for all off-road construction equipment
2. PM_{10} exhaust emissions only
3. $PM_{2.5}$ exhaust emissions only
4. Average daily emissions (lbs/day) based on 763 total working days
lbs/year= pounds per year
$PM_{2.5}$ = respirable particulate matter less than 2.5 micrometers in aerodynamic diameter
PM_{10} = respirable particulate matter less than 10 micrometers in aerodynamic diameter
Source: Appendix A, Emissions Summary

Table 5 summarizes the average daily controlled CAP emissions for Control Scenario 1. Control Scenario 1 assumes that the drill rig and excavator equipment are Tier IV and the remaining equipment is based on fleet average emission factors for the year 2021.

Table 5. Total Criteria Air Pollutant Construction Emissions – Control Scenario 1[1]

Year	Annual Emissions (lbs/year)				
	Source	**ROG**	**NO_X**	**PM_{10}[2]**	**$PM_{2.5}$[3]**
2021	Off-road	30.23	267.39	10.87	10.00
	On-road	55.44	1583.43	60.62	35.54
2021 Subtotal		**85.67**	**1850.82**	**71.49**	**45.54**
2022	Off-road	314.60	2688.62	170.43	156.80
	On-road	40.23	749.10	111.91	0.00
2022 Subtotal		**354.83**	**3437.72**	**282.35**	**156.80**
2023	Off-road	461.27	3789.04	236.08	217.19
	On-road	68.43	1190.18	204.63	91.14
	Architectural Coating	1430.60	0.00	0.00	0.00
2023 Subtotal		**1960.31**	**4979.22**	**440.70**	**308.33**
2024	Off-road	404.86	3320.94	202.74	186.52
	On-road	36.69	599.19	116.34	51.28
	Architectural Coating	6499.20	0.00	0.00	0.00
2024 Subtotal		**6940.76**	**3920.13**	**319.08**	**237.80**
Grand Total		**9341.56**	**14187.89**	**1113.63**	**748.47**
Average Daily Emissions[4]		**12.24**	**18.59**	**1.46**	**0.98**

Notes:

1. Based on Tier IV drill rig and excavators with remaining equipment based on fleet average emission factors for year 2021
2. PM_{10} exhaust emissions only
3. $PM_{2.5}$ exhaust emissions only
4. Average daily emissions (lbs/day) based on 763 total working days

lbs/year= pounds per year

NO_X = nitrogen oxide

$PM_{2.5}$ = respirable particulate matter less than 2.5 micrometers in aerodynamic diameter

PM_{10} = respirable particulate matter less than 10 micrometers in aerodynamic diameter

ROG = reactive organic gases

Source: Appendix A, Emissions Summary

Table 6 summarizes the average daily CAP emissions for Control Scenario 2. Control Scenario 2 assumes that all off-road construction equipment is Tier IV.

Table 6. Total Criteria Air Pollutant Construction Emissions – Control Scenario 2[1]

Year	Annual Emissions (lbs/year)				
	Source	**ROG**	**NO_X**	**PM_{10}[2]**	**$PM_{2.5}$[3]**
2021	Off-road	18.18	73.55	2.51	2.31
	On-road	55.44	1583.43	60.62	35.54
2021 Subtotal		**73.62**	**1656.98**	**63.13**	**37.85**
2022	Off-road	66.52	697.50	5.55	5.10
	On-road	40.23	749.10	111.91	0.00
2022 Subtotal		**106.76**	**1446.60**	**117.46**	**5.10**
2023	Off-road	108.56	1214.09	8.13	7.48
	On-road	68.43	1190.18	204.60	91.14
	Architectural Coating	1430.60	0.00	0.00	0.00
2023 Subtotal		**1607.59**	**2404.27**	**212.73**	**98.61**
2024	Off-road	101.50	1095.76	8.43	7.76
	On-road	36.69	599.19	116.34	51.28
	Architectural Coating	6499.20	0.00	0.00	0.00
2024 Subtotal		**6637.39**	**1694.95**	**124.78**	**59.04**
Grand Total		**8425.36**	**7202.80**	**518.10**	**200.60**
Average Daily Emissions[4]		**11.04**	**9.44**	**0.68**	**0.26**

Notes:

1. Based on all off-road construction equipment being Tier IV
2. PM_{10} exhaust emissions only
3. $PM_{2.5}$ exhaust emissions only
4. Average daily emissions (lbs/day) based on 763 total working days

lbs/year= pounds per year

NO_X = nitrogen oxide

$PM_{2.5}$ = respirable particulate matter less than 2.5 micrometers in aerodynamic diameter

PM_{10} = respirable particulate matter less than 10 micrometers in aerodynamic diameter

ROG = reactive organic gases

Source: Appendix A, Emissions Summary

2.1.3 Operations

The project's operational CAP emissions are summarized in Table 7. The emissions are for full buildout of the project.

Table 7. Total Criteria Air Pollutant Operational Emissions

Annual Emissions				
Source	**ROG**	**NOx**	**PM_{10}**	**$PM_{2.5}$**
	(tons/year)			
Area	2.40	0.04	0.02	0.02
Energy	0.02	0.20	0.02	0.02
Generators	0.11	0.49	0.02	0.02
Traffic	0.01	0.05	0.00	0.00
Total Emissions (tons/year)	**2.55**	**0.77**	**0.06**	**0.06**
Average Daily Emissions				
Source	**ROG**	**NOx**	**PM_{10}**	**$PM_{2.5}$**
	(lbs/day)			
Area	12.82	0.44	0.21	0.21
Energy	0.12	1.03	0.08	0.08
Generators	0.60	2.70	0.09	0.09
Traffic	0.08	0.28	0.00	0.00
Total Emissions (lbs/day)	**13.62**	**4.46**	**0.39**	**0.39**

Notes:

1. Emissions shown assume the generator operates a maximum of 50 hours pursuant to BAAQMD permitting constraints
2. Area and Energy sources from CalEEMod
3. Traffic emissions from CARB EMFAC 2017 emission factors
4. Average daily emissions (lbs/day) based on 365 days of operation per year

BAAQMD = Bay Area Air Quality Management District
CARB = California Air Resources Board
lbs/day= pounds per day
NO_X = nitrogen oxide
$PM_{2.5}$ = respirable particulate matter less than 2.5 micrometers in aerodynamic diameter
PM_{10} = respirable particulate matter less than 10 micrometers in aerodynamic diameter
ROG = reactive organic gases
tons/year = tons per year
Source: Appendix A, Emissions Summary

2.2 PROJECT HEALTH RISKS AND $PM_{2.5}$ RESULTS

2.2.1 Offsite Risks and $PM_{2.5}$ Concentrations

The analysis looked at health risks and respirable particulate matter less than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$) concentrations resulting from project construction and operation upon the surrounding community. The offsite health risks and $PM_{2.5}$ concentrations for the uncontrolled and controlled scenarios at the Maximally Exposed Individual Sensitive Receptor (MEISR) are shown in Table 8.

Table 8. Lifetime Cancer Risk and $PM_{2.5}$ Concentration at Project Offsite MEISR[1]

UTM_x	UTM_y	Scenario	Source Category	Lifetime Cancer Risk (in a million)	$PM_{2.5}$ Concentration ($\mu g/m^3$)
(m)					
552020	4181760	Uncontrolled	Construction	65.2	0.3
			Operation (diesel generator and traffic)	0.08	0.0004
			Total	**65.28**	**0.3004**
552020	4181760	Control Scenario 1	Construction	64.6	0.3
			Operation (diesel generator and traffic)	0.08	0.0004
			Total	**64.68**	**0.3004**
552020	4181760	Control Scenario 2	Construction	6.43	0.031
			Operation (diesel generator and traffic)	0.08	0.0004
			Total	**6.51**	**0.0314**

Notes:

1. Project MEISR was identified as the sensitive receptor location with the maximum cancer risk and $PM_{2.5}$ concentration attributed to the emissions associated with project construction and operation (emissions from the diesel generator and traffic).

Abbreviations:

$\mu g/m^3$ = micrograms per cubic meter

m = meter

MEISR = Maximally Exposed Individual Sensitive Receptor

$PM_{2.5}$ = respirable particulate matter less than 2.5 micrometers in aerodynamic diameter

UTM = Universal Transverse Mercator

2.2.2 Onsite Risks and $PM_{2.5}$ Concentrations

The analysis looked at health risks and $PM_{2.5}$ concentrations resulting from project operation on the onsite residents. The onsite health risks and $PM_{2.5}$ concentrations are shown in Table 9. The controlled scenarios were not modeled.

Table 9. Lifetime Cancer Risk and $PM_{2.5}$ Concentration at Project Onsite MEISR[1]

Category	UTM_x (m)	UTM_y (m)	Source Category	Lifetime Cancer Risk (in a million)	$PM_{2.5}$ Concentration ($\mu g/m^3$)
Onsite Resident	552020	4181780	Construction	N/A	N/A
			Operation (diesel generator and traffic)	4.14	0.0009
			Total	**4.14**	**0.0009**

Notes:

1. Project onsite MEISR was identified as the onsite sensitive receptor location with the maximum cancer risk and PM2.5 concentration attributed to the emissions associated with project operation (emissions from the diesel generator and traffic).

Abbreviations:

$\mu g/m^3$ = micrograms per cubic meter

m = meter

MEISR = Maximally Exposed Individual Sensitive Receptor

N/A = not applicable, construction would be completed before first occupancy

$PM_{2.5}$ = respirable particulate matter less than 2.5 micrometers in aerodynamic diameter

UTM = Universal Transverse Mercator

2.3 EXISTING PLUS PROJECT HEALTH RISKS AND $PM_{2.5}$ RESULTS

2.3.1 Off-site Risks and $PM_{2.5}$ Concentrations

The analysis evaluated the existing plus project health risks and $PM_{2.5}$ concentrations resulting from proposed project construction and operation upon the surrounding community. The offsite health risks and $PM_{2.5}$ concentrations for the uncontrolled and controlled scenarios at the offsite MEISR are shown in Table 10.

2.3.2 Onsite Risks and $PM_{2.5}$ Concentrations

The analysis also evaluated the existing plus project health risks and $PM_{2.5}$ concentrations resulting from proposed project operation on the onsite residents. The onsite health risks and $PM_{2.5}$ concentrations are shown in Table 11.

Table 10. Existing Plus Project Lifetime Cancer Risk and $PM_{2.5}$ Concentration at Project Offsite MEISR[1]

UTM_x (m)	UTM_y (m)	Scenario	Source Category	Lifetime Cancer Risk (in a million)	$PM_{2.5}$ Concentration ($\mu g/m^3$)
552020	4181760	Uncontrolled	Construction	65.2	0.3
			Operation (diesel generator and traffic)	0.08	0.0004
			Background	348.19[2]	12.35[2]
			Total	**413.47**	**12.65**
552020	4181760	Control Scenario 1	Construction	64.6	0.3
			Operation (diesel generator and traffic)	0.08	0.0004
			Background	348.19[2]	12.35[2]
			Total	**412.87**	**12.65**
552020	4181760	Control Scenario 2	Construction	6.43	0.031
			Operation (diesel generator and traffic)	0.08	0.0004
			Background	348.19[2]	12.35[2]
			Total	**354.69**	**12.38**

Notes:

1. Project MEISR was identified as the sensitive receptor location with the maximum cancer risk and $PM_{2.5}$ concentration attributed to the emissions associated with project construction and operation (emissions from the diesel generator and traffic).

2. Background concentration from 2020 citywide health risk assessment database.

Abbreviations:

$\mu g/m^3$ = micrograms per cubic meter

m = meter

MEISR = Maximally Exposed Individual Sensitive Receptor

OEHHA = California Office of Environmental Health and Hazard Assessment

$PM_{2.5}$ = respirable particulate matter less than 2.5 micrometers in aerodynamic diameter

UTM = Universal Transverse Mercator

Table 11. Existing Plus Project Lifetime Cancer Risk and $PM_{2.5}$ Concentration at Project Onsite MEISR[1]

Category	UTM_x	UTM_y	Source Category	Lifetime Cancer Risk (in a million)	$PM_{2.5}$ Concentration ($\mu g/m^3$)
	(m)				
Onsite Resident	552020	4181780	Construction	N/A	N/A
			Operation (diesel generator and traffic)	4.14	0.0009
			Background	322.74[2]	11.86[2]
			Total	**326.88**	**11.86**

Notes:

1. Project onsite MEISR was identified as the onsite sensitive receptor location with the maximum cancer risk and $PM_{2.5}$ concentration attributed to the emissions associated with project operation (emissions from the diesel generator and traffic).

Abbreviations:

2. Background concentration from 2020 citywide health risk assessment database.

N/A – not applicable, construction would be completed before first occupancy

$\mu g/m^3$ = micrograms per cubic meter

m = meter

MEISR = Maximally Exposed Individual Sensitive Receptor

N/A = not applicable, construction would be completed before first occupancy

OEHHA = California Office of Environmental Health and Hazard Assessment

$PM_{2.5}$ = respirable particulate matter less than 2.5 micrometers in aerodynamic diameter

UTM = Universal Transverse Mercator

2.4 CUMULALTIVE HEALTH RISKS AND $PM_{2.5}$ RESULTS

This cumulative analysis evaluates known construction activities and their future operations that could affect local air quality and health risks with respect to the MEISR. Projects within 1,000 feet of the project site that have conducted a quantitative health risk assessment are identified in Table 12. There are additional cumulative projects within 1,000 feet of the project site, but the environmental review of those projects did not require a quantitative health risk assessment. Of the two cumulative projects that did include a quantitative health risk assessment, the 5M project would be the largest. Since a health risk assessment has been conducted for those projects in their Environmental Impact Reports, the construction and operational health risk impacts from those assessments have been included in the quantitative cumulative analysis below.

Table 12: Cumulative Projects Within 1,000 feet Radius of the Proposed Project with a Quantitative Health Risk Assessment

Project (Case No.)	Description
5M (2011.0409E)	The 5M project entails the development of office, retail, residential, cultural, educational, and open space uses in the southwest quadrant of Fifth and Mission streets, and its construction would potentially overlap with the proposed project, resulting in cumulative air quality impacts. Two development options are proposed for the 5M project that would result in approximately the same net increase of 1.5 million square feet of development.
Better Market Street (2014.0012E)	The multi-agency project would replace and upgrade aging infrastructure including streetlights, traffic signals, streetcar tracks, overhead wires, and underground utilities.

Sources:
San Francisco Planning Department 2019
San Francisco Public Works Department 2019

The Planning Department has conducted a citywide health risk assessment for year 2040. This citywide 2040 health risk assessment accounts for expected growth in vehicle trips and associated emissions, but also accounts for projected lower emissions from vehicles as new regulations are phased in over time. Therefore, vehicle-generated emissions from the cumulative projects would be accounted for in the 2040 citywide health risk assessment database and are therefore accounted for in this cumulative analysis.

The citywide health risk assessment database for existing conditions (2020 model) and 2040 projected conditions were compared at the project MEISR to determine which database (existing or projected 2040 conditions) had higher background cancer risk and $PM_{2.5}$ levels at the project MEISR. The results of this comparison revealed that background $PM_{2.5}$ emissions at the project MEISR was higher under existing conditions at 12.35 µg/m^3 compared to 9.6 µg/m^3 under 2040 conditions. Similarly, the background modeled cancer risk is expected to decrease from a risk of 348.19/million in 2020 to 80/million in 2040. Therefore, in order to present a worst-case cumulative analysis, the background $PM_{2.5}$ and cancer risk from the existing conditions, which report higher concentrations and risks, are included in the quantitative cumulative analysis below.

Table 13. Cumulative Lifetime Cancer Risk and $PM_{2.5}$ Concentration at Project Offsite MEISR[1]

UTM_x (m)	UTM_y (m)	Scenario	Source Category	Lifetime Cancer Risk (in a million)	$PM_{2.5}$ Concentration ($\mu g/m^3$)
552020	4181760	Uncontrolled	Construction	65.2	0.3
			Operation (diesel generator and traffic)	0.08	0.0004
			Background	348.19[2]	12.35[2]
			5M	6.4	0.2
			Better Market Street	2.4	0.1
			Total	**422.27**	**12.95**
552020	4181760	Control Scenario 1	Construction	64.6	0.3
			Operation (diesel generator and traffic)	0.08	0.0004
			Background	348.19[2]	12.35[2]
			5M	6.4	0.2
			Better Market Street	2.4	0.1
			Total	**421.67**	**12.95**
552020	4181760	Control Scenario 2	Construction	6.43	0.031
			Operation (diesel generator and traffic)	0.08	0.0004
			Background	348.19[2]	12.35[2]
			5M	6.4	0.2
			Better Market Street	2.4	0.1
			Total	**363.5**	**12.68**

Notes:

1. Project MEISR was identified as the sensitive receptor location with the maximum cancer risk and $PM_{2.5}$ concentration attributed to the emissions associated with project construction and operation (emissions from the diesel generator and traffic).

2. Background concentration from 2020 cityside health risk assessment database.

Abbreviations:

$\mu g/m^3$ – micrograms per cubic meter

m = meter

MEISR = Maximally Exposed Individual Sensitive Receptor

$PM_{2.5}$ = respirable particulate matter less than 2.5 micrometers in aerodynamic diameter

UTM = Universal Transverse Mercator

Table 14: Cumulative Lifetime Cancer Risk and $PM_{2.5}$ Concentration at Project Onsite MEISR[1]

Category	UTM_x	UTM_y	Source Category	Lifetime Cancer Risk (in a million)	$PM_{2.5}$ Concentration ($\mu g/m^3$)
	(m)				
Onsite Resident	552020	4181780	Construction	N/A	N/A
			Operation (diesel generator and traffic)	4.14	0.0009
			Background	322.74[2]	11.86[2]
			5M	6.4	0.2
			Better Market Street	2.4	0.1
			Total	**335.68**	**12.16**

Notes:

1. Project onsite MEISR was identified as the onsite sensitive receptor location with the maximum cancer risk and $PM_{2.5}$ concentration attributed to the emissions associated with project operation (emissions from the diesel generator and traffic).

2. Background concentration from 2020 citywide health risk assessment database.

Abbreviations:

$\mu g/m^3$ – micrograms per cubic meter

m = meter

MEISR = Maximally Exposed Individual Sensitive Receptor

N/A = not applicable, construction would be completed before first occupancy

$PM_{2.5}$ = respirable particulate matter less than 2.5 micrometers in aerodynamic diameter

UTM = Universal Transverse Mercator

In addition to the quantitative cumulative health risk and $PM_{2.5}$ concentrations at the project MEISR as reported in Tables 13 and 14, above, other cumulative projects within 1,000 feet of the offsite and onsite MEISRs may include the use of diesel generating construction equipment, generators or other stationary sources, which could increase the cumulative health risk and $PM_{2.5}$ concentrations at the project offsite and onsite MEISR. Therefore, the cumulative health risks are likely to be higher than that reported in Tables 13 and 14. However, the proposed project's contribution to cumulative health risks would remain the same as under the existing plus project scenario.

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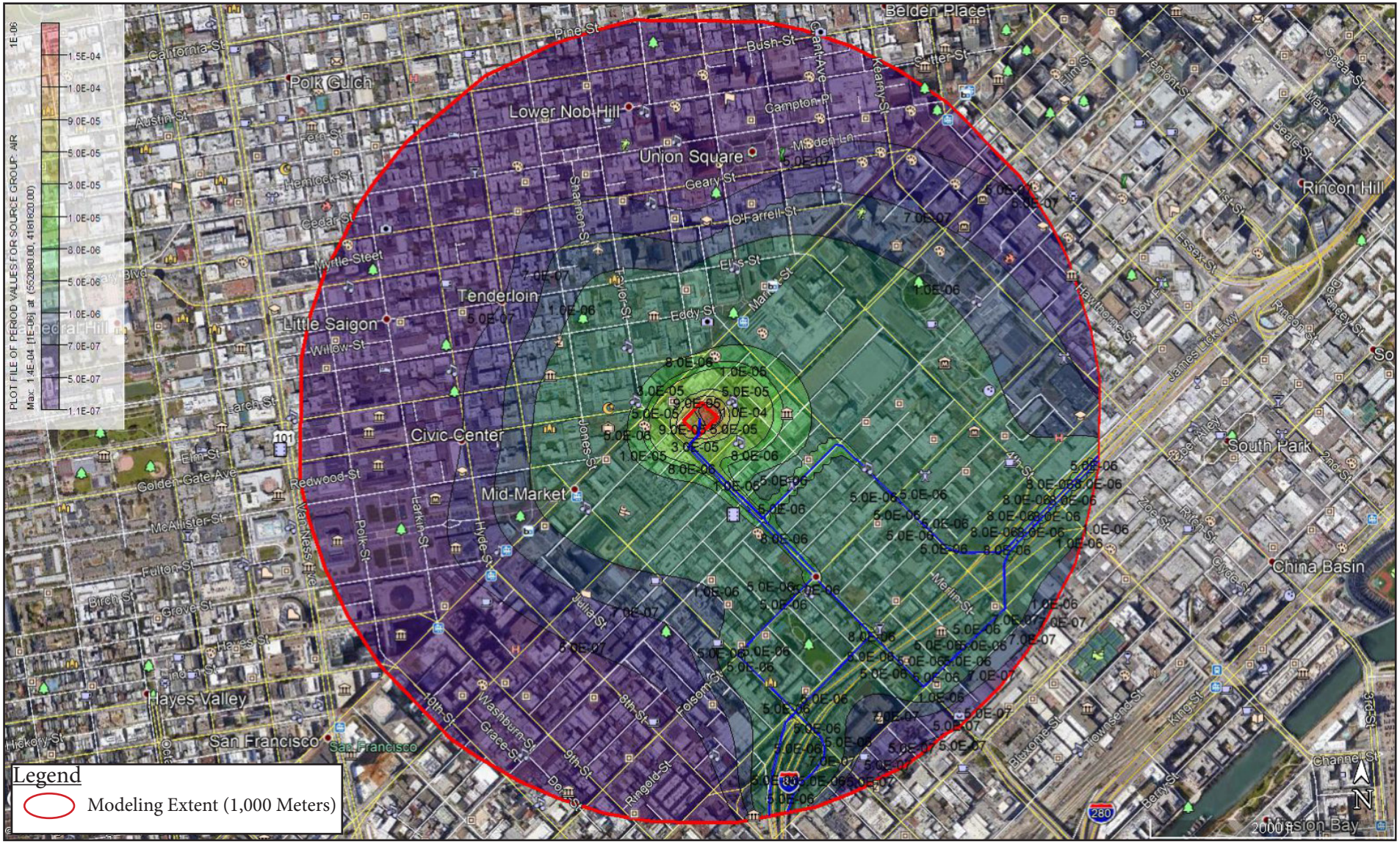

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Figure 3: Uncontrolled Construction Cancer Risk Impacts

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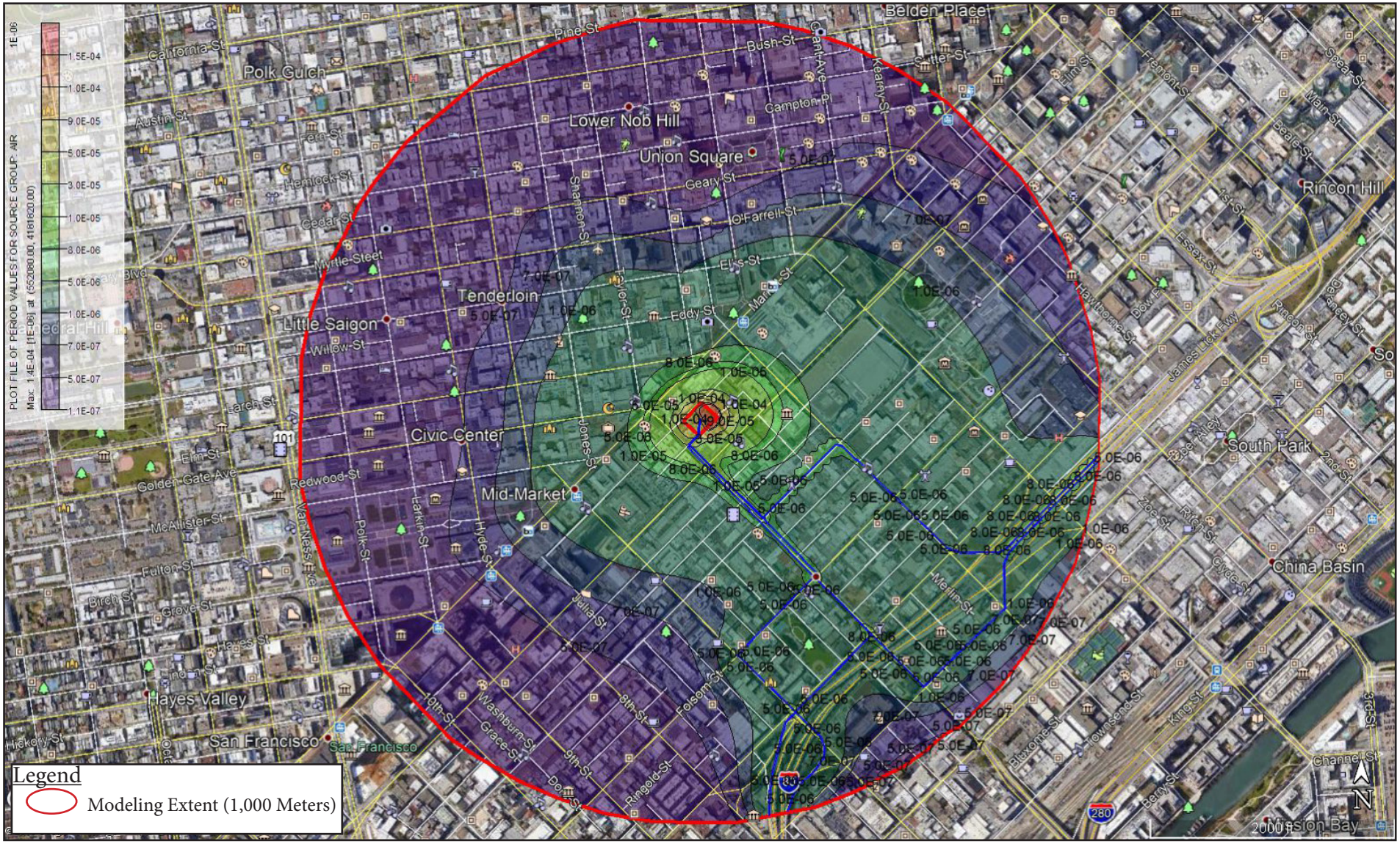
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1.0E-04
9.0E-05
5.0E-05
3.0E-05
1.0E-05
8.0E-06
5.0E-06
1.0E-06
7.0E-07
5.0E-07
1.1E-07
Legend
Modeling Extent (1,000 Meters)
Polk Gulch
Lower Nob Hill
Union Square
Tenderloin
Little Saigon
Civic Center
Mid-Market
Hayes Valley
San Francisco
Rincon Hill
South Park
China Basin
Belden Place
Pine St
Bush St
Sutter St
Geary St
O'Farrell St
Eddy St
Ellis St
Market St
Mission St
Howard St
Folsom St
Harrison St
Bryant St
Brannan St
Townsend St
King St
Berry St
Channel St
Embarcadero
Van Ness Ave
Polk St
Larkin St
Hyde St
Jones St
Taylor St
Shannon St
Kearny St
Grant Ave
Stockton St
Powell St
Mason St
Leavenworth St
Hyde St
Polk St
Van Ness Ave
Franklin St
Gough St
Octavia St
Laguna St
Buchanan St
Webster St
Fillmore St
Steiner St
Pierce St
Scott St
Divisadero St
Broderick St
Baker St
Lyon St
Presidio Ave
Arguello Blvd
Cherry St
Maple St
Willow St
Redwood St
Golden Gate Ave
McAllister St
Fulton St
Grove St
Hayes St
Fell St
Oak St
Page St
Haight St
Waller St
Frederick St
Carl St
Beulah St
Clayton St
Cole St
Shrader St
Stanyan St
Ashbury St
Cole St
Belvedere St
Masonic Ave
Central Ave

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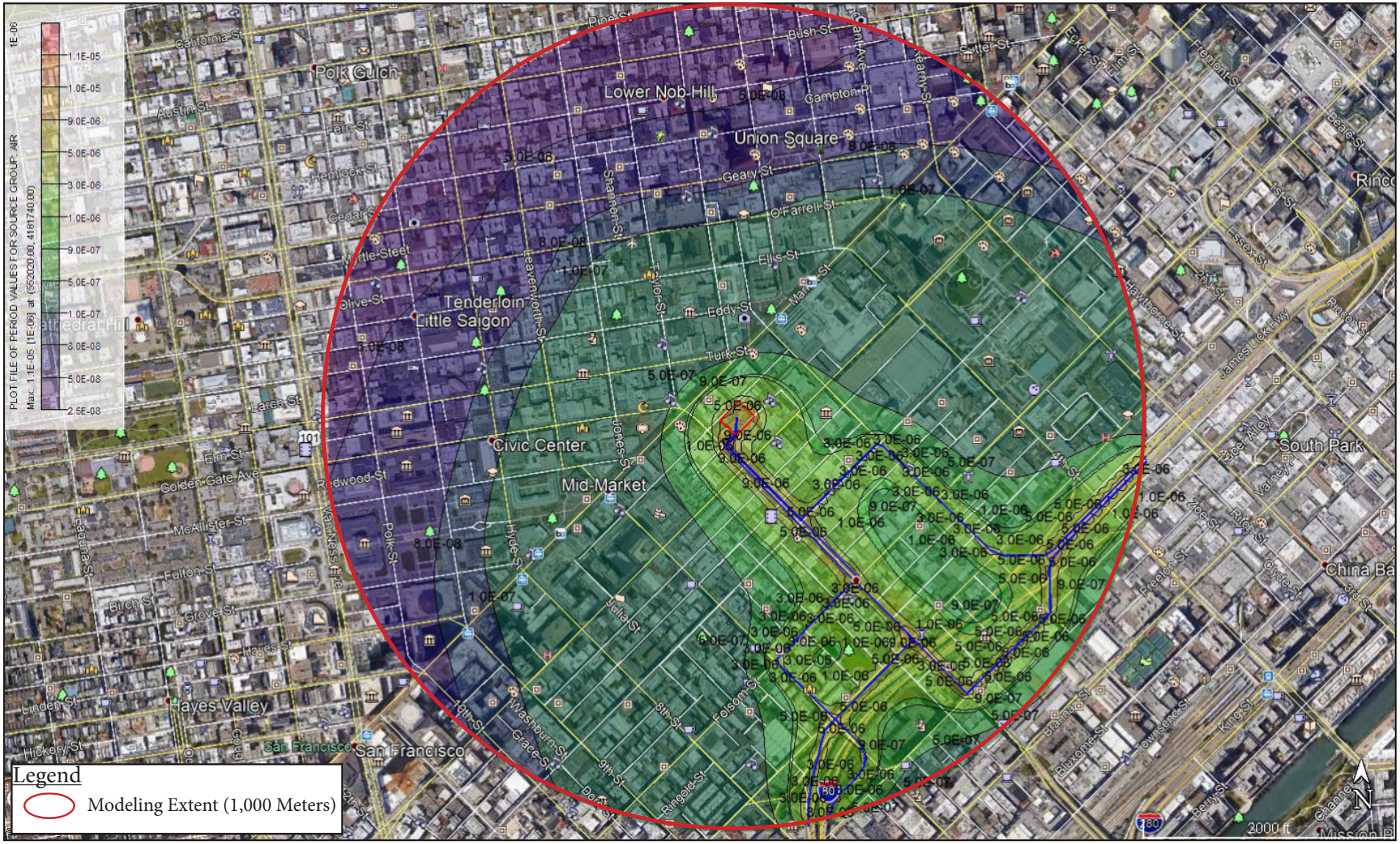

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Figure 5: Control Scenario 2 Construction Cancer Risk Impacts

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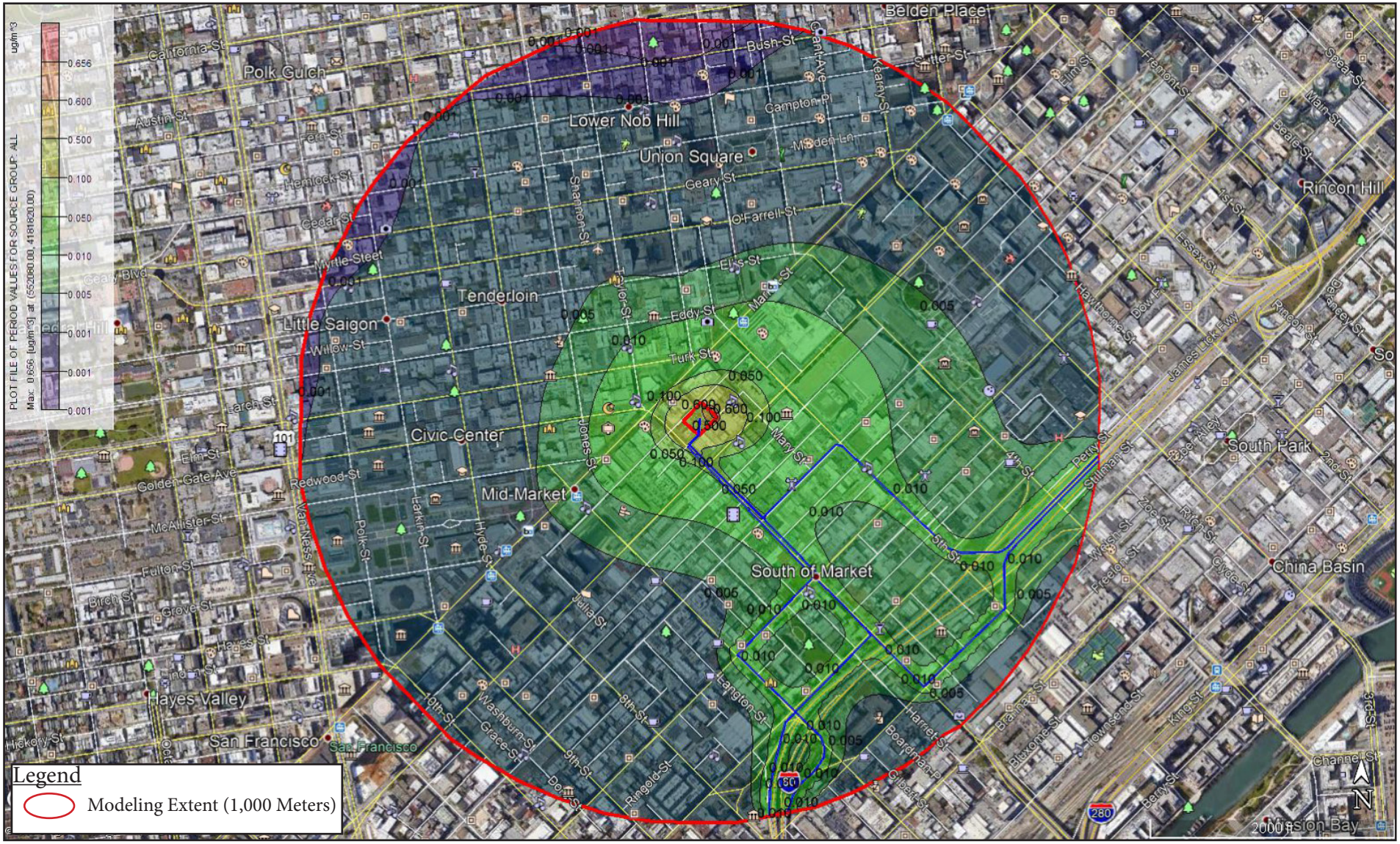

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Figure 6: Uncontrolled $PM_{2.5}$ Concentrations

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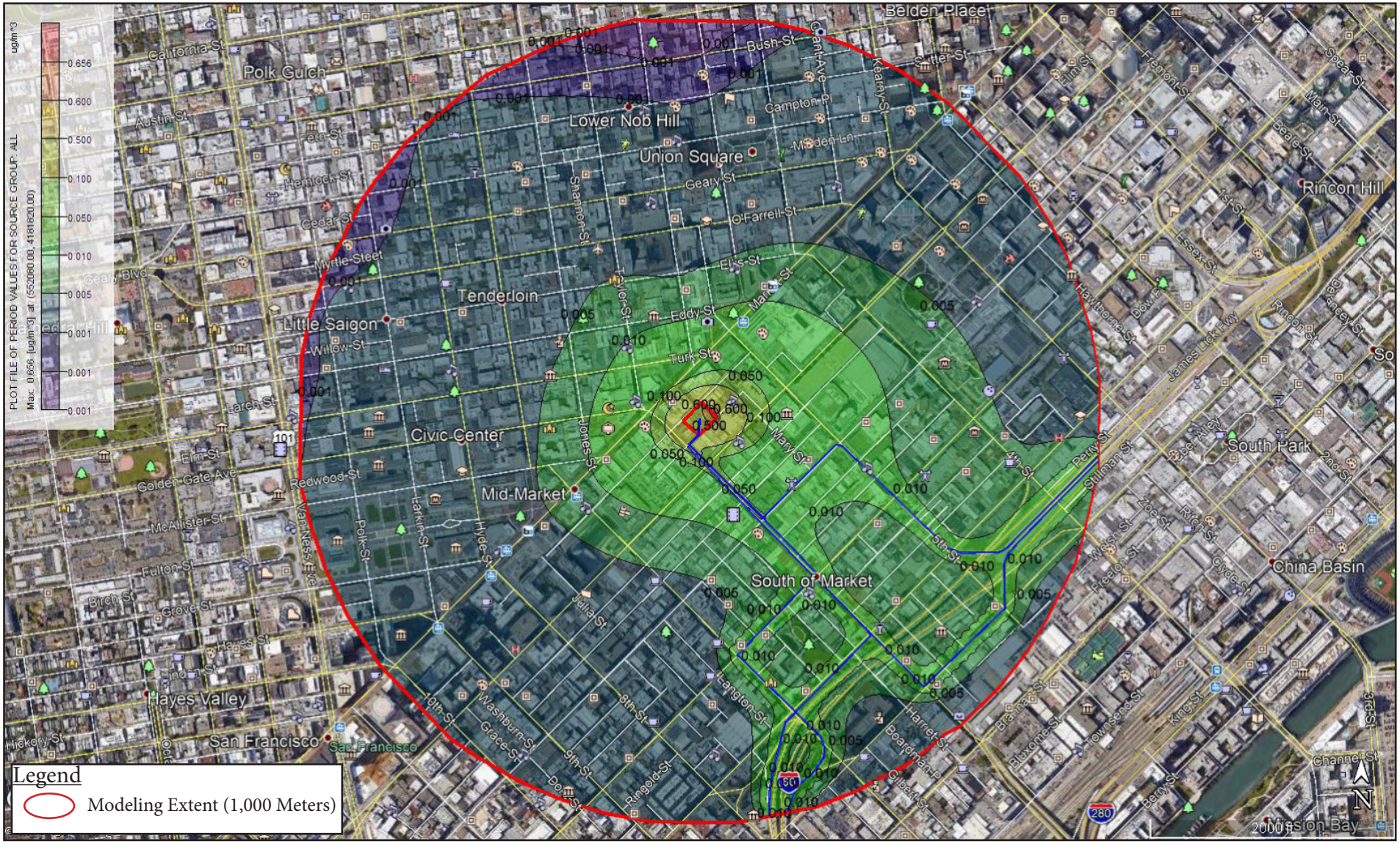
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ug/m^3
0.656
0.600
0.500
0.100
0.050
0.010
0.005
0.001
0.001
Legend
Modeling Extent (1,000 Meters)
Polk Gulch
Lower Nob Hill
Union Square
Tenderloin
Little Saigon
Civic Center
Mid-Market
South of Market
Hayes Valley
San Francisco
Rincon Hill
South Park
China Basin
Belden Place
Bush St
Geary St
O'Farrell St
Eddy St
Turk St
Mary St
Jones St
Taylor St
Shannon St
Mason St
Kearny St
Sutter St
Fremont St
Beale St
Main St
Spear St
Embarcadero
Steuart St
Harrison St
Bryant St
Brannan St
Townsend St
King St
Berry St
Channel St
3rd St
2nd St
4th St
5th St
6th St
7th St
8th St
9th St
10th St
Langton St
Harriet St
Boardman Pl
Gilbert St
Ringold St
Bluxome St
Division St
Grace St
Washburn St
Julia St
Hyde St
Larkin St
Polk St
Van Ness Ave
Redwood St
Golden Gate Ave
McAllister St
Fulton St
Grove St
Hayes St
Fell St
Oak St
Page St
Haight St
Waller St
Carl St
Parnassus Ave
Frederick St
Cole St
Clayton St
Ashbury St
Cesar Chavez St
Mariposa St
Kansas St
Mission Bay
Channel St
Pier 70
Illinois St
Indiana St
Minnesota St
Tennessee St
Maryland St
Pennsylvania Ave
Iowa St
Georgia St
Louisiana St
Arizona St
Texas St
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Indiana

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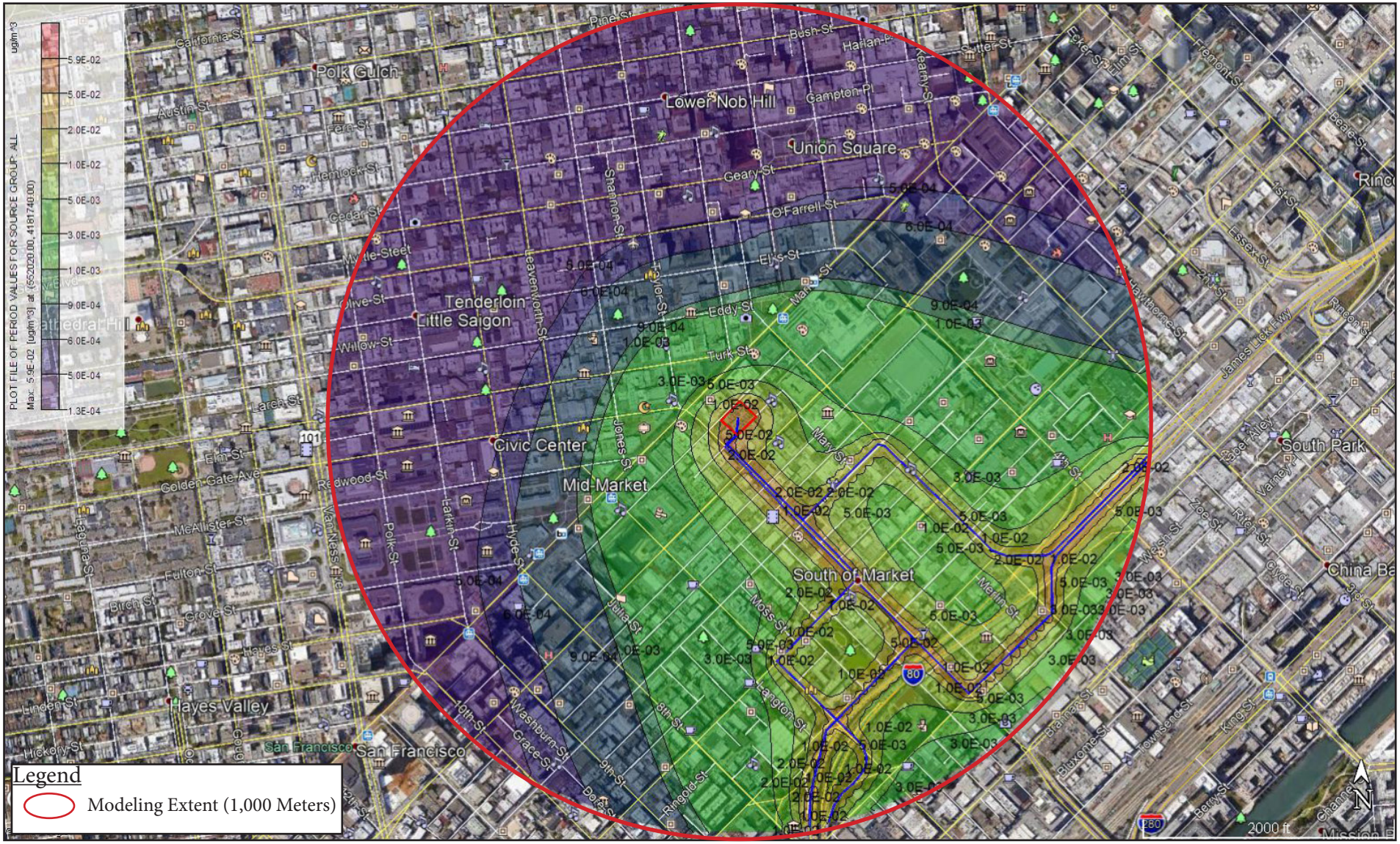

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Figure 8. Control Scenario 2 $PM_{2.5}$ Concentrations

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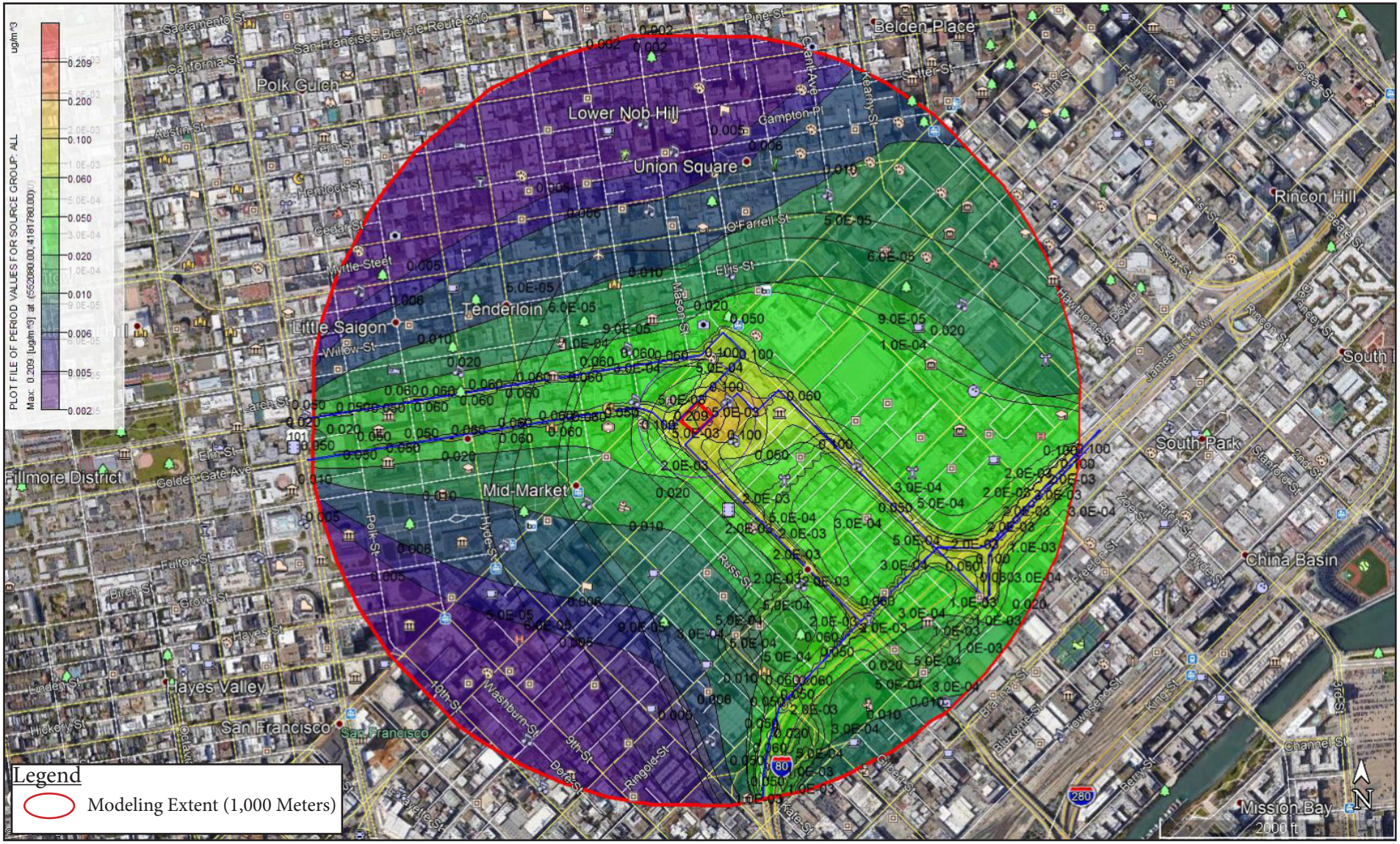

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Figure 9: Operational Cancer Risk

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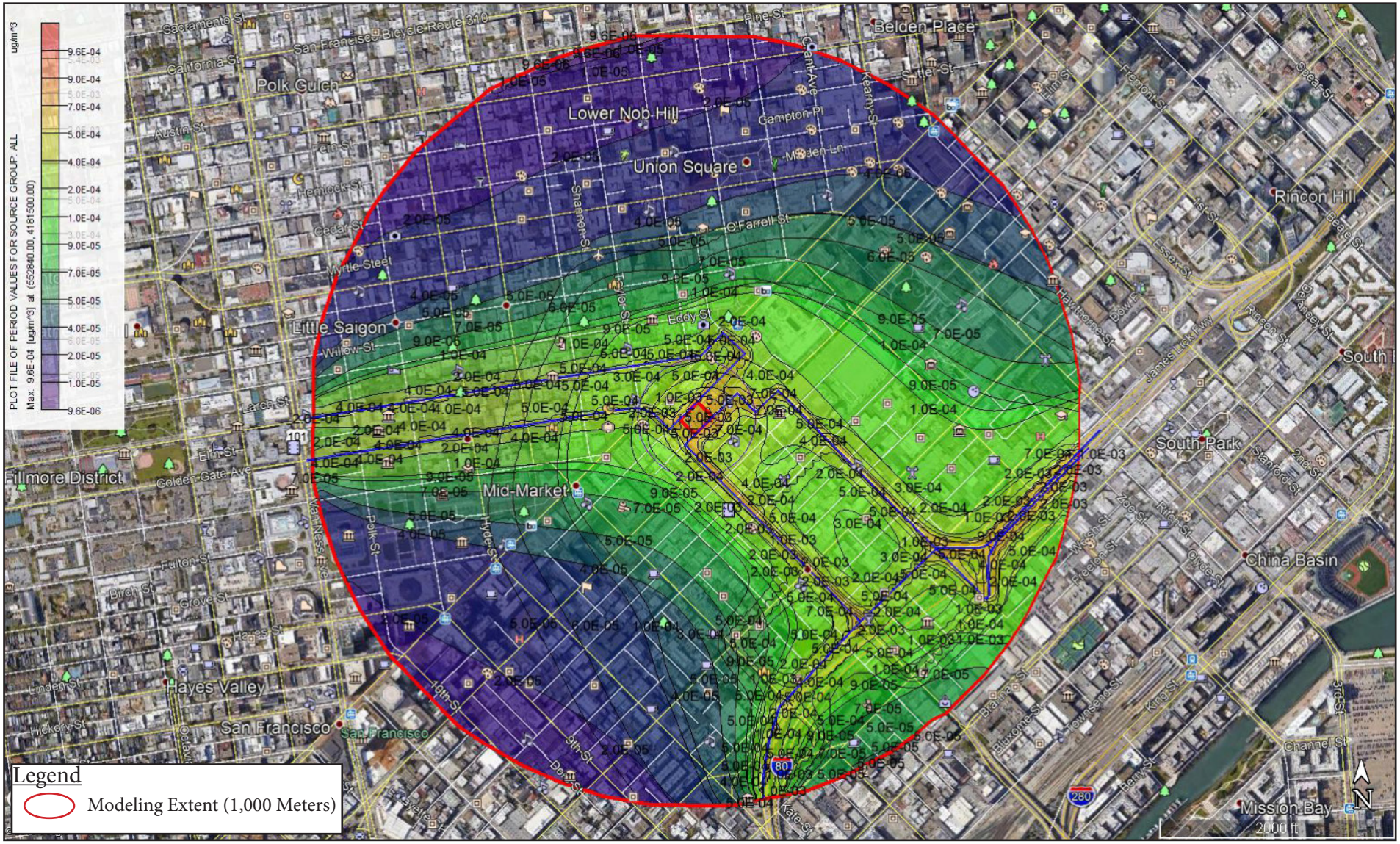

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Figure 10: Operational $PM_{2.5}$ Concentrations

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APPENDIX A: CRITERIA AIR POLLUTANT EMISSIONS ESTIMATE

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CONSTRUCTION EMISSIONS SUMMARIES

Uncontrolled, Control Scenario 1, and Control Scenario 2

Uncontrolled Construction Emissions Summary

		Annual Emissions (Tons/Year)					
Year	**Source**	**ROG**	**NOX**	**PM10 Exhaust**	**PM10 Fugitive**	**PM2.5 Exhaust**	**PM2.5 Fugitive**
2021	Offroad	0.02	0.17	0.01	0.00	0.01	0.00
	Onroad	0.03	0.79	0.03	0.00	0.02	0.00
	Fugitive PM	0.00	0.00	0.00	0.29	0.00	0.08
2021 Subtotal		**0.04**	**0.96**	**0.04**	**0.29**	**0.02**	**0.08**
2022	Offroad	0.16	1.34	0.09	0.00	0.08	0.00
	Onroad	0.02	0.37	0.06	0.00	0.00	0.00
	Fugitive PM	0.00	0.00	0.00	0.70	0.00	0.19
2022 Subtotal		**0.18**	**1.72**	**0.14**	**0.70**	**0.08**	**0.19**
2023	Offroad	0.23	1.89	0.12	0.00	0.11	0.00
	Onroad	0.03	0.60	0.10	0.00	0.05	0.00
	Fugitive PM	0.00	0.00	0.00	0.56	0.00	0.15
	Architectural Coating	0.72	0.00	0.00	0.00	0.00	0.00
2023 Subtotal		**0.98**	**2.49**	**0.22**	**0.56**	**0.15**	**0.15**
2024	Offroad	0.20	1.66	0.10	0.00	0.09	0.00
	Onroad	0.02	0.30	0.06	0.00	0.03	0.00
	Fugitive PM	0.00	0.00	0.00	0.56	0.00	0.15
	Architectural Coating	3.25	0.00	0.00	0.00	0.00	0.00
2024 Subtotal		**3.47**	**1.96**	**0.16**	**0.56**	**0.12**	**0.15**

		Annual Emissions (Lbs/Year)					
Year	**Source**	**ROG**	**NOX**	**PM10 Exhaust**	**PM10 Fugitive**	**PM2.5 Exhaust**	**PM2.5 Fugitive**
2021	Offroad	34.34	337.01	13.75	0.00	12.65	0.00
	Onroad	55.44	1,583.43	60.62	0.00	35.54	0.00
	Fugitive PM	0.00	0.00	0.00	586.20	0.00	153.60
2021 Subtotal		**89.78**	**1,920.44**	**74.37**	**586.20**	**48.18**	**153.60**
2022	Offroad	314.60	2,688.62	170.43	0.00	156.80	0.00
	Onroad	40.23	749.10	111.91	0.00	0.00	0.00
	Fugitive PM	0.00	0.00	0.00	1,392.40	0.00	373.60
2022 Subtotal		**354.83**	**3,437.72**	**282.35**	**1,392.40**	**156.80**	**373.60**
2023	Offroad	461.27	3,789.04	236.08	0.00	217.19	0.00
	Onroad	68.43	1,190.18	204.63	0.00	91.14	0.00
	Fugitive PM	0.00	0.00	0.00	1,119.20	0.00	299.60
	Architectural Coating	1,430.60	0.00	0.00	0.00	0.00	0.00
2023 Subtotal		**1,960.31**	**4,979.22**	**440.70**	**1,119.20**	**308.33**	**299.60**
2024	Offroad	404.86	3,320.94	202.74	0.00	186.52	0.00
	Onroad	36.69	599.19	116.34	0.00	51.28	0.00
	Fugitive PM	0.00	0.00	0.00	1,119.20	0.00	299.60
	Architectural Coating	6,499.20	0.00	0.00	0.00	0.00	0.00
2024 Subtotal		**6,940.76**	**3,920.13**	**319.08**	**1,119.20**	**237.80**	**299.60**
Grand Total		**9,345.68**	**14,257.52**	**1,116.50**	**4,217.00**	**751.11**	**1,126.40**
Average Daily Emissions		**12.25**	**18.69**	**1.46**	**5.53**	**0.98**	**1.48**

Control Scenario 1 - Construction Emissions Summary

		Annual Emissions (Tons/Year)					
Year	**Source**	**ROG**	**NOX**	**PM10 Exhaust**	**PM10 Fugitive**	**PM2.5 Exhaust**	**PM2.5 Fugitive**
2021	Offroad	0.02	0.13	0.01	0.00	0.01	0.00
	Onroad	0.03	0.79	0.03	0.00	0.02	0.00
	Fugitive PM	0.00	0.00	0.00	0.29	0.00	0.08
2021 Subtotal		**0.04**	**0.93**	**0.04**	**0.29**	**0.02**	**0.08**
2022	Offroad	0.16	1.34	0.09	0.00	0.08	0.00
	Onroad	0.02	0.37	0.06	0.00	0.00	0.00
	Fugitive PM	0.00	0.00	0.00	0.70	0.00	0.19
2022 Subtotal		**0.18**	**1.72**	**0.14**	**0.70**	**0.08**	**0.19**
2023	Offroad	0.23	1.89	0.12	0.00	0.11	0.00
	Onroad	0.03	0.60	0.10	0.00	0.05	0.00
	Fugitive PM	0.00	0.00	0.00	0.56	0.00	0.15
	Architectural Coating	0.72	0.00	0.00	0.00	0.00	0.00
2023 Subtotal		**0.98**	**2.49**	**0.22**	**0.56**	**0.15**	**0.15**
2024	Offroad	0.20	1.66	0.10	0.00	0.09	0.00
	Onroad	0.02	0.30	0.06	0.00	0.03	0.00
	Fugitive PM	0.00	0.00	0.00	0.56	0.00	0.15
	Architectural Coating	3.25	0.00	0.00	0.00	0.00	0.00
2024 Subtotal		**3.47**	**1.96**	**0.16**	**0.56**	**0.12**	**0.15**

		Annual Emissions (Lbs/Year)					
Year	**Source**	**ROG**	**NOX**	**PM10 Exhaust**	**PM10 Fugitive**	**PM2.5 Exhaust**	**PM2.5 Fugitive**
2021	Offroad	30.23	267.39	10.87	0.00	10.00	0.00
	Onroad	55.44	1,583.43	60.62	0.00	35.54	0.00
	Fugitive PM	0.00	0.00	0.00	586.20	0.00	153.60
2021 Subtotal		**85.67**	**1,850.82**	**71.49**	**586.20**	**45.54**	**153.60**
2022	Offroad	314.60	2,688.62	170.43	0.00	156.80	0.00
	Onroad	40.23	749.10	111.91	0.00	0.00	0.00
	Fugitive PM	0.00	0.00	0.00	1,392.40	0.00	373.60
2022 Subtotal		**354.83**	**3,437.72**	**282.35**	**1,392.40**	**156.80**	**373.60**
2023	Offroad	461.27	3,789.04	236.08	0.00	217.19	0.00
	Onroad	68.43	1,190.18	204.63	0.00	91.14	0.00
	Fugitive PM	0.00	0.00	0.00	1,119.20	0.00	299.60
	Architectural Coating	1,430.60	0.00	0.00	0.00	0.00	0.00
2023 Subtotal		**1,960.31**	**4,979.22**	**440.70**	**1,119.20**	**308.33**	**299.60**
2024	Offroad	404.86	3,320.94	202.74	0.00	186.52	0.00
	Onroad	36.69	599.19	116.34	0.00	51.28	0.00
	Fugitive PM	0.00	0.00	0.00	1,119.20	0.00	299.60
	Architectural Coating	6,499.20	0.00	0.00	0.00	0.00	0.00
2024 Subtotal		**6,940.76**	**3,920.13**	**319.08**	**1,119.20**	**237.80**	**299.60**
Grand Total		**9,341.56**	**14,187.89**	**1,113.63**	**4,217.00**	**748.46**	**1,126.40**
Average Daily Emissions		**12.24**	**18.59**	**1.46**	**5.53**	**0.98**	**1.48**

Control Scenario 2 - Construction Emissions Summary

		Annual Emissions (Tons/Year)					
Year	**Source**	**ROG**	**NOX**	**PM10 Exhaust**	**PM10 Fugitive**	**PM2.5 Exhaust**	**PM2.5 Fugitive**
2021	Offroad	0.01	0.04	0.00	0.00	0.00	0.00
	Onroad	0.03	0.79	0.03	0.00	0.02	0.00
	Fugitive PM	0.00	0.00	0.00	0.29	0.00	0.08
2021 Subtotal		**0.04**	**0.83**	**0.03**	**0.29**	**0.02**	**0.08**
2022	Offroad	0.03	0.35	0.00	0.00	0.00	0.00
	Onroad	0.02	0.37	0.06	0.00	0.00	0.00
	Fugitive PM	0.00	0.00	0.00	0.70	0.00	0.19
2022 Subtotal		**0.05**	**0.72**	**0.06**	**0.70**	**0.00**	**0.19**
2023	Offroad	0.05	0.61	0.00	0.00	0.00	0.00
	Onroad	0.03	0.60	0.10	0.00	0.05	0.00
	Fugitive PM	0.00	0.00	0.00	0.56	0.00	0.15
	Architectural Coating	0.72	0.00	0.00	0.00	0.00	0.00
2023 Subtotal		**0.80**	**1.20**	**0.11**	**0.56**	**0.05**	**0.15**
2024	Offroad	0.05	0.55	0.00	0.00	0.00	0.00
	Onroad	0.02	0.30	0.06	0.00	0.03	0.00
	Fugitive PM	0.00	0.00	0.00	0.56	0.00	0.15
	Architectural Coating	3.25	0.00	0.00	0.00	0.00	0.00
2024 Subtotal		**3.32**	**0.85**	**0.06**	**0.56**	**0.03**	**0.15**

		Annual Emissions (Lbs/Year)					
Year	**Source**	**ROG**	**NOX**	**PM10 Exhaust**	**PM10 Fugitive**	**PM2.5 Exhaust**	**PM2.5 Fugitive**
2021	Offroad	18.18	73.55	2.51	0.00	2.31	0.00
	Onroad	55.44	1583.43	60.62	0.00	35.54	0.00
	Fugitive PM	0.00	0.00	0.00	586.20	0.00	153.60
2021 Subtotal		**73.62**	**1656.98**	**63.13**	**586.20**	**37.85**	**153.60**
2022	Offroad	66.52	697.50	5.55	0.00	5.10	0.00
	Onroad	40.23	749.10	111.91	0.00	0.00	0.00
	Fugitive PM	0.00	0.00	0.00	1392.40	0.00	373.60
2022 Subtotal		**106.76**	**1446.60**	**117.46**	**1392.40**	**5.10**	**373.60**
2023	Offroad	108.56	1214.09	8.13	0.00	7.48	0.00
	Onroad	68.43	1190.18	204.60	0.00	91.14	0.00
	Fugitive PM	0.00	0.00	0.00	1119.20	0.00	299.60
	Architectural Coating	1430.60	0.00	0.00	0.00	0.00	0.00
2023 Subtotal		**1607.59**	**2404.27**	**212.73**	**1119.20**	**98.61**	**299.60**
2024	Offroad	101.50	1095.76	8.43	0.00	7.76	0.00
	Onroad	36.69	599.19	116.34	0.00	51.28	0.00
	Fugitive PM	0.00	0.00	0.00	1119.20	0.00	299.60
	Architectural Coating	6499.20	0.00	0.00	0.00	0.00	0.00
2024 Subtotal		**6637.39**	**1694.95**	**124.78**	**1119.20**	**59.04**	**299.60**
Grand Total		**8425.36**	**7202.80**	**518.10**	**4217.00**	**200.60**	**1126.40**
Average Daily Emissions		**11.04**	**9.44**	**0.68**	**5.53**	**0.26**	**1.48**

UNCONTROLLED
OFFROAD EMISSIONS ESTIMATE

Fleet Average

Construction Equipment Fleet Average Emission Factors Conversion Calculations for Uncontrolled

Uncontrolled: County Fleet Average Emission Factors

Project-Specific Construction Equipment List			OFFROAD2017 (v1.0.1) Emissions Inventory																								
Phase	Year	Offroad Equipment	Horsepower	Emission Factors	Region	CalYr	VehClass	MdlYr	HP_Bin	Fuel	HC_tpd	TOG_tpd	ROG_tpd	CO_tpd	NOx_tpd	SOx_tpd	PM10_tpd	PM2_5_tpd	PM_tpd	CO2_tpd	NH3_tpd	Fuel_gpy	l_Activity	al_Populat	Horsepower_Hours_hhpv
Site Preparation/Demolition	2021	Dump Truck	402	Fleet Average	San Francisco	2021	stMin - Off-Highway Tr	Aggregated	600	Diesel	8.783E-05	0.000126476	0.000106275	0.000635903	0.000930281	2.29768E-06	3.41791E-05	3.14447E-05	3.41791E-05	0.248803488	2.0307E-06	8072.155	1085.804	0.806953	408837.441
Site Preparation/Demolition	2021	Excavators	158	Fleet Average	San Francisco	2021	ConstMin - Excavators	Aggregated	175	Diesel	2.801E-05	4.03384E-05	3.38954E-05	0.000480591	0.000318035	7.58206E-07	1.54832E-05	1.42445E-05	1.54832E-05	0.08209905	6.70081E-07	2663.613	922.9008	1.578674	134778.606
Excavation Shoring	2021	Bore/Drill Rigs	225	Fleet Average	San Francisco	2021	onstMin - Bore/Drill Rig	Aggregated	300	Diesel	1.644E-06	2.36751E-06	1.98937E-06	1.57144E-05	2.34708E-05	7.09442E-08	7.14639E-07	6.57468E-07	7.14639E-07	0.007678719	6.26727E-08	249.1276	46.51684	0.144922	9670.47762
Excavation Shoring	2021	Dumpers/Tenders	97	Fleet Average	San Francisco	2021	ConstMin - Dumpers/Te	Aggregated	25 (only bin)	Diesel	7.044E-06	1.0143E-05	8.38264E-06	3.46154E-05	6.41042E-05	1.06667E-07	2.42323E-06	2.22937E-06	2.42323E-06	0.008406815	7.07033E-08	281.05	810.3	1.22	12964.8
Excavation Shoring	2021	Excavators	97	Fleet Average	San Francisco	2021	ConstMin - Excavators	Aggregated	100	Diesel	1.604E-05	2.3098E-05	1.94087E-05	0.000245291	0.000197965	3.39132E-07	1.12708E-05	1.03692E-05	1.12708E-05	0.036732856	2.99809E-07	1191.757	740.7475	1.170868	60607.0392
Excavation Shoring	2021	Skid Steer Loaders	97	Fleet Average	San Francisco	2021	stMin - Skid Steer Load	Aggregated	100	Diesel	3.669E-07	5.2827E-07	4.43893E-07	7.35556E-06	6.70931E-06	1.04718E-08	4.36989E-07	4.0203E-07	4.36989E-07	0.001133825	9.25413E-09	36.7857	25.78303	0.080461	1957.25
Excavation Shoring	2021	Tractors/Loaders/Backhoes	97	Fleet Average	San Francisco	2021	in - Tractors/Loaders/B	Aggregated	100	Diesel	0.0001774	0.000255498	0.000214689	0.002686939	0.002198281	3.7111E-06	0.000127792	0.000117568	0.000127792	0.401971519	3.28084E-06	13041.52	8208.016	13.26873	682344.987
Excavation Shoring	2021	Aerial Lifts	226	Fleet Average	San Francisco	2021	- Other Construction E	Aggregated	300	Diesel	6.599E-06	9.50297E-06	7.98513E-06	4.37465E-05	9.78226E-05	1.39681E-07	3.67855E-06	3.38427E-06	3.67855E-06	0.015129408	1.23484E-07	490.857	103.9074	0.25906	22744.6054
Excavation Shoring	2021	Off-Highway Trucks	402	Fleet Average	San Francisco	2021	stMin - Off-Highway Tr	Aggregated	600	Diesel	8.783E-05	0.000126476	0.000106275	0.000635903	0.000930281	2.29768E-06	3.41791E-05	3.14447E-05	3.41791E-05	0.248803488	2.0307E-06	8072.155	1085.804	0.806953	408837.441
Foundation/Below Grade Construction	2022	Manlift	63	Fleet Average	San Francisco	2021	- Other Construction E	Aggregated	75	Diesel	1.11E-06	1.59895E-06	1.34356E-06	6.16747E-06	1.137E-05	6.43522E-09	8.6619E-07	7.96895E-07	8.6619E-07	0.000699641	5.71038E-09	22.69909	14.6538	0.048403	1068.32941
Foundation/Below Grade Construction	2022	Off-Highway Trucks	402	Fleet Average	San Francisco	2021	stMin - Off-Highway Tr	Aggregated	600	Diesel	8.783E-05	0.000126476	0.000106275	0.000635903	0.000930281	2.29768E-06	3.41791E-05	3.14447E-05	3.41791E-05	0.248803488	2.0307E-06	8072.155	1085.804	0.806953	408837.441
Building Construction	2022	Aerial Lifts, Manlift, Scissor Lift	63	Fleet Average	San Francisco	2021	- Other Construction E	Aggregated	75	Diesel	1.11E-06	1.59895E-06	1.34356E-06	6.16747E-06	1.137E-05	6.43522E-09	8.6619E-07	7.96895E-07	8.6619E-07	0.000699641	5.71038E-09	22.69909	14.6538	0.048403	1068.32941
Building Construction	2022	Cranes	231	Fleet Average	San Francisco	2021	ConstMin - Cranes	Aggregated	300	Diesel	1.553E-05	2.2364E-05	1.8792E-05	9.33639E-05	0.000222773	2.56735E-07	9.01696E-06	8.2956E-06	9.01696E-06	0.027819076	2.27056E-07	902.5593	274.4223	0.587788	60606.3229
Building Construction	2022	Forklifts	89	Fleet Average	San Francisco	2021	Min - Rough Terrain Fo	Aggregated	100	Diesel	1.467E-05	2.11219E-05	1.77483E-05	0.000406281	0.000263553	6.16073E-07	8.00364E-06	7.36335E-06	8.00364E-06	0.066682568	5.44254E-07	2163.442	1080.511	3.864544	103966.294
Building Construction	2022	Off-Highway Trucks	97	Fleet Average	San Francisco	2021	stMin - Off-Highway Tr	Aggregated	100	Diesel	5.181E-07	7.46013E-07	6.26858E-07	6.17488E-06	5.55626E-06	7.65621E-09	4.02818E-07	3.70593E-07	4.02818E-07	0.000829783	6.77258E-09	26.92139	15.55031	0.01233	1361.74427
Building Construction	2022	Rough Terrain Forklifts	89	Fleet Average	San Francisco	2021	Min - Rough Terrain Fo	Aggregated	100	Diesel	1.467E-05	2.11219E-05	1.77483E-05	0.000406281	0.000263553	6.16073E-07	8.00364E-06	7.36335E-06	8.00364E-06	0.066682568	5.44254E-07	2163.442	1080.511	3.864544	103966.294
Building Construction	2022	Welders	46	Fleet Average	San Francisco	2021	Light Commercial - We	Aggregated	50	Diesel	0.0054676	0.007873337	0.00650689	0.046795148	0.041197036	7.40955E-05	0.001923268	0.001769407	0.001923268	5.73161971	4.82693E-05	191873.2	161326.4	251.23	7421012.1
Building Construction	2023	Aerial Lifts, Manlift, Scissor Lift	63	Fleet Average	San Francisco	2021	- Other Construction E	Aggregated	75	Diesel	1.11E-06	1.59895E-06	1.34356E-06	6.16747E-06	1.137E-05	6.43522E-09	8.6619E-07	7.96895E-07	8.6619E-07	0.000699641	5.71038E-09	22.69909	14.6538	0.048403	1068.32941
Building Construction	2023	Cranes	231	Fleet Average	San Francisco	2021	ConstMin - Cranes	Aggregated	300	Diesel	1.553E-05	2.2364E-05	1.8792E-05	9.33639E-05	0.000222773	2.56735E-07	9.01696E-06	8.2956E-06	9.01696E-06	0.027819076	2.27056E-07	902.5593	274.4223	0.587788	60606.3229
Building Construction	2023	Forklifts	89	Fleet Average	San Francisco	2021	Min - Rough Terrain Fo	Aggregated	100	Diesel	1.467E-05	2.11219E-05	1.77483E-05	0.000406281	0.000263553	6.16073E-07	8.00364E-06	7.36335E-06	8.00364E-06	0.066682568	5.44254E-07	2163.442	1080.511	3.864544	103966.294
Building Construction	2023	Off-Highway Trucks	97	Fleet Average	San Francisco	2021	stMin - Off-Highway Tr	Aggregated	100	Diesel	5.181E-07	7.46013E-07	6.26858E-07	6.17488E-06	5.55626E-06	7.65621E-09	4.02818E-07	3.70593E-07	4.02818E-07	0.000829783	6.77258E-09	26.92139	15.55031	0.01233	1361.74427
Building Construction	2023	Rough Terrain Forklifts	89	Fleet Average	San Francisco	2021	Min - Rough Terrain Fo	Aggregated	100	Diesel	1.467E-05	2.11219E-05	1.77483E-05	0.000406281	0.000263553	6.16073E-07	8.00364E-06	7.36335E-06	8.00364E-06	0.066682568	5.44254E-07	2163.442	1080.511	3.864544	103966.294
Building Construction	2023	Welders	46	Fleet Average	San Francisco	2021	Light Commercial - We	Aggregated	50	Diesel	0.0054676	0.007873337	0.00650689	0.046795148	0.041197036	7.40955E-05	0.001923268	0.001769407	0.001923268	5.73161971	4.82693E-05	191873.2	161326.4	251.23	7421012.1
Exterior Finishing	2023	Air Compressors	78	Fleet Average	San Francisco	2021	nt Commercial - Air Con	Aggregated	25 & 50 are	Diesel	0.0012788	0.001841413	0.001521829	0.010876979	0.009159492	1.247131537	0.000438464	0.000403387	0.000438464	1.61223E-05	1.05183E-05	41810.75	40920.15	50.29	1514045.55
Exterior Finishing	2023	Forklifts	89	Fleet Average	San Francisco	2021	Min - Rough Terrain Fo	Aggregated	100	Diesel	1.467E-05	2.11219E-05	1.77483E-05	0.000406281	0.000263553	6.16073E-07	8.00364E-06	7.36335E-06	8.00364E-06	0.066682568	5.44254E-07	2163.442	1080.511	3.864544	103966.294
Exterior Finishing	2023	Manlift	63	Fleet Average	San Francisco	2021	- Other Construction E	Aggregated	75	Diesel	1.11E-06	1.59895E-06	1.34356E-06	6.16747E-06	1.137E-05	6.43522E-09	8.6619E-07	7.96895E-07	8.6619E-07	0.000699641	5.71038E-09	22.69909	14.6538	0.048403	1068.32941
Exterior Finishing	2023	Welders	46	Fleet Average	San Francisco	2021	Light Commercial - We	Aggregated	50	Diesel	0.0054676	0.007873337	0.00650689	0.046795148	0.041197036	7.40955E-05	0.001923268	0.001769407	0.001923268	5.73161971	4.82693E-05	191873.2	161326.4	251.23	7421012.1
Building Construction	2024	Aerial Lifts, Manlift, Scissor Lift	63	Fleet Average	San Francisco	2021	- Other Construction E	Aggregated	75	Diesel	1.11E-06	1.59895E-06	1.34356E-06	6.16747E-06	1.137E-05	6.43522E-09	8.6619E-07	7.96895E-07	8.6619E-07	0.000699641	5.71038E-09	22.69909	14.6538	0.048403	1068.32941
Building Construction	2024	Cranes	231	Fleet Average	San Francisco	2021	ConstMin - Cranes	Aggregated	300	Diesel	1.553E-05	2.2364E-05	1.8792E-05	9.33639E-05	0.000222773	2.56735E-07	9.01696E-06	8.2956E-06	9.01696E-06	0.027819076	2.27056E-07	902.5593	274.4223	0.587788	60606.3229
Building Construction	2024	Forklifts	89	Fleet Average	San Francisco	2021	Min - Rough Terrain Fo	Aggregated	100	Diesel	1.467E-05	2.11219E-05	1.77483E-05	0.000406281	0.000263553	6.16073E-07	8.00364E-06	7.36335E-06	8.00364E-06	0.066682568	5.44254E-07	2163.442	1080.511	3.864544	103966.294
Building Construction	2024	Off-Highway Trucks	97	Fleet Average	San Francisco	2021	stMin - Off-Highway Tr	Aggregated	100	Diesel	5.181E-07	7.46013E-07	6.26858E-07	6.17488E-06	5.55626E-06	7.65621E-09	4.02818E-07	3.70593E-07	4.02818E-07	0.000829783	6.77258E-09	26.92139	15.55031	0.01233	1361.74427
Building Construction	2024	Rough Terrain Forklifts	89	Fleet Average	San Francisco	2021	Min - Rough Terrain Fo	Aggregated	100	Diesel	1.467E-05	2.11219E-05	1.77483E-05	0.000406281	0.000263553	6.16073E-07	8.00364E-06	7.36335E-06	8.00364E-06	0.066682568	5.44254E-07	2163.442	1080.511	3.864544	103966.294
Building Construction	2024	Welders	46	Fleet Average	San Francisco	2021	Light Commercial - We	Aggregated	50	Diesel	0.0054676	0.007873337	0.00650689	0.046795148	0.041197036	7.40955E-05	0.001923268	0.001769407	0.001923268	5.73161971	4.82693E-05	191873.2	161326.4	251.23	7421012.1
Exterior Finishing	2024	Air Compressors	78	Fleet Average	San Francisco	2021	nt Commercial - Air Con	Aggregated	25 & 50 are	Diesel	0.0012788	0.001841413	0.001521829	0.010876979	0.009159492	1.247131537	0.000438464	0.000403387	0.000438464	1.61223E-05	1.05183E-05	41810.75	40920.15	50.29	1514045.55
Exterior Finishing	2024	Forklifts	89	Fleet Average	San Francisco	2021	Min - Rough Terrain Fo	Aggregated	100	Diesel	1.467E-05	2.11219E-05	1.77483E-05	0.000406281	0.000263553	6.16073E-07	8.00364E-06	7.36335E-06	8.00364E-06	0.066682568	5.44254E-07	2163.442	1080.511	3.864544	103966.294
Exterior Finishing	2024	Manlift	63	Fleet Average	San Francisco	2021	- Other Construction E	Aggregated	75	Diesel	1.11E-06	1.59895E-06	1.34356E-06	6.16747E-06	1.137E-05	6.43522E-09	8.6619E-07	7.96895E-07	8.6619E-07	0.000699641	5.71038E-09	22.69909	14.6538	0.048403	1068.32941
Exterior Finishing	2024	Welders	46	Fleet Average	San Francisco	2021	Light Commercial - We	Aggregated	50	Diesel	0.0054676	0.007873337	0.00650689	0.046795148	0.041197036	7.40955E-05	0.001923268	0.001769407	0.001923268	5.73161971	4.82693E-05	191873.2	161326.4	251.23	7421012.1
Site Work/Paving	2024	Cement and Mortar Mixers	9	Fleet Average	San Francisco	2021	tMin - Cement and Mo	Aggregated	25	Diesel	6.9E-05	9.93663E-05	8.21209E-05	0.000481012	0.000620917	1.25966E-06	2.44666E-05	2.25093E-05	2.44666E-05	0.084054363	7.05197E-07	2803.2	8464.35	28.23	87275.15
Site Work/Paving	2024	Pavers	125	Fleet Average	San Francisco	2021	ConstMin - Pavers	Aggregated	175	Diesel	4.431E-06	6.38132E-06	5.36208E-06	6.21485E-05	5.61711E-05	1.00278E-07	2.74887E-06	2.52896E-06	2.74887E-06	0.010860564	8.86425E-08	352.3591	103.7632	0.272152	16378.9081
Site Work/Paving	2024	Paving Equipment	130	Fleet Average	San Francisco	2021	stMin - Paving Equipm	Aggregated	175	Diesel	1.721E-06	2.47878E-06	2.08287E-06	2.64972E-05	2.09508E-05	4.19646E-08	1.04816E-06	9.64305E-07	1.04816E-06	0.004544515	3.70917E-08	147.4418	55.13169	0.120155	8043.88445
Site Work/Paving	2024	Pressure Washer	13	Fleet Average	San Francisco	2021	t Commercial - Pressure	Aggregated	25	Diesel	1.308E-05	1.883E-05	1.5562E-05	9.41251E-05	0.000128312	2.44261E-07	5.70825E-06	5.25159E-06	5.70825E-06	0.01646963	1.33143E-07	529.25	2263	15.64	31937.5

Fleet Average Emission Factors for Uncontrolled Scenario in grams/hp-hr

Phase	Year	Offroad Equipment	Horsepower	Emission Factors	OFFROAD2017 (v1.0.1) Emissions Inventory							
					ROG	CO	NOX	SOX	PM10	PM2.5	PM	CO2
Site Preparation/Demolition	2021	Dump Truck	402	Fleet Average	0.086073	0.515025	0.753445	0.001861	0.027682	0.025467	0.027682	201.508815
Site Preparation/Demolition	2021	Excavators	158	Fleet Average	0.083274	1.180710	0.781343	0.001863	0.038039	0.034996	0.038039	201.699778
Excavation Shoring	2021	Bore/Drill Rigs	225	Fleet Average	0.068117	0.538070	0.803651	0.002429	0.024470	0.022512	0.024470	262.923320
Excavation Shoring	2021	Dumpers/Tenders	97	Fleet Average	0.214093	0.884081	1.637227	0.002724	0.061889	0.056938	0.061889	214.710807
Excavation Shoring	2021	Excavators	97	Fleet Average	0.106038	1.340129	1.081569	0.001853	0.061577	0.056651	0.061577	200.687296
Excavation Shoring	2021	Skid Steer Loaders	97	Fleet Average	0.075097	1.244393	1.135062	0.001772	0.073929	0.068014	0.073929	191.817365
Excavation Shoring	2021	Tractors/Loaders/Backhoes	97	Fleet Average	0.104182	1.303893	1.066762	0.001801	0.062014	0.057052	0.062014	195.065077
Excavation Shoring	2021	Aerial Lifts	226	Fleet Average	0.116250	0.636874	1.424128	0.002034	0.053553	0.049269	0.053553	220.258036
Excavation Shoring	2021	Off-Highway Trucks	402	Fleet Average	0.086073	0.515025	0.753445	0.001861	0.027682	0.025467	0.027682	201.508815
Foundation/Below Grade Construction	2022	Manlift	63	Fleet Average	0.416429	1.911568	3.524075	0.001995	0.268470	0.246993	0.268470	216.849542
Foundation/Below Grade Construction	2022	Off-Highway Trucks	402	Fleet Average	0.086073	0.515025	0.753445	0.001861	0.027682	0.025467	0.027682	201.508815
Building Construction	2022	Aerial Lifts, Manlift, Scissor Lift	63	Fleet Average	0.416429	1.911568	3.524075	0.001995	0.268470	0.246993	0.268470	216.849542
Building Construction	2022	Cranes	231	Fleet Average	0.102670	0.510093	1.217116	0.001403	0.049264	0.045323	0.049264	151.989298
Building Construction	2022	Forklifts	89	Fleet Average	0.056526	1.293963	0.839390	0.001962	0.025491	0.023452	0.025491	212.377253
Building Construction	2022	Off-Highway Trucks	97	Fleet Average	0.152427	1.501485	1.351062	0.001862	0.097949	0.090113	0.097949	201.770287
Building Construction	2022	Rough Terrain Forklifts	89	Fleet Average	0.056526	1.293963	0.839390	0.001962	0.025491	0.023452	0.025491	212.377253
Building Construction	2022	Welders	46	Fleet Average	0.290334	2.087978	1.838193	0.003306	0.085815	0.078950	0.085815	255.742246
Building Construction	2023	Aerial Lifts, Manlift, Scissor Lift	63	Fleet Average	0.416429	1.911568	3.524075	0.001995	0.268470	0.246993	0.268470	216.849542
Building Construction	2023	Cranes	231	Fleet Average	0.102670	0.510093	1.217116	0.001403	0.049264	0.045323	0.049264	151.989298
Building Construction	2023	Forklifts	89	Fleet Average	0.056526	1.293963	0.839390	0.001962	0.025491	0.023452	0.025491	212.377253
Building Construction	2023	Off-Highway Trucks	97	Fleet Average	0.152427	1.501485	1.351062	0.001862	0.097949	0.090113	0.097949	201.770287
Building Construction	2023	Rough Terrain Forklifts	89	Fleet Average	0.056526	1.293963	0.839390	0.001962	0.025491	0.023452	0.025491	212.377253
Building Construction	2023	Welders	46	Fleet Average	0.290334	2.087978	1.838193	0.003306	0.085815	0.078950	0.085815	255.742246
Exterior Finishing	2023	Air Compressors	78	Fleet Average	0.332824	2.378798	2.003183	272.747995	0.095892	0.088221	0.095892	0.003526
Exterior Finishing	2023	Forklifts	89	Fleet Average	0.056526	1.293963	0.839390	0.001962	0.025491	0.023452	0.025491	212.377253
Exterior Finishing	2023	Manlift	63	Fleet Average	0.416429	1.911568	3.524075	0.001995	0.268470	0.246993	0.268470	216.849542
Exterior Finishing	2023	Welders	46	Fleet Average	0.290334	2.087978	1.838193	0.003306	0.085815	0.078950	0.085815	255.742246
Building Construction	2024	Aerial Lifts, Manlift, Scissor Lift	63	Fleet Average	0.416429	1.911568	3.524075	0.001995	0.268470	0.246993	0.268470	216.849542
Building Construction	2024	Cranes	231	Fleet Average	0.102670	0.510093	1.217116	0.001403	0.049264	0.045323	0.049264	151.989298
Building Construction	2024	Forklifts	89	Fleet Average	0.056526	1.293963	0.839390	0.001962	0.025491	0.023452	0.025491	212.377253
Building Construction	2024	Off-Highway Trucks	97	Fleet Average	0.152427	1.501485	1.351062	0.001862	0.097949	0.090113	0.097949	201.770287
Building Construction	2024	Rough Terrain Forklifts	89	Fleet Average	0.056526	1.293963	0.839390	0.001962	0.025491	0.023452	0.025491	212.377253
Building Construction	2024	Welders	46	Fleet Average	0.290334	2.087978	1.838193	0.003306	0.085815	0.078950	0.085815	255.742246
Exterior Finishing	2024	Air Compressors	78	Fleet Average	0.332824	2.378798	2.003183	272.747995	0.095892	0.088221	0.095892	0.003526
Exterior Finishing	2024	Forklifts	89	Fleet Average	0.056526	1.293963	0.839390	0.001962	0.025491	0.023452	0.025491	212.377253
Exterior Finishing	2024	Manlift	63	Fleet Average	0.416429	1.911568	3.524075	0.001995	0.268470	0.246993	0.268470	216.849542
Exterior Finishing	2024	Welders	46	Fleet Average	0.290334	2.087978	1.838193	0.003306	0.085815	0.078950	0.085815	255.742246
Site Work/Paving	2024	Cement and Mortar Mixers	9	Fleet Average	0.311567	1.824962	2.355762	0.004779	0.092826	0.085400	0.092826	318.902485
Site Work/Paving	2024	Pavers	125	Fleet Average	0.108402	1.256417	1.135576	0.002027	0.055572	0.051126	0.055572	219.561251
Site Work/Paving	2024	Paving Equipment	130	Fleet Average	0.085740	1.090744	0.862428	0.001727	0.043147	0.039695	0.043147	187.072490
Site Work/Paving	2024	Pressure Washer	13	Fleet Average	0.161344	0.975872	1.330310	0.002532	0.059182	0.054448	0.059182	170.754111

Offroad Emissions Estimate for Uncontrolled Scenario — Fleet Average

Phase	Year	Offroad Equipment	Quantity	Horsepower	Load Factor	Emission Factors	Total Days	Hours per Day	Total Hours	Emissions (lbs/day)								Emissions (tons/year)							
										ROG	CO	NOX	SOX	PM10	PM2.5	PM	CO2	ROG	CO	NOX	SOX	PM10	PM2.5	PM	CO2
Site Preparation/Demolition	2021	Dump Truck	2	402	0.38	2016	20	8	160	0.4638	2.7751	4.0598	0.0100	0.1492	0.1372	0.1492	1085.8020	0.0046	0.0278	0.0406	0.0001	0.0015	0.0014	0.0015	10.8580
		Excavators	1	158	0.38	2016	20	8	160	0.0882	1.2503	0.8274	0.0020	0.0403	0.0371	0.0403	213.5812	0.0009	0.0125	0.0083	0.0000	0.0004	0.0004	0.0004	2.1358
Excavation Shoring	2021	Bore/Drill Rigs	1	225	0.5	2016	28	8	224	0.1352	1.0676	1.5945	0.0048	0.0486	0.0447	0.0486	521.6733	0.0019	0.0149	0.0223	0.0001	0.0007	0.0006	0.0007	7.3034
		Dumpers/Tenders	1	97	0.38	2016	28	8	224	0.1392	0.5747	1.0643	0.0018	0.0402	0.0370	0.0402	139.5810	0.0019	0.0080	0.0149	0.0000	0.0006	0.0005	0.0006	1.9541
		Excavators	1	97	0.38	2016	28	8	224	0.0689	0.8712	0.7031	0.0012	0.0400	0.0368	0.0400	130.4644	0.0010	0.0122	0.0098	0.0000	0.0006	0.0005	0.0006	1.8265
		Skid Steer Loaders	1	97	0.37	2016	28	8	224	0.0475	0.7877	0.7185	0.0011	0.0468	0.0431	0.0468	121.4167	0.0007	0.0110	0.0101	0.0000	0.0007	0.0006	0.0007	1.6998
		Tractors/Loaders/Backhoes	1	97	0.37	2016	28	8	224	0.0659	0.8253	0.6752	0.0011	0.0393	0.0361	0.0393	123.4724	0.0009	0.0116	0.0095	0.0000	0.0005	0.0005	0.0005	1.7286
		Aerial Lifts	1	226	0.31	2016	28	8	224	0.1436	0.7869	1.7597	0.0025	0.0662	0.0609	0.0662	272.1566	0.0020	0.0110	0.0246	0.0000	0.0009	0.0009	0.0009	3.8102
		Off-Highway Trucks	1	402	0.38	2016	28	8	224	0.2319	1.3876	2.0299	0.0050	0.0746	0.0686	0.0746	542.9010	0.0032	0.0194	0.0284	0.0001	0.0010	0.0010	0.0010	7.6006
									Total 2021	**1.3843**	**10.3265**	**13.4325**	**0.0296**	**0.5451**	**0.5014**	**0.5451**	**3151.0485**	**0.0172**	**0.1285**	**0.1685**	**0.0004**	**0.0069**	**0.0063**	**0.0069**	**38.9171**
Foundation/Below Grade Construction	2022	Manlift	1	63	0.31	2016	45	8	360	0.1434	0.6584	1.2138	0.0007	0.0925	0.0851	0.0925	74.6926	0.0032	0.0148	0.0273	0.0000	0.0021	0.0019	0.0021	1.6806
		Off-Highway Trucks	1	402	0.38	2016	45	8	360	0.2319	1.3876	2.0299	0.0050	0.0746	0.0686	0.0746	542.9010	0.0052	0.0312	0.0457	0.0001	0.0017	0.0015	0.0017	12.2153
Building Construction	2022	Aerial Lifts, Manlift, Scissor Lift	6	63	0.31	2016	205	8	1,640	0.8606	3.9506	7.2831	0.0041	0.5548	0.5105	0.5548	448.1557	0.0882	0.4049	0.7465	0.0004	0.0569	0.0523	0.0569	45.9360
		Cranes	1	231	0.29	2016	205	8	1,640	0.1213	0.6027	1.4380	0.0017	0.0582	0.0535	0.0582	179.5725	0.0124	0.0618	0.1474	0.0002	0.0060	0.0055	0.0060	18.4062
		Forklifts	1	89	0.2	2016	205	8	1,640	0.0177	0.4062	0.2635	0.0006	0.0080	0.0074	0.0080	66.6722	0.0018	0.0416	0.0270	0.0001	0.0008	0.0008	0.0008	6.8339
		Off-Highway Trucks	1	97	0.38	2016	205	8	1,640	0.0991	0.9761	0.8783	0.0012	0.0637	0.0586	0.0637	131.1685	0.0102	0.1001	0.0900	0.0001	0.0065	0.0060	0.0065	13.4448
		Rough Terrain Forklifts	1	89	0.4	2016	205	8	1,640	0.0355	0.8124	0.5270	0.0012	0.0160	0.0147	0.0160	133.3444	0.0036	0.0833	0.0540	0.0001	0.0016	0.0015	0.0016	13.6678
		Welders	3	46	0.45	2016	205	8	1,640	0.3180	2.2868	2.0133	0.0036	0.0940	0.0865	0.0940	280.0987	0.0326	0.2344	0.2064	0.0004	0.0096	0.0089	0.0096	28.7101
									Total 2022	**1.8276**	**11.0808**	**15.6470**	**0.0182**	**0.9618**	**0.8848**	**0.9618**	**1856.6057**	**0.1573**	**0.9721**	**1.3443**	**0.0014**	**0.0852**	**0.0784**	**0.0852**	**140.8946**
Building Construction	2023	Aerial Lifts, Manlift, Scissor Lift	6	63	0.31	2016	252	8	2,016	0.8606	3.9506	7.2831	0.0041	0.5548	0.5105	0.5548	448.1557	0.1084	0.4978	0.9177	0.0005	0.0699	0.0643	0.0699	56.4676
		Cranes	1	231	0.29	2016	252	8	2,016	0.1213	0.6027	1.4380	0.0017	0.0582	0.0535	0.0582	179.5725	0.0153	0.0759	0.1812	0.0002	0.0073	0.0067	0.0073	22.6261
		Forklifts	1	89	0.2	2016	252	8	2,016	0.0177	0.4062	0.2635	0.0006	0.0080	0.0074	0.0080	66.6722	0.0022	0.0512	0.0332	0.0001	0.0010	0.0009	0.0010	8.4007
		Off-Highway Trucks	1	97	0.38	2016	252	8	2,016	0.0991	0.9761	0.8783	0.0012	0.0637	0.0586	0.0637	131.1685	0.0125	0.1230	0.1107	0.0002	0.0080	0.0074	0.0080	16.5272
		Rough Terrain Forklifts	1	89	0.4	2016	252	8	2,016	0.0355	0.8124	0.5270	0.0012	0.0160	0.0147	0.0160	133.3444	0.0045	0.1024	0.0664	0.0002	0.0020	0.0019	0.0020	16.8014
		Welders	3	46	0.45	2016	252	8	2,016	0.3180	2.2868	2.0133	0.0036	0.0940	0.0865	0.0940	280.0987	0.0401	0.2881	0.2537	0.0005	0.0118	0.0109	0.0118	35.2924
Exterior Finishing	2023	Air Compressors	1	78	0.48	2016	148	6	888	0.1648	1.1781	0.9921	135.0752	0.0475	0.0437	0.0475	0.0017	0.0122	0.0872	0.0734	9.9956	0.0035	0.0032	0.0035	0.0001
		Forklifts	1	89	0.2	2016	148	8	1,184	0.0177	0.4062	0.2635	0.0006	0.0080	0.0074	0.0080	66.6722	0.0013	0.0301	0.0195	0.0000	0.0006	0.0005	0.0006	4.9337
		Manlift	1	63	0.31	2016	148	8	1,184	0.1434	0.6584	1.2138	0.0007	0.0925	0.0851	0.0925	74.6926	0.0106	0.0487	0.0898	0.0001	0.0068	0.0063	0.0068	5.5273
		Welders	3	46	0.45	2016	148	8	1,184	0.3180	2.2868	2.0133	0.0036	0.0940	0.0865	0.0940	280.0987	0.0235	0.1692	0.1490	0.0003	0.0070	0.0064	0.0070	20.7273
									Total 2023	**2.0962**	**13.5644**	**16.8859**	**135.0926**	**1.0367**	**0.9537**	**1.0367**	**1660.4773**	**0.2306**	**1.4736**	**1.8945**	**9.9975**	**0.1180**	**0.1086**	**0.1180**	**187.3039**
Building Construction	2024	Aerial Lifts, Manlift, Scissor Lift	6	63	0.31	2016	196	8	1,568	0.8606	3.9506	7.2831	0.0041	0.5548	0.5105	0.5548	448.1557	0.0843	0.3872	0.7137	0.0004	0.0544	0.0500	0.0544	43.9193
		Cranes	1	231	0.29	2016	196	8	1,568	0.1213	0.6027	1.4380	0.0017	0.0582	0.0535	0.0582	179.5725	0.0119	0.0591	0.1409	0.0002	0.0057	0.0052	0.0057	17.5981
		Forklifts	1	89	0.2	2016	196	8	1,568	0.0177	0.4062	0.2635	0.0006	0.0080	0.0074	0.0080	66.6722	0.0017	0.0398	0.0258	0.0001	0.0008	0.0007	0.0008	6.5339
		Off-Highway Trucks	1	97	0.38	2016	196	8	1,568	0.0991	0.9761	0.8783	0.0012	0.0637	0.0586	0.0637	131.1685	0.0097	0.0957	0.0861	0.0001	0.0062	0.0057	0.0062	12.8545
		Rough Terrain Forklifts	1	89	0.4	2016	196	8	1,568	0.0355	0.8124	0.5270	0.0012	0.0160	0.0147	0.0160	133.3444	0.0035	0.0796	0.0516	0.0001	0.0016	0.0014	0.0016	13.0678
		Welders	3	46	0.45	2016	196	8	1,568	0.3180	2.2868	2.0133	0.0036	0.0940	0.0865	0.0940	280.0987	0.0312	0.2241	0.1973	0.0004	0.0092	0.0085	0.0092	27.4497
Exterior Finishing	2024	Air Compressors	1	78	0.48	2016	158	6	948	0.1648	1.1781	0.9921	135.0752	0.0475	0.0437	0.0475	0.0017	0.0130	0.0931	0.0784	10.6709	0.0038	0.0035	0.0038	0.0001
		Forklifts	1	89	0.2	2016	158	8	1,264	0.0177	0.4062	0.2635	0.0006	0.0080	0.0074	0.0080	66.6722	0.0014	0.0321	0.0208	0.0000	0.0006	0.0006	0.0006	5.2671
		Manlift	1	63	0.31	2016	158	8	1,264	0.1434	0.6584	1.2138	0.0007	0.0925	0.0851	0.0925	74.6926	0.0113	0.0520	0.0959	0.0001	0.0073	0.0067	0.0073	5.9007
		Welders	3	46	0.45	2016	158	8	1,264	0.3180	2.2868	2.0133	0.0036	0.0940	0.0865	0.0940	280.0987	0.0251	0.1807	0.1590	0.0003	0.0074	0.0068	0.0074	22.1278
Site Work/Paving	2024	Cement and Mortar Mixers	1	9	0.56	2016	88	8	704	0.0277	0.1622	0.2094	0.0004	0.0083	0.0076	0.0083	28.3469	0.0012	0.0071	0.0092	0.0000	0.0004	0.0003	0.0004	1.2473
		Pavers	1	125	0.42	2016	88	8	704	0.1004	1.1633	1.0515	0.0019	0.0515	0.0473	0.0515	203.2975	0.0044	0.0512	0.0463	0.0001	0.0023	0.0021	0.0023	8.9451
		Paving Equipment	1	130	0.36	2016	88	8	704	0.0708	0.9003	0.7118	0.0014	0.0356	0.0328	0.0356	154.4090	0.0031	0.0396	0.0313	0.0001	0.0016	0.0014	0.0016	6.7940
		Pressure Washer	1	13	0.3	2016	88	8	704	0.0111	0.0671	0.0915	0.0002	0.0041	0.0037	0.0041	11.7450	0.0005	0.0030	0.0040	0.0000	0.0002	0.0002	0.0002	0.5168
									Total 2024	**2.3062**	**15.8574**	**18.9501**	**135.0965**	**1.1361**	**1.0452**	**1.1361**	**2058.2757**	**0.2024**	**1.3441**	**1.6605**	**10.6727**	**0.1014**	**0.0933**	**0.1014**	**172.2221**
									Grand Total	**7.6142**	**50.8290**	**64.9154**	**270.2368**	**3.6795**	**3.3852**	**3.6795**	**8726.4072**	**0.6075**	**3.9183**	**5.0678**	**20.6720**	**0.3115**	**0.2866**	**0.3115**	**539.3378**

CONTROL SCENARIO 1
OFFROAD EMISSIONS ESTIMATE

Tier IV Drill Rig, Excavator

Construction Equipment Emission Factors Conversion Calculations for Control Scenario 1

Control Scenario 1: Fleet Average Emission Factors with TIV Drill Rigs and Excavators

E														OFFROAD2017 (v1.0.1) Emissions Inventory												
Phase	Year	Offroad Equipment	Horsepower	Emission Factors	Region	CalYr	VehClass	MdlYr	HP_Bin	Fuel	HC_tpd	TOG_tpd	ROG_tpd	CO_tpd	NOx_tpd	SOx_tpd	PM10_tpd	PM2_5_tpd	PM_tpd	CO2_tpd	NH3_tpd	Fuel_gpy	al_Activity	al_Populat	Horsepower_Hours_hhpy
Site Preparation/Demolition	2021	Dump Truck	402	Fleet Average	San Francisco	2021	ConstMin - Off-Highway Trucks	Aggregated	600	Diesel	8.783E-05	0.000126476	0.000106275	0.000635903	0.000930281	2.29768E-06	3.41791E-05	3.14447E-05	3.41791E-05	0.248803488	2.0307E-06	8072.16	1085.8	0.80695	408837
Site Preparation/Demolition	2021	Excavators	158	Tier IV	San Francisco	2021	ConstMin - Excavators	2016	175	Diesel	7.283E-07	1.04875E-06	8.8124E-07	3.04135E-05	2.74437E-06	4.93915E-08	1.04641E-07	9.62699E-08	1.04641E-07	0.005344584	4.36218E-08	173.399	59.99	0.10581	8760.92
Excavation Shoring	2021	Bore/Drill Rigs	225	Tier IV	San Francisco	2021	ConstMin - Bore/Drill Rigs	2016	300	Diesel	5.111E-08	7.36051E-08	6.18488E-08	8.06701E-07	2.16053E-07	3.94181E-09	7.71784E-09	7.10042E-09	7.71784E-09	0.000426515	3.48116E-09	13.8378	2.69362	0.0069	554.151
Excavation Shoring	2021	Dumpers/Tenders	97	Fleet Average	San Francisco	2021	OFF - ConstMin - Dumpers/Tenders	Aggregated	25 (only bin)	Diesel	7.044E-06	1.0143E-05	8.38264E-06	3.46154E-05	6.41042E-05	1.06667E-07	2.42323E-06	2.22937E-06	2.42323E-06	0.008406815	7.07033E-08	281.05	810.3	1.22	12964.8
Excavation Shoring	2021	Excavators	97	Tier IV	San Francisco	2021	ConstMin - Excavators	2016	175	Diesel	7.283E-07	1.04875E-06	8.8124E-07	3.04135E-05	2.74437E-06	4.93915E-08	1.04641E-07	9.62699E-08	1.04641E-07	0.005344584	4.36218E-08	173.399	59.99	0.10581	8760.92
Excavation Shoring	2021	Skid Steer Loaders	97	Fleet Average	San Francisco	2021	ConstMin - Skid Steer Loaders	Aggregated	100	Diesel	3.669E-07	5.2827E-07	4.43893E-07	7.35556E-06	6.70931E-06	1.04718E-08	4.36989E-07	4.0203E-07	4.36989E-07	0.001133825	9.25413E-09	36.7857	25.783	0.08046	1957.25
Excavation Shoring	2021	Tractors/Loaders/Backhoes	97	Fleet Average	San Francisco	2021	ConstMin - Tractors/Loaders/Backhoes	Aggregated	100	Diesel	0.0001774	0.000255498	0.000214689	0.002686939	0.002198281	3.7111E-06	0.000127792	0.000117568	0.000127792	0.401971519	3.28084E-06	13041.5	8208.02	13.2687	682345
Excavation Shoring	2021	Aerial Lifts	226	Fleet Average	San Francisco	2021	ConstMin - Other Construction Equipment	Aggregated	300	Diesel	6.599E-06	9.50297E-06	7.98513E-06	4.37465E-05	9.78226E-05	1.39681E-07	3.67855E-06	3.38427E-06	3.67855E-06	0.015129408	1.23484E-07	490.857	103.907	0.25906	22744.6
Excavation Shoring	2021	Off-Highway Trucks	402	Fleet Average	San Francisco	2021	ConstMin - Off-Highway Trucks	Aggregated	600	Diesel	8.783E-05	0.000126476	0.000106275	0.000635903	0.000930281	2.29768E-06	3.41791E-05	3.14447E-05	3.41791E-05	0.248803488	2.0307E-06	8072.16	1085.8	0.80695	408837
Foundation/Below Grade Construction	2022	Manlift	63	Fleet Average	San Francisco	2021	ConstMin - Other Construction Equipment	Aggregated	75	Diesel	1.11E-06	1.59895E-06	1.34356E-06	6.16747E-06	1.137E-05	6.43522E-09	8.6619E-07	7.96895E-07	8.6619E-07	0.000699641	5.71038E-09	22.6991	14.6538	0.0484	1068.33
Foundation/Below Grade Construction	2022	Off-Highway Trucks	402	Fleet Average	San Francisco	2021	ConstMin - Off-Highway Trucks	Aggregated	600	Diesel	8.783E-05	0.000126476	0.000106275	0.000635903	0.000930281	2.29768E-06	3.41791E-05	3.14447E-05	3.41791E-05	0.248803488	2.0307E-06	8072.16	1085.8	0.80695	408837
Building Construction	2022	Aerial Lifts, Manlift, Scissor Lift	63	Fleet Average	San Francisco	2021	ConstMin - Other Construction Equipment	Aggregated	75	Diesel	1.11E-06	1.59895E-06	1.34356E-06	6.16747E-06	1.137E-05	6.43522E-09	8.6619E-07	7.96895E-07	8.6619E-07	0.000699641	5.71038E-09	22.6991	14.6538	0.0484	1068.33
Building Construction	2022	Cranes	231	Fleet Average	San Francisco	2021	ConstMin - Cranes	Aggregated	300	Diesel	1.553E-05	2.2364E-05	1.8792E-05	9.33639E-05	0.000222773	2.56735E-07	9.01696E-06	8.2956E-06	9.01696E-06	0.027819076	2.27056E-07	902.559	274.422	0.58779	60606.3
Building Construction	2022	Forklifts	89	Fleet Average	San Francisco	2021	ConstMin - Rough Terrain Forklifts	Aggregated	100	Diesel	1.467E-05	2.11219E-05	1.77483E-05	0.000406281	0.000263553	6.16073E-07	8.00364E-06	7.36335E-06	8.00364E-06	0.066682568	5.44254E-07	2163.44	1080.51	3.86454	103966
Building Construction	2022	Off-Highway Trucks	97	Fleet Average	San Francisco	2021	ConstMin - Off-Highway Trucks	Aggregated	100	Diesel	5.181E-07	7.46013E-07	6.26858E-07	6.17488E-06	5.55626E-06	7.65621E-09	4.02818E-07	3.70593E-07	4.02818E-07	0.000829783	6.77258E-09	26.9214	15.5503	0.01233	1361.74
Building Construction	2022	Rough Terrain Forklifts	89	Fleet Average	San Francisco	2021	ConstMin - Rough Terrain Forklifts	Aggregated	100	Diesel	1.467E-05	2.11219E-05	1.77483E-05	0.000406281	0.000263553	6.16073E-07	8.00364E-06	7.36335E-06	8.00364E-06	0.066682568	5.44254E-07	2163.44	1080.51	3.86454	103966
Building Construction	2022	Welders	46	Fleet Average	San Francisco	2021	OFF - Light Commercial - Welders	Aggregated	50	Diesel	0.0054676	0.007873337	0.00650689	0.046795148	0.041197036	7.40955E-05	0.001923268	0.001769407	0.001923268	5.73161971	4.82693E-05	191873	161326	251.23	7421012
Building Construction	2023	Aerial Lifts, Manlift, Scissor Lift	63	Fleet Average	San Francisco	2021	ConstMin - Other Construction Equipment	Aggregated	75	Diesel	1.11E-06	1.59895E-06	1.34356E-06	6.16747E-06	1.137E-05	6.43522E-09	8.6619E-07	7.96895E-07	8.6619E-07	0.000699641	5.71038E-09	22.6991	14.6538	0.0484	1068.33
Building Construction	2023	Cranes	231	Fleet Average	San Francisco	2021	ConstMin - Cranes	Aggregated	300	Diesel	1.553E-05	2.2364E-05	1.8792E-05	9.33639E-05	0.000222773	2.56735E-07	9.01696E-06	8.2956E-06	9.01696E-06	0.027819076	2.27056E-07	902.559	274.422	0.58779	60606.3
Building Construction	2023	Forklifts	89	Fleet Average	San Francisco	2021	ConstMin - Rough Terrain Forklifts	Aggregated	100	Diesel	1.467E-05	2.11219E-05	1.77483E-05	0.000406281	0.000263553	6.16073E-07	8.00364E-06	7.36335E-06	8.00364E-06	0.066682568	5.44254E-07	2163.44	1080.51	3.86454	103966
Building Construction	2023	Off-Highway Trucks	97	Fleet Average	San Francisco	2021	ConstMin - Off-Highway Trucks	Aggregated	100	Diesel	5.181E-07	7.46013E-07	6.26858E-07	6.17488E-06	5.55626E-06	7.65621E-09	4.02818E-07	3.70593E-07	4.02818E-07	0.000829783	6.77258E-09	26.9214	15.5503	0.01233	1361.74
Building Construction	2023	Rough Terrain Forklifts	89	Fleet Average	San Francisco	2021	ConstMin - Rough Terrain Forklifts	Aggregated	100	Diesel	1.467E-05	2.11219E-05	1.77483E-05	0.000406281	0.000263553	6.16073E-07	8.00364E-06	7.36335E-06	8.00364E-06	0.066682568	5.44254E-07	2163.44	1080.51	3.86454	103966
Building Construction	2023	Welders	46	Fleet Average	San Francisco	2021	OFF - Light Commercial - Welders	Aggregated	50	Diesel	0.0054676	0.007873337	0.00650689	0.046795148	0.041197036	7.40955E-05	0.001923268	0.001769407	0.001923268	5.73161971	4.82693E-05	191873	161326	251.23	7421012
Exterior Finishing	2023	Air Compressors	78	Fleet Average	San Francisco	2021	OFF - Light Commercial - Air Compressors	Aggregated	25 & 50 are	Diesel	0.0012788	0.001841413	0.001521829	0.010876979	0.009159492	1.247131537	0.000438464	0.000403387	0.000438464	1.61223E-05	1.05183E-05	41810.8	40920.1	50.29	1514046
Exterior Finishing	2023	Forklifts	89	Fleet Average	San Francisco	2021	ConstMin - Rough Terrain Forklifts	Aggregated	100	Diesel	1.467E-05	2.11219E-05	1.77483E-05	0.000406281	0.000263553	6.16073E-07	8.00364E-06	7.36335E-06	8.00364E-06	0.066682568	5.44254E-07	2163.44	1080.51	3.86454	103966
Exterior Finishing	2023	Manlift	63	Fleet Average	San Francisco	2021	ConstMin - Other Construction Equipment	Aggregated	75	Diesel	1.11E-06	1.59895E-06	1.34356E-06	6.16747E-06	1.137E-05	6.43522E-09	8.6619E-07	7.96895E-07	8.6619E-07	0.000699641	5.71038E-09	22.6991	14.6538	0.0484	1068.33
Exterior Finishing	2023	Welders	46	Fleet Average	San Francisco	2021	OFF - Light Commercial - Welders	Aggregated	50	Diesel	0.0054676	0.007873337	0.00650689	0.046795148	0.041197036	7.40955E-05	0.001923268	0.001769407	0.001923268	5.73161971	4.82693E-05	191873	161326	251.23	7421012
Building Construction	2024	Aerial Lifts, Manlift, Scissor Lift	63	Fleet Average	San Francisco	2021	ConstMin - Other Construction Equipment	Aggregated	75	Diesel	1.11E-06	1.59895E-06	1.34356E-06	6.16747E-06	1.137E-05	6.43522E-09	8.6619E-07	7.96895E-07	8.6619E-07	0.000699641	5.71038E-09	22.6991	14.6538	0.0484	1068.33
Building Construction	2024	Cranes	231	Fleet Average	San Francisco	2021	ConstMin - Cranes	Aggregated	300	Diesel	1.553E-05	2.2364E-05	1.8792E-05	9.33639E-05	0.000222773	2.56735E-07	9.01696E-06	8.2956E-06	9.01696E-06	0.027819076	2.27056E-07	902.559	274.422	0.58779	60606.3
Building Construction	2024	Forklifts	89	Fleet Average	San Francisco	2021	ConstMin - Rough Terrain Forklifts	Aggregated	100	Diesel	1.467E-05	2.11219E-05	1.77483E-05	0.000406281	0.000263553	6.16073E-07	8.00364E-06	7.36335E-06	8.00364E-06	0.066682568	5.44254E-07	2163.44	1080.51	3.86454	103966
Building Construction	2024	Off-Highway Trucks	97	Fleet Average	San Francisco	2021	ConstMin - Off-Highway Trucks	Aggregated	100	Diesel	5.181E-07	7.46013E-07	6.26858E-07	6.17488E-06	5.55626E-06	7.65621E-09	4.02818E-07	3.70593E-07	4.02818E-07	0.000829783	6.77258E-09	26.9214	15.5503	0.01233	1361.74
Building Construction	2024	Rough Terrain Forklifts	89	Fleet Average	San Francisco	2021	ConstMin - Rough Terrain Forklifts	Aggregated	100	Diesel	1.467E-05	2.11219E-05	1.77483E-05	0.000406281	0.000263553	6.16073E-07	8.00364E-06	7.36335E-06	8.00364E-06	0.066682568	5.44254E-07	2163.44	1080.51	3.86454	103966
Building Construction	2024	Welders	46	Fleet Average	San Francisco	2021	OFF - Light Commercial - Welders	Aggregated	50	Diesel	0.0054676	0.007873337	0.00650689	0.046795148	0.041197036	7.40955E-05	0.001923268	0.001769407	0.001923268	5.73161971	4.82693E-05	191873	161326	251.23	7421012
Exterior Finishing	2024	Air Compressors	78	Fleet Average	San Francisco	2021	OFF - Light Commercial - Air Compressors	Aggregated	25 & 50 are	Diesel	0.0012788	0.001841413	0.001521829	0.010876979	0.009159492	1.247131537	0.000438464	0.000403387	0.000438464	1.61223E-05	1.05183E-05	41810.8	40920.1	50.29	1514046
Exterior Finishing	2024	Forklifts	89	Fleet Average	San Francisco	2021	ConstMin - Rough Terrain Forklifts	Aggregated	100	Diesel	1.467E-05	2.11219E-05	1.77483E-05	0.000406281	0.000263553	6.16073E-07	8.00364E-06	7.36335E-06	8.00364E-06	0.066682568	5.44254E-07	2163.44	1080.51	3.86454	103966
Exterior Finishing	2024	Manlift	63	Fleet Average	San Francisco	2021	ConstMin - Other Construction Equipment	Aggregated	75	Diesel	1.11E-06	1.59895E-06	1.34356E-06	6.16747E-06	1.137E-05	6.43522E-09	8.6619E-07	7.96895E-07	8.6619E-07	0.000699641	5.71038E-09	22.6991	14.6538	0.0484	1068.33
Exterior Finishing	2024	Welders	46	Fleet Average	San Francisco	2021	OFF - Light Commercial - Welders	Aggregated	50	Diesel	0.0054676	0.007873337	0.00650689	0.046795148	0.041197036	7.40955E-05	0.001923268	0.001769407	0.001923268	5.73161971	4.82693E-05	191873	161326	251.23	7421012
Site Work/Paving	2024	Cement and Mortar Mixers	9	Fleet Average	San Francisco	2021	OFF - ConstMin - Cement and Mortar Mixers	Aggregated	25	Diesel	6.9E-05	9.93663E-05	8.21209E-05	0.000481012	0.000620917	1.25966E-06	2.44666E-05	2.25093E-05	2.44666E-05	0.084054363	7.05197E-07	2803.2	8464.35	28.23	87275.2
Site Work/Paving	2024	Pavers	125	Fleet Average	San Francisco	2021	ConstMin - Pavers	Aggregated	175	Diesel	4.431E-06	6.38132E-06	5.36208E-06	6.21485E-05	5.61711E-05	1.00278E-07	2.74887E-06	2.52896E-06	2.74887E-06	0.010860564	8.86425E-08	352.359	103.763	0.27215	16378.9
Site Work/Paving	2024	Paving Equipment	130	Fleet Average	San Francisco	2021	ConstMin - Paving Equipment	Aggregated	175	Diesel	1.721E-06	2.47878E-06	2.08287E-06	2.64972E-05	2.09508E-05	4.19646E-08	1.04816E-06	9.64305E-07	1.04816E-06	0.004544515	3.70917E-08	147.442	55.1317	0.12016	8043.88
Site Work/Paving	2024	Pressure Washer	13	Fleet Average	San Francisco	2021	OFF - Light Commercial - Pressure Washers	Aggregated	25	Diesel	1.308E-05	1.883E-05	1.5562E-05	9.41251E-05	0.000128312	2.44261E-07	5.70825E-06	5.25159E-06	5.70825E-06	0.01646963	1.33143E-07	529.25	2263	15.64	31937.5

Emission Factors for Control Scenario 1 in grams/hp-hr

Control Scenario 1: Fleet Average Emission Factors with Tier IV Drill Rigs and Excavators

Phase	Year	Offroad Equipment	Horsepower	Emission Factors	OFFROAD2017 (v1.0.1) Emissions Inventory							
					ROG	CO	NOX	SOX	PM10	PM2.5	PM	CO2
Site Preparation/Demolition	2021	Dump Truck	402	Fleet Average	0.086073	0.515025	0.753445	0.001861	0.027682	0.025467	0.027682	201.508815
Site Preparation/Demolition	2021	Excavators	158	Tier IV	0.033307	1.149489	0.103724	0.001867	0.003955	0.003639	0.003955	202.000537
Excavation Shoring	2021	Bore/Drill Rigs	225	Tier IV	0.036957	0.482028	0.129098	0.002355	0.004612	0.004243	0.004612	254.855673
Excavation Shoring	2021	Dumpers/Tenders	97	Fleet Average	0.214093	0.884081	1.637227	0.002724	0.061889	0.056938	0.061889	214.710807
Excavation Shoring	2021	Excavators	97	Tier IV	0.033307	1.149489	0.103724	0.001867	0.003955	0.003639	0.003955	202.000537
Excavation Shoring	2021	Skid Steer Loaders	97	Fleet Average	0.075097	1.244393	1.135062	0.001772	0.073929	0.068014	0.073929	191.817365
Excavation Shoring	2021	Tractors/Loaders/Backhoes	97	Fleet Average	0.104182	1.303893	1.066762	0.001801	0.062014	0.057052	0.062014	195.065077
Excavation Shoring	2021	Aerial Lifts	226	Fleet Average	0.116250	0.636874	1.424128	0.002034	0.053553	0.049269	0.053553	220.258036
Excavation Shoring	2021	Off-Highway Trucks	402	Fleet Average	0.086073	0.515025	0.753445	0.001861	0.027682	0.025467	0.027682	201.508815
Foundation/Below Grade Construction	2022	Manlift	63	Fleet Average	0.416429	1.911568	3.524075	0.001995	0.268470	0.246993	0.268470	216.849542
Foundation/Below Grade Construction	2022	Off-Highway Trucks	402	Fleet Average	0.086073	0.515025	0.753445	0.001861	0.027682	0.025467	0.027682	201.508815
Building Construction	2022	Aerial Lifts, Manlift, Scissor Lift	63	Fleet Average	0.416429	1.911568	3.524075	0.001995	0.268470	0.246993	0.268470	216.849542
Building Construction	2022	Cranes	231	Fleet Average	0.102670	0.510093	1.217116	0.001403	0.049264	0.045323	0.049264	151.989298
Building Construction	2022	Forklifts	89	Fleet Average	0.056526	1.293963	0.839390	0.001962	0.025491	0.023452	0.025491	212.377253
Building Construction	2022	Off-Highway Trucks	97	Fleet Average	0.152427	1.501485	1.351062	0.001862	0.097949	0.090113	0.097949	201.770287
Building Construction	2022	Rough Terrain Forklifts	89	Fleet Average	0.056526	1.293963	0.839390	0.001962	0.025491	0.023452	0.025491	212.377253
Building Construction	2022	Welders	46	Fleet Average	0.290334	2.087978	1.838193	0.003306	0.085815	0.078950	0.085815	255.742246
Building Construction	2023	Aerial Lifts, Manlift, Scissor Lift	63	Fleet Average	0.416429	1.911568	3.524075	0.001995	0.268470	0.246993	0.268470	216.849542
Building Construction	2023	Cranes	231	Fleet Average	0.102670	0.510093	1.217116	0.001403	0.049264	0.045323	0.049264	151.989298
Building Construction	2023	Forklifts	89	Fleet Average	0.056526	1.293963	0.839390	0.001962	0.025491	0.023452	0.025491	212.377253
Building Construction	2023	Off-Highway Trucks	97	Fleet Average	0.152427	1.501485	1.351062	0.001862	0.097949	0.090113	0.097949	201.770287
Building Construction	2023	Rough Terrain Forklifts	89	Fleet Average	0.056526	1.293963	0.839390	0.001962	0.025491	0.023452	0.025491	212.377253
Building Construction	2023	Welders	46	Fleet Average	0.290334	2.087978	1.838193	0.003306	0.085815	0.078950	0.085815	255.742246
Exterior Finishing	2023	Air Compressors	78	Fleet Average	0.332824	2.378798	2.003183	272.747995	0.095892	0.088221	0.095892	0.003526
Exterior Finishing	2023	Forklifts	89	Fleet Average	0.056526	1.293963	0.839390	0.001962	0.025491	0.023452	0.025491	212.377253
Exterior Finishing	2023	Manlift	63	Fleet Average	0.416429	1.911568	3.524075	0.001995	0.268470	0.246993	0.268470	216.849542
Exterior Finishing	2023	Welders	46	Fleet Average	0.290334	2.087978	1.838193	0.003306	0.085815	0.078950	0.085815	255.742246
Building Construction	2024	Aerial Lifts, Manlift, Scissor Lift	63	Fleet Average	0.416429	1.911568	3.524075	0.001995	0.268470	0.246993	0.268470	216.849542
Building Construction	2024	Cranes	231	Fleet Average	0.102670	0.510093	1.217116	0.001403	0.049264	0.045323	0.049264	151.989298
Building Construction	2024	Forklifts	89	Fleet Average	0.056526	1.293963	0.839390	0.001962	0.025491	0.023452	0.025491	212.377253
Building Construction	2024	Off-Highway Trucks	97	Fleet Average	0.152427	1.501485	1.351062	0.001862	0.097949	0.090113	0.097949	201.770287
Building Construction	2024	Rough Terrain Forklifts	89	Fleet Average	0.056526	1.293963	0.839390	0.001962	0.025491	0.023452	0.025491	212.377253
Building Construction	2024	Welders	46	Fleet Average	0.290334	2.087978	1.838193	0.003306	0.085815	0.078950	0.085815	255.742246
Exterior Finishing	2024	Air Compressors	78	Fleet Average	0.332824	2.378798	2.003183	272.747995	0.095892	0.088221	0.095892	0.003526
Exterior Finishing	2024	Forklifts	89	Fleet Average	0.056526	1.293963	0.839390	0.001962	0.025491	0.023452	0.025491	212.377253
Exterior Finishing	2024	Manlift	63	Fleet Average	0.416429	1.911568	3.524075	0.001995	0.268470	0.246993	0.268470	216.849542
Exterior Finishing	2024	Welders	46	Fleet Average	0.290334	2.087978	1.838193	0.003306	0.085815	0.078950	0.085815	255.742246
Site Work/Paving	2024	Cement and Mortar Mixers	9	Fleet Average	0.311567	1.824962	2.355762	0.004779	0.092826	0.085400	0.092826	318.902485
Site Work/Paving	2024	Pavers	125	Fleet Average	0.108402	1.256417	1.135576	0.002027	0.055572	0.051126	0.055572	219.561251
Site Work/Paving	2024	Paving Equipment	130	Fleet Average	0.085740	1.090744	0.862428	0.001727	0.043147	0.039695	0.043147	187.072490
Site Work/Paving	2024	Pressure Washer	13	Fleet Average	0.161344	0.975872	1.330310	0.002532	0.059182	0.054448	0.059182	170.754111

Offroad Emissions Estimate for Control Scenario 1 — Fleet Average with Tier IV Drill Rig and Excavator

Phase	Year	Offroad Equipment	Quantity	Horsepower	Load Factor	Emission Factors	Total Days	Hours per Day	Total Hours	Emissions (lbs/day)								Emissions (tons/year)							
										ROG	CO	NOX	SOX	PM10	PM2.5	PM	CO2	ROG	CO	NOX	SOX	PM10	PM2.5	PM	CO2
Site Preparation/Demolition	2021	Dump Truck	2	402	0.38	Fleet Average	20	8	160	0.4638	2.7751	4.0598	0.0100	0.1492	0.1372	0.1492	1085.8020	0.0046	0.0278	0.0406	0.0001	0.0015	0.0014	0.0015	10.8580
		Excavators	1	158	0.38	Tier IV	20	8	160	0.0353	1.2172	0.1098	0.0020	0.0042	0.0039	0.0042	213.8997	0.0004	0.0122	0.0011	0.0000	0.0000	0.0000	0.0000	2.1390
Excavation Shoring	2021	Bore/Drill Rigs	1	225	0.5	Tier IV	28	8	224	0.0733	0.9564	0.2561	0.0047	0.0092	0.0084	0.0092	505.6660	0.0010	0.0134	0.0036	0.0001	0.0001	0.0001	0.0001	7.0793
		Dumpers/Tenders	1	97	0.38	Fleet Average	28	8	224	0.1392	0.5747	1.0643	0.0018	0.0402	0.0370	0.0402	139.5810	0.0019	0.0080	0.0149	0.0000	0.0006	0.0005	0.0006	1.9541
		Excavators	1	97	0.38	Tier IV	28	8	224	0.0217	0.7473	0.0674	0.0012	0.0026	0.0024	0.0026	131.3182	0.0003	0.0105	0.0009	0.0000	0.0000	0.0000	0.0000	1.8385
		Skid Steer Loaders	1	97	0.37	Fleet Average	28	8	224	0.0475	0.7877	0.7185	0.0011	0.0468	0.0431	0.0468	121.4167	0.0007	0.0110	0.0101	0.0000	0.0007	0.0006	0.0007	1.6998
		Tractors/Loaders/Backhoes	1	97	0.37	Fleet Average	28	8	224	0.0659	0.8253	0.6752	0.0011	0.0393	0.0361	0.0393	123.4724	0.0009	0.0116	0.0095	0.0000	0.0005	0.0005	0.0005	1.7286
		Aerial Lifts	1	226	0.31	Fleet Average	28	8	224	0.1436	0.7869	1.7597	0.0025	0.0662	0.0609	0.0662	272.1566	0.0020	0.0110	0.0246	0.0000	0.0009	0.0009	0.0009	3.8102
		Off-Highway Trucks	1	402	0.38	Fleet Average	28	8	224	0.2319	1.3876	2.0299	0.0050	0.0746	0.0686	0.0746	542.9010	0.0032	0.0194	0.0284	0.0001	0.0010	0.0010	0.0010	7.6006
									Total 2021	**1.2222**	**10.0583**	**10.7409**	**0.0295**	**0.4321**	**0.3975**	**0.4321**	**3136.2135**	**0.0151**	**0.1248**	**0.1337**	**0.0004**	**0.0054**	**0.0050**	**0.0054**	**38.7082**
Foundation/Below Grade Construction	2022	Manlift	1	63	0.31	Fleet Average	45	8	360	0.1434	0.6584	1.2138	0.0007	0.0925	0.0851	0.0925	74.6926	0.0032	0.0148	0.0273	0.0000	0.0021	0.0019	0.0021	1.6806
		Off-Highway Trucks	1	402	0.38	Fleet Average	45	8	360	0.2319	1.3876	2.0299	0.0050	0.0746	0.0686	0.0746	542.9010	0.0052	0.0312	0.0457	0.0001	0.0017	0.0015	0.0017	12.2153
Building Construction	2022	Aerial Lifts, Manlift, Scissor Lift	6	63	0.31	Fleet Average	205	8	1,640	0.8606	3.9506	7.2831	0.0041	0.5548	0.5105	0.5548	448.1557	0.0882	0.4049	0.7465	0.0004	0.0569	0.0523	0.0569	45.9360
		Cranes	1	231	0.29	Fleet Average	205	8	1,640	0.1213	0.6027	1.4380	0.0017	0.0582	0.0535	0.0582	179.5725	0.0124	0.0618	0.1474	0.0002	0.0060	0.0055	0.0060	18.4062
		Forklifts	1	89	0.2	Fleet Average	205	8	1,640	0.0177	0.4062	0.2635	0.0006	0.0080	0.0074	0.0080	66.6722	0.0018	0.0416	0.0270	0.0001	0.0008	0.0008	0.0008	6.8339
		Off-Highway Trucks	1	97	0.38	Fleet Average	205	8	1,640	0.0991	0.9761	0.8783	0.0012	0.0637	0.0586	0.0637	131.1685	0.0102	0.1001	0.0900	0.0001	0.0065	0.0060	0.0065	13.4448
		Rough Terrain Forklifts	1	89	0.4	Fleet Average	205	8	1,640	0.0355	0.8124	0.5270	0.0012	0.0160	0.0147	0.0160	133.3444	0.0036	0.0833	0.0540	0.0001	0.0016	0.0015	0.0016	13.6678
		Welders	3	46	0.45	Fleet Average	205	8	1,640	0.3180	2.2868	2.0133	0.0036	0.0940	0.0865	0.0940	280.0987	0.0326	0.2344	0.2064	0.0004	0.0096	0.0089	0.0096	28.7101
									Total 2022	**1.8276**	**11.0808**	**15.6470**	**0.0182**	**0.9618**	**0.8848**	**0.9618**	**1856.6057**	**0.1573**	**0.9721**	**1.3443**	**0.0014**	**0.0852**	**0.0784**	**0.0852**	**140.8946**
Building Construction	2023	Aerial Lifts, Manlift, Scissor Lift	6	63	0.31	Fleet Average	252	8	2,016	0.8606	3.9506	7.2831	0.0041	0.5548	0.5105	0.5548	448.1557	0.1084	0.4978	0.9177	0.0005	0.0699	0.0643	0.0699	56.4676
		Cranes	1	231	0.29	Fleet Average	252	8	2,016	0.1213	0.6027	1.4380	0.0017	0.0582	0.0535	0.0582	179.5725	0.0153	0.0759	0.1812	0.0002	0.0073	0.0067	0.0073	22.6261
		Forklifts	1	89	0.2	Fleet Average	252	8	2,016	0.0177	0.4062	0.2635	0.0006	0.0080	0.0074	0.0080	66.6722	0.0022	0.0512	0.0332	0.0001	0.0010	0.0009	0.0010	8.4007
		Off-Highway Trucks	1	97	0.38	Fleet Average	252	8	2,016	0.0991	0.9761	0.8783	0.0012	0.0637	0.0586	0.0637	131.1685	0.0125	0.1230	0.1107	0.0002	0.0080	0.0074	0.0080	16.5272
		Rough Terrain Forklifts	1	89	0.4	Fleet Average	252	8	2,016	0.0355	0.8124	0.5270	0.0012	0.0160	0.0147	0.0160	133.3444	0.0045	0.1024	0.0664	0.0002	0.0020	0.0019	0.0020	16.8014
		Welders	3	46	0.45	Fleet Average	252	8	2,016	0.3180	2.2868	2.0133	0.0036	0.0940	0.0865	0.0940	280.0987	0.0401	0.2881	0.2537	0.0005	0.0118	0.0109	0.0118	35.2924
Exterior Finishing	2023	Air Compressors	1	78	0.48	Fleet Average	148	6	888	0.1648	1.1781	0.9921	135.0752	0.0475	0.0437	0.0475	0.0017	0.0122	0.0872	0.0734	9.9956	0.0035	0.0032	0.0035	0.0001
		Forklifts	1	89	0.2	Fleet Average	148	8	1,184	0.0177	0.4062	0.2635	0.0006	0.0080	0.0074	0.0080	66.6722	0.0013	0.0301	0.0195	0.0000	0.0006	0.0005	0.0006	4.9337
		Manlift	1	63	0.31	Fleet Average	148	8	1,184	0.1434	0.6584	1.2138	0.0007	0.0925	0.0851	0.0925	74.6926	0.0106	0.0487	0.0898	0.0001	0.0068	0.0063	0.0068	5.5273
		Welders	3	46	0.45	Fleet Average	148	8	1,184	0.3180	2.2868	2.0133	0.0036	0.0940	0.0865	0.0940	280.0987	0.0235	0.1692	0.1490	0.0003	0.0070	0.0064	0.0070	20.7273
									Total 2023	**2.0962**	**13.5644**	**16.8859**	**135.0926**	**1.0367**	**0.9537**	**1.0367**	**1660.4773**	**0.2306**	**1.4736**	**1.8945**	**9.9975**	**0.1180**	**0.1086**	**0.1180**	**187.3039**
Building Construction	2024	Aerial Lifts, Manlift, Scissor Lift	6	63	0.31	Fleet Average	196	8	1,568	0.8606	3.9506	7.2831	0.0041	0.5548	0.5105	0.5548	448.1557	0.0843	0.3872	0.7137	0.0004	0.0544	0.0500	0.0544	43.9193
		Cranes	1	231	0.29	Fleet Average	196	8	1,568	0.1213	0.6027	1.4380	0.0017	0.0582	0.0535	0.0582	179.5725	0.0119	0.0591	0.1409	0.0002	0.0057	0.0052	0.0057	17.5981
		Forklifts	1	89	0.2	Fleet Average	196	8	1,568	0.0177	0.4062	0.2635	0.0006	0.0080	0.0074	0.0080	66.6722	0.0017	0.0398	0.0258	0.0001	0.0008	0.0007	0.0008	6.5339
		Off-Highway Trucks	1	97	0.38	Fleet Average	196	8	1,568	0.0991	0.9761	0.8783	0.0012	0.0637	0.0586	0.0637	131.1685	0.0097	0.0957	0.0861	0.0001	0.0062	0.0057	0.0062	12.8545
		Rough Terrain Forklifts	1	89	0.4	Fleet Average	196	8	1,568	0.0355	0.8124	0.5270	0.0012	0.0160	0.0147	0.0160	133.3444	0.0035	0.0796	0.0516	0.0001	0.0016	0.0014	0.0016	13.0678
		Welders	3	46	0.45	Fleet Average	196	8	1,568	0.3180	2.2868	2.0133	0.0036	0.0940	0.0865	0.0940	280.0987	0.0312	0.2241	0.1973	0.0004	0.0092	0.0085	0.0092	27.4497
Exterior Finishing	2024	Air Compressors	1	78	0.48	Fleet Average	158	6	948	0.1648	1.1781	0.9921	135.0752	0.0475	0.0437	0.0475	0.0017	0.0130	0.0931	0.0784	10.6709	0.0038	0.0035	0.0038	0.0001
		Forklifts	1	89	0.2	Fleet Average	158	8	1,264	0.0177	0.4062	0.2635	0.0006	0.0080	0.0074	0.0080	66.6722	0.0014	0.0321	0.0208	0.0000	0.0006	0.0006	0.0006	5.2671
		Manlift	1	63	0.31	Fleet Average	158	8	1,264	0.1434	0.6584	1.2138	0.0007	0.0925	0.0851	0.0925	74.6926	0.0113	0.0520	0.0959	0.0001	0.0073	0.0067	0.0073	5.9007
		Welders	3	46	0.45	Fleet Average	158	8	1,264	0.3180	2.2868	2.0133	0.0036	0.0940	0.0865	0.0940	280.0987	0.0251	0.1807	0.1590	0.0003	0.0074	0.0068	0.0074	22.1278
Site Work/Paving	2024	Cement and Mortar Mixers	1	9	0.56	Fleet Average	88	8	704	0.0277	0.1622	0.2094	0.0004	0.0083	0.0076	0.0083	28.3469	0.0012	0.0071	0.0092	0.0000	0.0004	0.0003	0.0004	1.2473
		Pavers	1	125	0.42	Fleet Average	88	8	704	0.1004	1.1633	1.0515	0.0019	0.0515	0.0473	0.0515	203.2975	0.0044	0.0512	0.0463	0.0001	0.0023	0.0021	0.0023	8.9451
		Paving Equipment	1	130	0.36	Fleet Average	88	8	704	0.0708	0.9003	0.7118	0.0014	0.0356	0.0328	0.0356	154.4090	0.0031	0.0396	0.0313	0.0001	0.0016	0.0014	0.0016	6.7940
		Pressure Washer	1	13	0.3	Fleet Average	88	8	704	0.0111	0.0671	0.0915	0.0002	0.0041	0.0037	0.0041	11.7450	0.0005	0.0030	0.0040	0.0000	0.0002	0.0002	0.0002	0.5168
									Total 2024	**2.3062**	**15.8574**	**18.9501**	**135.0965**	**1.1361**	**1.0452**	**1.1361**	**2058.2757**	**0.2024**	**1.3441**	**1.6605**	**10.6727**	**0.1014**	**0.0933**	**0.1014**	**172.2221**
									Grand Total	**7.4522**	**50.5608**	**62.2238**	**270.2367**	**3.5666**	**3.2813**	**3.5666**	**8711.5721**	**0.6055**	**3.9147**	**5.0330**	**20.6720**	**0.3101**	**0.2853**	**0.3101**	**539.1288**

CONTROL SCENARIO 2
OFFROAD EMISSIONS ESTIMATE

All Tier IV

Construction Equipment Emission Factors Conversion Calculations for Control Scenario 2

Control Scenario 2: All Tier IV Construction Equipment

Project-Specific Construction Equipment List							OFFROAD2017 (v1.0.1) Emissions Inventory																			
Phase	Year	Offroad Equipment	Horsepower	Emission Factors	Region	CalYr	VehClass	MdlYr	HP_Bin	Fuel	HC_tpd	TOG_tpd	ROG_tpd	CO_tpd	NOx_tpd	SOx_tpd	PM10_tpd	PM2_5_tpd	PM_tpd	CO2_tpd	NH3_tpd	Fuel_gpy	l_Activity	al_Popular	Horsepower_Hours_hhpy
Site Preparation/Demolition	2021	Dump Truck	402	Tier IV	San Francisco	2021	ConstMin - Off-Highway Trucks	2016	600	Diesel	3.103E-06	4.46774E-06	3.75414E-06	2.88632E-05	7.64427E-06	1.28355E-07	3.05922E-07	2.81448E-07	3.05922E-07	0.013893064	1.13393E-07	450.745	61.4835	0.04247	22753.9
Site Preparation/Demolition	2021	Excavators	158	Tier IV	San Francisco	2021	ConstMin - Excavators	2016	175	Diesel	7.283E-07	1.04875E-06	8.8124E-07	3.04135E-05	2.74437E-06	4.93915E-08	1.04641E-07	9.62699E-08	1.04641E-07	0.005344584	4.36218E-08	173.399	59.99	0.10581	8760.92
Excavation Shoring	2021	Bore/Drill Rigs	225	Tier IV	San Francisco	2021	ConstMin - Bore/Drill Rigs	2016	300	Diesel	5.111E-08	7.36051E-08	6.18488E-08	8.06701E-07	2.16053E-07	3.94181E-09	7.71784E-09	7.10042E-09	7.71784E-09	0.000426515	3.48116E-09	13.8378	2.69362	0.0069	554.151
Excavation Shoring	2021	Dumpers/Tenders	97	Tier IV	San Francisco	2021	OFF - ConstMin - Dumpers/Tenders	2016	25	Diesel	6.753E-07	9.72441E-07	8.0367E-07	3.31907E-06	6.14505E-06	1.02276E-08	2.29612E-07	2.11243E-07	2.29612E-07	0.00080608	6.42758E-09	25.55	76.65	0.12	1226.4
Excavation Shoring	2021	Excavators	97	Tier IV	San Francisco	2021	ConstMin - Excavators	2016	175	Diesel	7.283E-07	1.04875E-06	8.8124E-07	3.04135E-05	2.74437E-06	4.93915E-08	1.04641E-07	9.62699E-08	1.04641E-07	0.005344584	4.36218E-08	173.399	59.99	0.10581	8760.92
Excavation Shoring	2021	Skid Steer Loaders	97	Tier IV	San Francisco	2021	ConstMin - Skid Steer Loaders	2016	175	Diesel	8.182E-09	1.17826E-08	9.90065E-09	4.26144E-07	3.9323E-08	7.27059E-10	1.41188E-09	1.29893E-09	1.41188E-09	7.86659E-05	6.4206E-10	2.55223	0.9518	0.00285	135.394
Excavation Shoring	2021	Tractors/Loaders/Backhoes	97	Tier IV	San Francisco	2021	ConstMin - Tractors/Loaders/Backhoes	2016	100	Diesel	4.471E-06	6.43779E-06	5.40953E-06	0.000142108	5.85328E-05	2.02732E-07	5.22122E-07	4.80353E-07	5.22122E-07	0.021942188	1.79089E-07	711.89	449.87	0.64852	36942.8
Excavation Shoring	2021	Aerial Lifts	226	Tier IV	San Francisco	2021	ConstMin - Other Construction Equipment	2016	300	Diesel	8.5E-08	1.224E-07	1.0285E-07	1.33079E-06	3.56126E-07	6.491E-09	1.27405E-08	1.17213E-08	1.27405E-08	0.000702347	5.73246E-09	22.7869	4.88511	0.01091	1056.41
Excavation Shoring	2021	Off-Highway Trucks	402	Tier IV	San Francisco	2021	ConstMin - Off-Highway Trucks	2016	600	Diesel	3.103E-06	4.46774E-06	3.75414E-06	2.88632E-05	7.64427E-06	1.28355E-07	3.05922E-07	2.81448E-07	3.05922E-07	0.013893064	1.13393E-07	450.745	61.4835	0.04247	22753.9
Foundation/Below Grade Construction	2022	Manlift	63	Tier IV	San Francisco	2021	ConstMin - Other Construction Equipment	2016	100	Diesel	1.466E-07	2.11113E-07	1.77394E-07	5.29382E-06	2.21152E-06	7.7838E-09	1.82746E-08	1.68126E-08	1.82746E-08	0.000842377	6.87537E-09	27.33	14.6007	0.03136	1257.56
Foundation/Below Grade Construction	2022	Off-Highway Trucks	402	Tier IV	San Francisco	2021	ConstMin - Off-Highway Trucks	2016	600	Diesel	3.103E-06	4.46774E-06	3.75414E-06	2.88632E-05	7.64427E-06	1.28355E-07	3.05922E-07	2.81448E-07	3.05922E-07	0.013893064	1.13393E-07	450.745	61.4835	0.04247	22753.9
Building Construction	2022	Aerial Lifts, Manlift, Scissor Lift	63	Tier IV	San Francisco	2021	ConstMin - Other Construction Equipment	2016	100	Diesel	1.466E-07	2.11113E-07	1.77394E-07	5.29382E-06	2.21152E-06	7.7838E-09	1.82746E-08	1.68126E-08	1.82746E-08	0.000842377	6.87537E-09	27.33	14.6007	0.03136	1257.56
Building Construction	2022	Cranes	231	Tier IV	San Francisco	2021	ConstMin - Cranes	2016	300	Diesel	1.877E-07	2.70357E-07	2.27175E-07	3.04823E-06	8.18699E-07	1.49879E-08	2.90947E-08	2.67671E-08	2.90947E-08	0.001621713	1.32362E-08	52.6147	16.4647	0.03388	3532.64
Building Construction	2022	Forklifts	89	Tier IV	San Francisco	2021	ConstMin - Rough Terrain Forklifts	2016	100	Diesel	5.3E-07	7.6327E-07	6.41359E-07	2.38494E-05	1.01663E-05	3.65824E-08	7.46384E-08	6.86673E-08	7.46384E-08	0.003958498	3.23087E-08	128.429	64.4299	0.23296	6152.72
Building Construction	2022	Off-Highway Trucks	97	Tier IV	San Francisco	2021	ConstMin - Off-Highway Trucks	2016	175	Diesel	3.118E-07	4.49016E-07	3.77298E-07	8.97577E-06	7.68264E-07	1.28999E-08	3.34843E-08	3.08056E-08	3.34843E-08	0.001396279	1.13962E-08	45.3007	14.514	0.01233	2308.53
Building Construction	2022	Rough Terrain Forklifts	89	Tier IV	San Francisco	2021	ConstMin - Rough Terrain Forklifts	2016	100	Diesel	5.3E-07	7.6327E-07	6.41359E-07	2.38494E-05	1.01663E-05	3.65824E-08	7.46384E-08	6.86673E-08	7.46384E-08	0.003958498	3.23087E-08	128.429	64.4299	0.23296	6152.72
Building Construction	2022	Welders	46	Tier IV	San Francisco	2021	OFF - Light Commercial - Welders	2016	50	Diesel	0.0001357	0.000195368	0.000161461	0.002417292	0.001896021	4.69221E-06	7.96081E-06	7.32395E-06	7.96081E-06	0.3629634	3.03933E-06	12081.5	10216.3	15.91	469952
Building Construction	2023	Aerial Lifts, Manlift, Scissor Lift	63	Tier IV	San Francisco	2021	ConstMin - Other Construction Equipment	2016	100	Diesel	1.466E-07	2.11113E-07	1.77394E-07	5.29382E-06	2.21152E-06	7.7838E-09	1.82746E-08	1.68126E-08	1.82746E-08	0.000842377	6.87537E-09	27.33	14.6007	0.03136	1257.56
Building Construction	2023	Cranes	231	Tier IV	San Francisco	2021	ConstMin - Cranes	2016	300	Diesel	1.877E-07	2.70357E-07	2.27175E-07	3.04823E-06	8.18699E-07	1.49879E-08	2.90947E-08	2.67671E-08	2.90947E-08	0.001621713	1.32362E-08	52.6147	16.4647	0.03388	3532.64
Building Construction	2023	Forklifts	89	Tier IV	San Francisco	2021	ConstMin - Rough Terrain Forklifts	2016	100	Diesel	5.3E-07	7.6327E-07	6.41359E-07	2.38494E-05	1.01663E-05	3.65824E-08	7.46384E-08	6.86673E-08	7.46384E-08	0.003958498	3.23087E-08	128.429	64.4299	0.23296	6152.72
Building Construction	2023	Off-Highway Trucks	97	Tier IV	San Francisco	2021	ConstMin - Off-Highway Trucks	2016	175	Diesel	3.118E-07	4.49016E-07	3.77298E-07	8.97577E-06	7.68264E-07	1.28999E-08	3.34843E-08	3.08056E-08	3.34843E-08	0.001396279	1.13962E-08	45.3007	14.514	0.01233	2308.53
Building Construction	2023	Rough Terrain Forklifts	89	Tier IV	San Francisco	2021	ConstMin - Rough Terrain Forklifts	2016	100	Diesel	5.3E-07	7.6327E-07	6.41359E-07	2.38494E-05	1.01663E-05	3.65824E-08	7.46384E-08	6.86673E-08	7.46384E-08	0.003958498	3.23087E-08	128.429	64.4299	0.23296	6152.72
Building Construction	2023	Welders	46	Tier IV	San Francisco	2021	OFF - Light Commercial - Welders	2016	50	Diesel	0.0001357	0.000195368	0.000161461	0.002417292	0.001896021	4.69221E-06	7.96081E-06	7.32395E-06	7.96081E-06	0.3629634	3.03933E-06	12081.5	10216.3	15.91	469952
Exterior Finishing	2023	Air Compressors	78	Tier IV	San Francisco	2021	OFF - Light Commercial - Air Compressors	2016	25 & 50 are	Diesel	3.431E-05	4.94097E-05	4.08345E-05	0.000565557	0.000420709	1.02097E-06	1.87881E-06	1.7285E-06	1.87881E-06	0.07897647	6.6204E-07	2631.65	2591.5	3.18	95885.5
Exterior Finishing	2023	Forklifts	89	Tier IV	San Francisco	2021	ConstMin - Rough Terrain Forklifts	2016	100	Diesel	5.3E-07	7.6327E-07	6.41359E-07	2.38494E-05	1.01663E-05	3.65824E-08	7.46384E-08	6.86673E-08	7.46384E-08	0.003958498	3.23087E-08	128.429	64.4299	0.23296	6152.72
Exterior Finishing	2023	Manlift	63	Tier IV	San Francisco	2021	ConstMin - Other Construction Equipment	2016	100	Diesel	1.466E-07	2.11113E-07	1.77394E-07	5.29382E-06	2.21152E-06	7.7838E-09	1.82746E-08	1.68126E-08	1.82746E-08	0.000842377	6.87537E-09	27.33	14.6007	0.03136	1257.56
Exterior Finishing	2023	Welders	46	Tier IV	San Francisco	2021	OFF - Light Commercial - Welders	2016	50	Diesel	0.0001357	0.000195368	0.000161461	0.002417292	0.001896021	4.69221E-06	7.96081E-06	7.32395E-06	7.96081E-06	0.3629634	3.03933E-06	12081.5	10216.3	15.91	469952
Building Construction	2024	Aerial Lifts, Manlift, Scissor Lift	63	Tier IV	San Francisco	2021	ConstMin - Other Construction Equipment	2016	100	Diesel	1.466E-07	2.11113E-07	1.77394E-07	5.29382E-06	2.21152E-06	7.7838E-09	1.82746E-08	1.68126E-08	1.82746E-08	0.000842377	6.87537E-09	27.33	14.6007	0.03136	1257.56
Building Construction	2024	Cranes	231	Tier IV	San Francisco	2021	ConstMin - Cranes	2016	300	Diesel	1.877E-07	2.70357E-07	2.27175E-07	3.04823E-06	8.18699E-07	1.49879E-08	2.90947E-08	2.67671E-08	2.90947E-08	0.001621713	1.32362E-08	52.6147	16.4647	0.03388	3532.64
Building Construction	2024	Forklifts	89	Tier IV	San Francisco	2021	ConstMin - Rough Terrain Forklifts	2016	100	Diesel	5.3E-07	7.6327E-07	6.41359E-07	2.38494E-05	1.01663E-05	3.65824E-08	7.46384E-08	6.86673E-08	7.46384E-08	0.003958498	3.23087E-08	128.429	64.4299	0.23296	6152.72
Building Construction	2024	Off-Highway Trucks	97	Tier IV	San Francisco	2021	ConstMin - Off-Highway Trucks	2016	175	Diesel	3.118E-07	4.49016E-07	3.77298E-07	8.97577E-06	7.68264E-07	1.28999E-08	3.34843E-08	3.08056E-08	3.34843E-08	0.001396279	1.13962E-08	45.3007	14.514	0.01233	2308.53
Building Construction	2024	Rough Terrain Forklifts	89	Tier IV	San Francisco	2021	ConstMin - Rough Terrain Forklifts	2016	100	Diesel	5.3E-07	7.6327E-07	6.41359E-07	2.38494E-05	1.01663E-05	3.65824E-08	7.46384E-08	6.86673E-08	7.46384E-08	0.003958498	3.23087E-08	128.429	64.4299	0.23296	6152.72
Building Construction	2024	Welders	46	Tier IV	San Francisco	2021	OFF - Light Commercial - Welders	2016	50	Diesel	0.0001357	0.000195368	0.000161461	0.002417292	0.001896021	4.69221E-06	7.96081E-06	7.32395E-06	7.96081E-06	0.3629634	3.03933E-06	12081.5	10216.3	15.91	469952
Exterior Finishing	2024	Air Compressors	78	Tier IV	San Francisco	2021	OFF - Light Commercial - Air Compressors	2016	25 & 50 are	Diesel	3.431E-05	4.94097E-05	4.08345E-05	0.000565557	0.000420709	1.02097E-06	1.87881E-06	1.7285E-06	1.87881E-06	0.07897647	6.6204E-07	2631.65	2591.5	3.18	95885.5
Exterior Finishing	2024	Forklifts	89	Tier IV	San Francisco	2021	ConstMin - Rough Terrain Forklifts	2016	100	Diesel	5.3E-07	7.6327E-07	6.41359E-07	2.38494E-05	1.01663E-05	3.65824E-08	7.46384E-08	6.86673E-08	7.46384E-08	0.003958498	3.23087E-08	128.429	64.4299	0.23296	6152.72
Exterior Finishing	2024	Manlift	63	Tier IV	San Francisco	2021	ConstMin - Other Construction Equipment	2016	100	Diesel	1.466E-07	2.11113E-07	1.77394E-07	5.29382E-06	2.21152E-06	7.7838E-09	1.82746E-08	1.68126E-08	1.82746E-08	0.000842377	6.87537E-09	27.33	14.6007	0.03136	1257.56
Exterior Finishing	2024	Welders	46	Tier IV	San Francisco	2021	OFF - Light Commercial - Welders	2016	50	Diesel	0.0001357	0.000195368	0.000161461	0.002417292	0.001896021	4.69221E-06	7.96081E-06	7.32395E-06	7.96081E-06	0.3629634	3.03933E-06	12081.5	10216.3	15.91	469952
Site Work/Paving	2024	Cement and Mortar Mixers	9	Tier IV	San Francisco	2021	OFF - ConstMin - Cement and Mortar Mixers	2016	25	Diesel	7.026E-06	1.01177E-05	8.36172E-06	5.05158E-05	6.344E-05	1.31276E-07	2.46387E-06	2.26676E-06	2.46387E-06	0.008649732	7.25398E-08	288.35	912.5	3.05	8971.7
Site Work/Paving	2024	Pavers	125	Tier IV	San Francisco	2021	ConstMin - Pavers	2016	175	Diesel	7.88E-08	1.13476E-07	9.53512E-08	3.96885E-06	3.65114E-07	6.72644E-09	1.32192E-08	1.21616E-08	1.32192E-08	0.000727793	5.94015E-09	23.6124	7.01286	0.01778	1094.55
Site Work/Paving	2024	Paving Equipment	130	Tier IV	San Francisco	2021	ConstMin - Paving Equipment	2016	175	Diesel	3.871E-08	5.57476E-08	4.68435E-08	1.87505E-06	1.71857E-07	3.15217E-09	6.28516E-09	5.78234E-09	6.28516E-09	0.000341067	2.78375E-09	11.0656	4.09659	0.00819	601.174
Site Work/Paving	2024	Pressure Washer	13	Tier IV	San Francisco	2021	OFF - Light Commercial - Pressure Washers	2016	25	Diesel	7.823E-07	1.12649E-06	9.30982E-07	5.84137E-06	7.69135E-06	1.54682E-08	2.97088E-07	2.73321E-07	2.97088E-07	0.001042964	8.26403E-09	32.85	142.35	0.99	2003.85

Emission Factors for Control Scenario 2 in grams/hp-hr

Control Scenario 2: All Tier IV Construction Equipment

Phase	Year	Offroad Equipment	Horsepower	Emission Factors	OFFROAD2017 (v1.0.1) Emissions Inventory							
					ROG	CO	NOX	SOX	PM10	PM2.5	PM	CO2
Site Preparation/Demolition	2021	Dump Truck	402	Tier IV	0.054632	0.420028	0.111242	0.001868	0.004452	0.004096	0.004452	202.176655
Site Preparation/Demolition	2021	Excavators	158	Tier IV	0.033307	1.149489	0.103724	0.001867	0.003955	0.003639	0.003955	202.000537
Excavation Shoring	2021	Bore/Drill Rigs	225	Tier IV	0.036957	0.482028	0.129098	0.002355	0.004612	0.004243	0.004612	254.855673
Excavation Shoring	2021	Dumpers/Tenders	97	Tier IV	0.216987	0.896133	1.659133	0.002761	0.061994	0.057035	0.061994	217.637816
Excavation Shoring	2021	Excavators	97	Tier IV	0.033307	1.149489	0.103724	0.001867	0.003955	0.003639	0.003955	202.000537
Excavation Shoring	2021	Skid Steer Loaders	97	Tier IV	0.024213	1.042189	0.096169	0.001778	0.003453	0.003177	0.003453	192.387242
Excavation Shoring	2021	Tractors/Loaders/Backhoes	97	Tier IV	0.048486	1.273728	0.524636	0.001817	0.004680	0.004305	0.004680	196.670194
Excavation Shoring	2021	Aerial Lifts	226	Tier IV	0.032237	0.417127	0.111625	0.002035	0.003993	0.003674	0.003993	220.145184
Excavation Shoring	2021	Off-Highway Trucks	402	Tier IV	0.054632	0.420028	0.111242	0.001868	0.004452	0.004096	0.004452	202.176655
Foundation/Below Grade Construction	2022	Manlift	63	Tier IV	0.046708	1.393885	0.582302	0.002050	0.004812	0.004427	0.004812	221.801680
Foundation/Below Grade Construction	2022	Off-Highway Trucks	402	Tier IV	0.054632	0.420028	0.111242	0.001868	0.004452	0.004096	0.004452	202.176655
Building Construction	2022	Aerial Lifts, Manlift, Scissor Lift	63	Tier IV	0.046708	1.393885	0.582302	0.002050	0.004812	0.004427	0.004812	221.801680
Building Construction	2022	Cranes	231	Tier IV	0.021294	0.285717	0.076738	0.001405	0.002727	0.002509	0.002727	152.006808
Building Construction	2022	Forklifts	89	Tier IV	0.034516	1.283509	0.547123	0.001969	0.004017	0.003695	0.004017	213.035221
Building Construction	2022	Off-Highway Trucks	97	Tier IV	0.054117	1.287433	0.110195	0.001850	0.004803	0.004419	0.004803	200.274128
Building Construction	2022	Rough Terrain Forklifts	89	Tier IV	0.034516	1.283509	0.547123	0.001969	0.004017	0.003695	0.004017	213.035221
Building Construction	2022	Welders	46	Tier IV	0.113763	1.703193	1.335912	0.003306	0.005609	0.005160	0.005609	255.739308
Building Construction	2023	Aerial Lifts, Manlift, Scissor Lift	63	Tier IV	0.046708	1.393885	0.582302	0.002050	0.004812	0.004427	0.004812	221.801680
Building Construction	2023	Cranes	231	Tier IV	0.021294	0.285717	0.076738	0.001405	0.002727	0.002509	0.002727	152.006808
Building Construction	2023	Forklifts	89	Tier IV	0.034516	1.283509	0.547123	0.001969	0.004017	0.003695	0.004017	213.035221
Building Construction	2023	Off-Highway Trucks	97	Tier IV	0.054117	1.287433	0.110195	0.001850	0.004803	0.004419	0.004803	200.274128
Building Construction	2023	Rough Terrain Forklifts	89	Tier IV	0.034516	1.283509	0.547123	0.001969	0.004017	0.003695	0.004017	213.035221
Building Construction	2023	Welders	46	Tier IV	0.113763	1.703193	1.335912	0.003306	0.005609	0.005160	0.005609	255.739308
Exterior Finishing	2023	Air Compressors	78	Tier IV	0.141014	1.953041	1.452838	0.003526	0.006488	0.005969	0.006488	272.730072
Exterior Finishing	2023	Forklifts	89	Tier IV	0.034516	1.283509	0.547123	0.001969	0.004017	0.003695	0.004017	213.035221
Exterior Finishing	2023	Manlift	63	Tier IV	0.046708	1.393885	0.582302	0.002050	0.004812	0.004427	0.004812	221.801680
Exterior Finishing	2023	Welders	46	Tier IV	0.113763	1.703193	1.335912	0.003306	0.005609	0.005160	0.005609	255.739308
Building Construction	2024	Aerial Lifts, Manlift, Scissor Lift	63	Tier IV	0.046708	1.393885	0.582302	0.002050	0.004812	0.004427	0.004812	221.801680
Building Construction	2024	Cranes	231	Tier IV	0.021294	0.285717	0.076738	0.001405	0.002727	0.002509	0.002727	152.006808
Building Construction	2024	Forklifts	89	Tier IV	0.034516	1.283509	0.547123	0.001969	0.004017	0.003695	0.004017	213.035221
Building Construction	2024	Off-Highway Trucks	97	Tier IV	0.054117	1.287433	0.110195	0.001850	0.004803	0.004419	0.004803	200.274128
Building Construction	2024	Rough Terrain Forklifts	89	Tier IV	0.034516	1.283509	0.547123	0.001969	0.004017	0.003695	0.004017	213.035221
Building Construction	2024	Welders	46	Tier IV	0.113763	1.703193	1.335912	0.003306	0.005609	0.005160	0.005609	255.739308
Exterior Finishing	2024	Air Compressors	78	Tier IV	0.141014	1.953041	1.452838	0.003526	0.006488	0.005969	0.006488	272.730072
Exterior Finishing	2024	Forklifts	89	Tier IV	0.034516	1.283509	0.547123	0.001969	0.004017	0.003695	0.004017	213.035221
Exterior Finishing	2024	Manlift	63	Tier IV	0.046708	1.393885	0.582302	0.002050	0.004812	0.004427	0.004812	221.801680
Exterior Finishing	2024	Welders	46	Tier IV	0.113763	1.703193	1.335912	0.003306	0.005609	0.005160	0.005609	255.739308
Site Work/Paving	2024	Cement and Mortar Mixers	9	Tier IV	0.308609	1.864408	2.341406	0.004845	0.090935	0.083660	0.090935	319.239157
Site Work/Paving	2024	Pavers	125	Tier IV	0.028846	1.200657	0.110454	0.002035	0.003999	0.003679	0.003999	220.172054
Site Work/Paving	2024	Paving Equipment	130	Tier IV	0.025801	1.032765	0.094658	0.001736	0.003462	0.003185	0.003462	187.857170
Site Work/Paving	2024	Pressure Washer	13	Tier IV	0.153838	0.965245	1.270941	0.002556	0.049092	0.045164	0.049092	172.342503

Offroad Emissions Estimate for Control Scenario 2 — All Tier IV Construction Equipment

Phase	Year	Offroad Equipment	Quantity	Horsepower	Load Factor	Emission Factors	Total Days	Hours per Day	Total Hours	Emissions (lbs/day)								Emissions (tons/year)							
										ROG	CO	NOX	SOX	PM10	PM2.5	PM	CO2	ROG	CO	NOX	SOX	PM10	PM2.5	PM	CO2
Site Preparation/Demolition	2021	Dump Truck	2	402	0.38	Fleet Average	20	8	160	0.2944	2.2633	0.5994	0.0101	0.0240	0.0221	0.0240	1089.4006	0.0029	0.0226	0.0060	0.0001	0.0002	0.0002	0.0002	10.8940
		Excavators	1	158	0.38	Tier IV	20	8	160	0.0353	1.2172	0.1098	0.0020	0.0042	0.0039	0.0042	213.8997	0.0004	0.0122	0.0011	0.0000	0.0000	0.0000	0.0000	2.1390
Excavation Shoring	2021	Bore/Drill Rigs	1	225	0.5	Tier IV	28	8	224	0.0733	0.9564	0.2561	0.0047	0.0092	0.0084	0.0092	505.6660	0.0010	0.0134	0.0036	0.0001	0.0001	0.0001	0.0001	7.0793
		Dumpers/Tenders	1	97	0.38	Fleet Average	28	8	224	0.1411	0.5826	1.0786	0.0018	0.0403	0.0371	0.0403	141.4838	0.0020	0.0082	0.0151	0.0000	0.0006	0.0005	0.0006	1.9808
		Excavators	1	97	0.38	Tier IV	28	8	224	0.0217	0.7473	0.0674	0.0012	0.0026	0.0024	0.0026	131.3182	0.0003	0.0105	0.0009	0.0000	0.0000	0.0000	0.0000	1.8385
		Skid Steer Loaders	1	97	0.37	Fleet Average	28	8	224	0.0153	0.6597	0.0609	0.0011	0.0022	0.0020	0.0022	121.7774	0.0002	0.0092	0.0009	0.0000	0.0000	0.0000	0.0000	1.7049
		Tractors/Loaders/Backhoes	1	97	0.37	Fleet Average	28	8	224	0.0307	0.8062	0.3321	0.0012	0.0030	0.0027	0.0030	124.4884	0.0004	0.0113	0.0046	0.0000	0.0000	0.0000	0.0000	1.7428
		Aerial Lifts	1	226	0.31	Fleet Average	28	8	224	0.0398	0.5154	0.1379	0.0025	0.0049	0.0045	0.0049	272.0171	0.0006	0.0072	0.0019	0.0000	0.0001	0.0001	0.0001	3.8082
		Off-Highway Trucks	1	402	0.38	Fleet Average	28	5	140	0.0920	0.7073	0.1873	0.0031	0.0075	0.0069	0.0075	340.4377	0.0013	0.0099	0.0026	0.0000	0.0001	0.0001	0.0001	4.7661
									Total 2021	**0.7435**	**8.4553**	**2.8296**	**0.0277**	**0.0978**	**0.0900**	**0.0978**	**2940.4888**	**0.0091**	**0.1045**	**0.0368**	**0.0003**	**0.0013**	**0.0012**	**0.0013**	**35.9536**
Foundation/Below Grade Construction	2022	Manlift	1	63	0.31	Fleet Average	45	8	360	0.0161	0.4801	0.2006	0.0007	0.0017	0.0015	0.0017	76.3984	0.0004	0.0108	0.0045	0.0000	0.0000	0.0000	0.0000	1.7190
		Off-Highway Trucks	1	402	0.38	Fleet Average	45	5	225	0.0920	0.7073	0.1873	0.0031	0.0075	0.0069	0.0075	340.4377	0.0021	0.0159	0.0042	0.0001	0.0002	0.0002	0.0002	7.6598
Building Construction	2022	Aerial Lifts, Manlift, Scissor Lift	6	63	0.31	Fleet Average	205	8	1,640	0.0965	2.8807	1.2034	0.0042	0.0099	0.0091	0.0099	458.3901	0.0099	0.2953	0.1234	0.0004	0.0010	0.0009	0.0010	46.9850
		Cranes	1	231	0.29	Fleet Average	205	8	1,640	0.0252	0.3376	0.0907	0.0017	0.0032	0.0030	0.0032	179.5932	0.0026	0.0346	0.0093	0.0002	0.0003	0.0003	0.0003	18.4083
		Forklifts	1	89	0.2	Fleet Average	205	8	1,640	0.0108	0.4029	0.1718	0.0006	0.0013	0.0012	0.0013	66.8788	0.0011	0.0413	0.0176	0.0001	0.0001	0.0001	0.0001	6.8551
		Off-Highway Trucks	1	97	0.38	Fleet Average	205	5	1,025	0.0220	0.5231	0.0448	0.0008	0.0020	0.0018	0.0020	81.3724	0.0023	0.0536	0.0046	0.0001	0.0002	0.0002	0.0002	8.3407
		Rough Terrain Forklifts	1	89	0.4	Fleet Average	205	8	1,640	0.0217	0.8059	0.3435	0.0012	0.0025	0.0023	0.0025	133.7576	0.0022	0.0826	0.0352	0.0001	0.0003	0.0002	0.0003	13.7102
		Welders	3	46	0.45	Fleet Average	205	8	1,640	0.1246	1.8654	1.4631	0.0036	0.0061	0.0057	0.0061	280.0954	0.0128	0.1912	0.1500	0.0004	0.0006	0.0006	0.0006	28.7098
									Total 2022	**0.4089**	**8.0030**	**3.7052**	**0.0160**	**0.0342**	**0.0315**	**0.0342**	**1616.9236**	**0.0333**	**0.7253**	**0.3487**	**0.0013**	**0.0028**	**0.0026**	**0.0028**	**132.3878**
Building Construction	2023	Aerial Lifts, Manlift, Scissor Lift	6	63	0.31	Fleet Average	252	8	2,016	0.0965	2.8807	1.2034	0.0042	0.0099	0.0091	0.0099	458.3901	0.0122	0.3630	0.1516	0.0005	0.0013	0.0012	0.0013	57.7572
		Cranes	1	231	0.29	Fleet Average	252	8	2,016	0.0252	0.3376	0.0907	0.0017	0.0032	0.0030	0.0032	179.5932	0.0032	0.0425	0.0114	0.0002	0.0004	0.0004	0.0004	22.6287
		Forklifts	1	89	0.2	Fleet Average	252	8	2,016	0.0108	0.4029	0.1718	0.0006	0.0013	0.0012	0.0013	66.8788	0.0014	0.0508	0.0216	0.0001	0.0002	0.0001	0.0002	8.4267
		Off-Highway Trucks	1	97	0.38	Fleet Average	252	5	1,260	0.0220	0.5231	0.0448	0.0008	0.0020	0.0018	0.0020	81.3724	0.0028	0.0659	0.0056	0.0001	0.0002	0.0002	0.0002	10.2529
		Rough Terrain Forklifts	1	89	0.4	Fleet Average	252	8	2,016	0.0217	0.8059	0.3435	0.0012	0.0025	0.0023	0.0025	133.7576	0.0027	0.1015	0.0433	0.0002	0.0003	0.0003	0.0003	16.8535
		Welders	3	46	0.45	Fleet Average	252	8	2,016	0.1246	1.8654	1.4631	0.0036	0.0061	0.0057	0.0061	280.0954	0.0157	0.2350	0.1844	0.0005	0.0008	0.0007	0.0008	35.2920
Exterior Finishing	2023	Air Compressors	1	78	0.48	Fleet Average	148	6	888	0.0698	0.9672	0.7195	0.0017	0.0032	0.0030	0.0032	135.0663	0.0052	0.0716	0.0532	0.0001	0.0002	0.0002	0.0002	9.9949
		Forklifts	1	89	0.2	Fleet Average	148	8	1,184	0.0108	0.4029	0.1718	0.0006	0.0013	0.0012	0.0013	66.8788	0.0008	0.0298	0.0127	0.0000	0.0001	0.0001	0.0001	4.9490
		Manlift	1	63	0.31	Fleet Average	148	8	1,184	0.0161	0.4801	0.2006	0.0007	0.0017	0.0015	0.0017	76.3984	0.0012	0.0355	0.0148	0.0001	0.0001	0.0001	0.0001	5.6535
		Welders	3	46	0.45	Fleet Average	148	8	1,184	0.1246	1.8654	1.4631	0.0036	0.0061	0.0057	0.0061	280.0954	0.0092	0.1380	0.1083	0.0003	0.0005	0.0004	0.0005	20.7271
									Total 2023	**0.5221**	**10.5312**	**5.8723**	**0.0188**	**0.0373**	**0.0343**	**0.0373**	**1758.5264**	**0.0543**	**1.1337**	**0.6070**	**0.0020**	**0.0041**	**0.0037**	**0.0041**	**192.5355**
Building Construction	2024	Aerial Lifts, Manlift, Scissor Lift	6	63	0.31	Fleet Average	196	8	1,568	0.0965	2.8807	1.2034	0.0042	0.0099	0.0091	0.0099	458.3901	0.0095	0.2823	0.1179	0.0004	0.0010	0.0009	0.0010	44.9222
		Cranes	1	231	0.29	Fleet Average	196	8	1,568	0.0252	0.3376	0.0907	0.0017	0.0032	0.0030	0.0032	179.5932	0.0025	0.0331	0.0089	0.0002	0.0003	0.0003	0.0003	17.6001
		Forklifts	1	89	0.2	Fleet Average	196	8	1,568	0.0108	0.4029	0.1718	0.0006	0.0013	0.0012	0.0013	66.8788	0.0011	0.0395	0.0168	0.0001	0.0001	0.0001	0.0001	6.5541
		Off-Highway Trucks	1	97	0.38	Fleet Average	196	5	980	0.0220	0.5231	0.0448	0.0008	0.0020	0.0018	0.0020	81.3724	0.0022	0.0513	0.0044	0.0001	0.0002	0.0002	0.0002	7.9745
		Rough Terrain Forklifts	1	89	0.4	Fleet Average	196	8	1,568	0.0217	0.8059	0.3435	0.0012	0.0025	0.0023	0.0025	133.7576	0.0021	0.0790	0.0337	0.0001	0.0002	0.0002	0.0002	13.1082
		Welders	3	46	0.45	Fleet Average	196	8	1,568	0.1246	1.8654	1.4631	0.0036	0.0061	0.0057	0.0061	280.0954	0.0122	0.1828	0.1434	0.0004	0.0006	0.0006	0.0006	27.4494
Exterior Finishing	2024	Air Compressors	1	78	0.48	Fleet Average	158	6	948	0.0698	0.9672	0.7195	0.0017	0.0032	0.0030	0.0032	135.0663	0.0055	0.0764	0.0568	0.0001	0.0003	0.0002	0.0003	10.6702
		Forklifts	1	89	0.2	Fleet Average	158	8	1,264	0.0108	0.4029	0.1718	0.0006	0.0013	0.0012	0.0013	66.8788	0.0009	0.0318	0.0136	0.0000	0.0001	0.0001	0.0001	5.2834
		Manlift	1	63	0.31	Fleet Average	158	8	1,264	0.0161	0.4801	0.2006	0.0007	0.0017	0.0015	0.0017	76.3984	0.0013	0.0379	0.0158	0.0001	0.0001	0.0001	0.0001	6.0355
		Welders	3	46	0.45	Fleet Average	158	8	1,264	0.1246	1.8654	1.4631	0.0036	0.0061	0.0057	0.0061	280.0954	0.0098	0.1474	0.1156	0.0003	0.0005	0.0004	0.0005	22.1275
Site Work/Paving	2024	Cement and Mortar Mixers	1	9	0.56	Fleet Average	88	8	704	0.0274	0.1657	0.2081	0.0004	0.0081	0.0074	0.0081	28.3768	0.0012	0.0073	0.0092	0.0000	0.0004	0.0003	0.0004	1.2486
		Pavers	1	125	0.42	Fleet Average	88	8	704	0.0267	1.1117	0.1023	0.0019	0.0037	0.0034	0.0037	203.8630	0.0012	0.0489	0.0045	0.0001	0.0002	0.0001	0.0002	8.9700
		Paving Equipment	1	130	0.36	Fleet Average	88	8	704	0.0213	0.8524	0.0781	0.0014	0.0029	0.0026	0.0029	155.0567	0.0009	0.0375	0.0034	0.0001	0.0001	0.0001	0.0001	6.8225
		Pressure Washer	1	13	0.3	Fleet Average	88	8	704	0.0106	0.0664	0.0874	0.0002	0.0034	0.0031	0.0034	11.8542	0.0005	0.0029	0.0038	0.0000	0.0001	0.0001	0.0001	0.5216
									Total 2024	**0.6082**	**12.7275**	**6.3482**	**0.0227**	**0.0553**	**0.0509**	**0.0553**	**2157.6772**	**0.0507**	**1.0581**	**0.5479**	**0.0019**	**0.0042**	**0.0039**	**0.0042**	**179.2879**
									Grand Total	**2.2827**	**39.7170**	**18.7552**	**0.0852**	**0.2246**	**0.2067**	**0.2246**	**8473.6161**	**0.1474**	**3.0216**	**1.5405**	**0.0056**	**0.0123**	**0.0113**	**0.0123**	**540.1648**

CONSTRUCTION
ONROAD EMISSIONS ESTIMATE

EMFAC2017 Fleet Average

Construction - Onroad Emissions - All Scenarios

						Emissions (lbs/day)							Emissions (tons/year)					
Phase	Year	Vehicle Type	Quantity	Daily Vehicle Mileage	Total Days	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	ROG	CO	NOX	SOX	PM10	PM2.5
Site Preparation/Demolition	2021	Worker	12	10.8	20	0.0026	0.1962	0.0131	0.0007	0.0132	0.0054	71.7613	0.0000	0.0020	0.0001	0.0000	0.0001	0.0001
		Trucks	50	40	20	0.6626	2.6421	19.0506	0.0586	0.7034	0.4170	6203.4131	0.0066	0.0264	0.1905	0.0006	0.0070	0.0042
Excavation/Shoring	2021	Worker	40	10.8	45	0.0086	0.6541	0.0437	0.0024	0.0439	0.0181	239.2043	0.0002	0.0147	0.0010	0.0001	0.0010	0.0004
		Trucks	70	40	45	0.9277	3.6990	26.6709	0.0820	0.9848	0.5838	8684.7783	0.0209	0.0832	0.6001	0.0018	0.0222	0.0131
					Total 2021	**1.6015**	**7.1914**	**45.7783**	**0.1437**	**1.7453**	**1.0244**	**15199.1569**	**0.0277**	**0.1263**	**0.7917**	**0.0025**	**0.0303**	**0.0178**
Foundation/Below Grade Construction	2022	Worker	40	10.8	45	0.0086	0.6541	0.0437	0.0024	0.0439	0.0181	239.2043	0.0002	0.0147	0.0010	0.0001	0.0010	0.0004
		Trucks	8	40	45	0.1060	0.4227	3.0481	0.0094	0.1125	0.0667	992.5461	0.0024	0.0095	0.0686	0.0002	0.0025	0.0015
Building Construction	2022	Worker	380	10.8	205	0.0820	6.2138	0.4151	0.0225	0.4170	0.1718	2272.4405	0.0084	0.6369	0.0425	0.0023	0.0427	0.0176
		Trucks	6.72	40	205	0.0891	0.3551	2.5604	0.0079	0.0945	0.0560	833.7387	0.0091	0.0364	0.2624	0.0008	0.0097	0.0057
					Total 2022	**0.2857**	**7.6458**	**6.0672**	**0.0421**	**0.6680**	**0.3127**	**4337.9295**	**0.0201**	**0.6975**	**0.3745**	**0.0034**	**0.0560**	**0.0253**
Building Construction	2023	Worker	380	10.8	252	0.0820	6.2138	0.4151	0.0225	0.4170	0.1718	2272.4405	0.0103	0.7829	0.0523	0.0028	0.0525	0.0216
		Trucks	6.72	40	252	0.0891	0.3551	2.5604	0.0079	0.0945	0.0560	833.7387	0.0112	0.0447	0.3226	0.0010	0.0119	0.0071
Exterior Finishing	2023	Worker	380	10.8	148	0.0820	6.2138	0.4151	0.0225	0.4170	0.1718	2272.4405	0.0061	0.4598	0.0307	0.0017	0.0309	0.0127
		Trucks	6.72	40	148	0.0891	0.3551	2.5604	0.0079	0.0945	0.0560	833.7387	0.0066	0.0263	0.1895	0.0006	0.0070	0.0041
					Total 2023	**0.3422**	**13.1379**	**5.9509**	**0.0607**	**1.0231**	**0.4557**	**6212.3584**	**0.0342**	**1.3138**	**0.5951**	**0.0061**	**0.1023**	**0.0456**
Building Construction	2024	Worker	380	10.8	196	0.0820	6.2138	0.4151	0.0225	0.4170	0.1718	2272.4405	0.0080	0.6090	0.0407	0.0022	0.0409	0.0168
		Trucks	6.72	40	196	0.0891	0.3551	2.5604	0.0079	0.0945	0.0560	833.7387	0.0087	0.0348	0.2509	0.0008	0.0093	0.0055
Exterior Finishing	2024	Worker	76	10.8	158	0.0164	1.2428	0.0830	0.0045	0.0834	0.0344	454.4881	0.0013	0.0982	0.0066	0.0004	0.0066	0.0027
		Trucks	0	40	158	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Site Work/Paving	2024	Worker	30	10.8	88	0.0065	0.4906	0.0328	0.0018	0.0329	0.0136	179.4032	0.0003	0.0216	0.0014	0.0001	0.0014	0.0006
		Trucks	0	40	88	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
					Total 2024	**0.1940**	**8.3023**	**3.0912**	**0.0366**	**0.6279**	**0.2758**	**3740.0705**	**0.0183**	**0.7635**	**0.2996**	**0.0034**	**0.0582**	**0.0256**
					Grand Total	**2.4234**	**29.0859**	**15.1094**	**0.1394**	**2.3191**	**1.0441**	**14290.3584**	**0.0727**	**2.7748**	**1.2692**	**0.0129**	**0.2164**	**0.0965**

EMFAC 2017 Emission Rates
Calendar Year 2020

EMFAC2017

	Vehicle Information			Emission Factor (grams/mile)																
								PM_{10}					$PM_{2.5}$					CO_2	CH_4	N_2O
	Type	Fuel	VMT	ROG	CO	NO_X	SO_X	Exhaust	TW	BW	TW+BW	Total	Exhaust	TW	BW	TW+BW	TOTAL			
2020	LDA	GAS	123087.259	0.007865	0.640657	0.037722	0.002332	0.001260991	0.008000002	0.036750011	0.0448	0.0460	0.00115946	0.002	0.01575	0.0178	0.0189	235.6206	0.001984	0.004202
	LDA	DSL	1682.7312	0.013495	0.18553	0.079285	0.001762	0.007505195	0.008000002	0.036750011	0.0448	0.0523	0.00718052	0.002	0.01575	0.0178	0.0249	186.3562	0.000627	0.029293
	LDT1	GAS	11715.0067	0.014745	0.924202	0.069971	0.002722	0.001511487	0.008000002	0.036750011	0.0448	0.0463	0.00138982	0.002	0.01575	0.0178	0.0191	275.1107	0.003389	0.005911
	LDT1	DSL	4.5165191	0.140397	0.875411	1.145821	0.003659	0.109881587	0.008000002	0.036750011	0.0448	0.1546	0.10512816	0.002	0.01575	0.0178	0.1229	387.0091	0.006521	0.060832
	LDT2	GAS	37060.0139	0.011012	0.794083	0.063802	0.002949	0.001234044	0.008000002	0.036750011	0.0448	0.0460	0.00113468	0.002	0.01575	0.0178	0.0189	298.0506	0.002715	0.00557
	LDT2	DSL	408.909061	0.011813	0.108821	0.035089	0.002457	0.004467647	0.008000002	0.036750011	0.0448	0.0492	0.00427438	0.002	0.01575	0.0178	0.0220	259.8814	0.000549	0.04085
	Weighted Average for Employees			0.009	0.687	0.046	0.002	0.001	0.008	0.037	0.045	0.046	0.001	0.002	0.016	0.018	0.019	251.164	0.002	0.005

	Vehicle Information			Emission Factor (grams/mile)																
								PM_{10}					$PM_{2.5}$					CO_2	CH_4	N_2O
	Type	Fuel	Speed	ROG	CO	NO_X	SO_X	Exhaust	TW	BW	TW+BW	Total	Exhaust	TW	BW	TW+BW	TOTAL			
	T7 Tractor Construction	DSL	5	1.698848	4.414891	16.91958	0.034638	0.172033958	0.03600001	0.061740018	0.0977	0.2698	0.16459185	0.009	0.02646	0.0355	0.2001	3666.402	0.078907	0.576307
	T7 Tractor Construction	DSL	15	0.716534	2.044159	9.983372	0.023417	0.107137503	0.03600001	0.061740018	0.0977	0.2049	0.10250278	0.009	0.02646	0.0355	0.1380	2478.655	0.033281	0.38961
	T7 Tractor Construction	DSL	40	0.150285	0.59923	4.320682	0.013292	0.061794031	0.03600001	0.061740018	0.0977	0.1595	0.05912085	0.009	0.02646	0.0355	0.0946	1406.934	0.00698	0.22115

ROG, CO, NOX, SOX, and CO2 from EMFAC for specific speeds. TW, BW for PM10 and PM2.5 from aggregated speeds

IDLING HHD

Vehicle Information		Idling Emission Factor (grams/vehicle per day)								
Type	Fuel	ROG	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
T7 Tractor Construction	DSL	1.58845	20.14862	22.71467	0.038778	0.022016293	0.021063878	4104.585987	0.073779372	0.645184

Methane emissions from TOG - ROG

Start Up HHD

Vehicle Information		Start Up Emission Factor (grams/trip)								
Type	Fuel	ROG	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
T7 Tractor Construction	DSL	0	0	4.567106	0	0	0	0	0	0

Start up Light Duty Vehicles

Vehicle Information		Start Up Emission Factor (grams/trip)								
Type	Fuel	ROG	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
Weighted Average	All	0.341991	2.628532	0.267938	0.000619	0	0	62.55269355	0	0.031102
Ford F150 LDT2	GAS	0.403735	3.154931	0.363814	0.000758			76.58935176		0.037972

Hot Soak Light Duty Vehicles

Vehicle Information		Hot Soak Emission Factor (grams/trip)								
Type	Fuel	ROG								
Weighted Average	All	0.136547								
Ford F150 LDT2	GAS	0.142982								

Run Loss Light Duty Vehicles

Vehicle Information		Run Loss Emission Factor (grams/trip)								
Type	Fuel	ROG								
Weighted Average	All	0.345581								
Ford F150 LDT2	GAS	0.476265								

EMFAC 2017 Emission Rates
Calendar Year 2020

Summary of Start up, Hot Soak, Run Loss

Vehicle Information		Summary of Start up, Hot Soak, Run Loss Emission Factor (grams/trip)								
Type	Fuel	ROG	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
Weighted Average	All	0.824118	2.628532	0.267938	0.000619			62.55269355		0.031102
Ford F150 LDT2	GAS	1.022981	3.154931	0.363814	0.000758			76.58935176		0.037972

Rest Loss Light Duty Vehicles

Vehicle Information		Rest Loss Emission Factor (g/vehicle/day)								
Type	Fuel	ROG								
Weighted Average	All	0.265511								
Ford F150 LDT2	GAS	0.312464								

Diurnal Light Duty Vehicles

Vehicle Information		Diurnal Emission Factor (g/vehicle/day)								
Type	Fuel	ROG								
Weighted Average	All	0.27947								
Ford F150 LDT2	GAS	0.306257								

Summary of Rest Loss and Diurnal for Light Duty Vehicles

Vehicle Information		Summary of Rest Loss and Diurnal Emission Factor (g/vehicle/day)								
Type	Fuel	ROG								
Weighted Average	All	0.544981								
Ford F150 LDT2	GAS	0.618721								

OPERATIONAL EMISSIONS ESTIMATE

Operational Emissions Summary

Source	Total Annual Emissions			
	ROG	NOX	PM10	PM2.5
	Tons/Year			
Area	2.40	0.04	0.02	0.02
Energy	0.02	0.19	0.02	0.02
Generators	0.11	0.49	0.02	0.02
Traffic	0.01	0.05	0.00	0.00
Total Emissions (tons/year)	**2.55**	**0.77**	**0.05**	**0.05**
Average Daily Emissions				
Area	12.82	0.44	0.21	0.21
Energy	0.12	1.03	0.08	0.08
Generators	0.60	2.70	0.09	0.09
Traffic	0.08	0.28	0.00	0.00
Total Emissions (lbs/day)	13.62	4.46	0.39	0.39

Apartments – High Rise – Weekday Trip Rate = 1.32/dwelling unit = 653.4

Commercial – Weekday Trip Rate = 14.6 trips/1,000 sf = 61.95

Fleet Mix	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments High Rise	0.604343	0.037677	0.192702	0.090337	0.013384	0.005111	0.031913	0.009324	0.004273	0.003317	0.006138	0.00948	0.00583
Commercial	0.604343	0.037677	0.192702	0.090337	0.013384	0.005111	0.031913	0.009324	0.004273	0.003317	0.006138	0.00948	0.00583

Apartments	394.8777	24.61815	125.9115	59.0262	8.745106	3.339527	20.85195	6.092302	2.791978	2.167328	4.010569	6.194232	3.809322
Commercial	37.43905	2.33409	11.93789	5.596377	0.829139	0.316626	1.97701	0.577622	0.264712	0.205488	0.380249	0.587286	0.361169

	Vehicle Type	Daily Trips	Daily Vehicle Mileage	Days	Emissions (lbs/day) ROG	CO	NOX	SOX	PM10	PM2.5	CO2	Emissions (tons/year) ROG	CO	NOX	SOX	PM10	PM2.5
Residential	LDA	394.8777162	2.3	365	0.011689116	1.119248997	0.059360517	0.004410505	0.002294897	0.002110087	445.6942	0.002133264	0.204262942	0.010833294	0.000804917	0.000418819	0.000385091
	LDT1	24.6181518	2.3	365	0.001345781	0.0952762	0.006617182	0.000323589	0.00016681	0.000153377	32.6996	0.000245605	0.017387906	0.001207636	5.9055E-05	3.04427E-05	2.79914E-05
	LDT2	125.9114868	2.3	365	0.005567135	0.443535723	0.031551409	0.001764194	0.000734631	0.00067547	178.2769	0.001016002	0.080945269	0.005758132	0.000321965	0.00013407	0.000123273
	MDV	59.0261958	2.3	365	0.002799656	0.207910309	0.015320244	0.000973177	0.000358585	0.00032972	98.34233	0.000510937	0.037943631	0.002795945	0.000177605	6.54418E-05	6.01739E-05
	LHD1	8.7451056	2.3	365	0.000743976	0.020628896	0.006510397	0.000308765	3.96147E-05	3.64242E-05	31.20156	0.000135776	0.003764774	0.001188147	5.63496E-05	7.22967E-06	6.64742E-06
	LHD2	3.3395274	2.3	365	0.000208053	0.006648729	0.002668354	0.000133934	1.47281E-05	1.3542E-05	13.53444	3.79696E-05	0.001213393	0.000486975	2.4443E-05	2.68788E-06	2.47141E-06
	T6TS	20.8519542	2.3	365	0.003951701	0.125825439	0.036150236	0.001536008	8.44444E-05	7.76435E-05	155.218	0.000721185	0.022963143	0.006597418	0.000280322	1.54111E-05	1.41699E-05
	T7IS	6.0923016	2.3	365	0.019363344	1.195892849	0.105248725	0.000527404	5.20999E-05	4.79039E-05	53.29568	0.00353381	0.218250445	0.019207892	9.62512E-05	9.50823E-06	8.74247E-06
	OBUS	2.7919782	2.3	365	0.00062611	0.018783207	0.005342842	0.000211153	9.10075E-06	8.3678E-06	21.33758	0.000114265	0.003427935	0.000975069	3.85354E-05	1.66089E-06	1.52712E-06
	UBUS	2.1673278	2.3	365	7.4031E-06	0.000721954	0.002468778	0.000119268	8.47313E-05	8.10659E-05	12.61619	1.35106E-06	0.000131757	0.000450552	2.17665E-05	1.54635E-05	1.47945E-05
	MCY	4.0105692	2.3	365	0.039136715	0.345536625	0.022757709	3.81722E-05	3.24536E-05	3.03763E-05	3.857411	0.007142451	0.063060434	0.004153282	6.96643E-06	5.92278E-06	5.54368E-06
	SBUS	6.194232	2.3	365	0.000337028	0.009576284	0.005158672	0.00021768	2.33945E-05	2.15104E-05	21.99718	6.15076E-05	0.001747672	0.000941458	3.97266E-05	4.26949E-06	3.92564E-06
	MH	3.809322	2.3	365	0.000654892	0.019781394	0.005009945	0.00026811	2.23749E-05	2.05729E-05	27.09324	0.000119518	0.003610104	0.000914315	4.893E-05	4.08342E-06	3.75455E-06
Total					**0.08643091**	**3.609366606**	**0.30416501**	**0.010831959**	**0.003917864**	**0.003606062**	**1095.164**	**0.015773641**	**0.658709406**	**0.055510114**	**0.001976833**	**0.00071501**	**0.000658106**
Retail	LDA	37.43904885	0.995	365	0.000479445	0.045907552	0.002434754	0.000180903	9.41284E-05	8.65482E-05	18.28077	8.74988E-05	0.008378128	0.000444343	3.30148E-05	1.71784E-05	1.5795E-05
	LDT1	2.33409015	0.995	365	5.51991E-05	0.003907886	0.000271413	1.32725E-05	6.84193E-06	6.29099E-06	1.341219	1.00738E-05	0.000713189	4.95329E-05	2.42222E-06	1.24865E-06	1.14811E-06
	LDT2	11.9378889	0.995	365	0.000228344	0.018192234	0.001294125	7.23609E-05	3.01319E-05	2.77053E-05	7.312273	4.16727E-05	0.003320083	0.000236178	1.32059E-05	5.49907E-06	5.05623E-06
	MDV	5.59637715	0.995	365	0.000114832	0.00852773	0.000628381	3.99162E-05	1.47079E-05	1.35239E-05	4.033647	2.09568E-05	0.001556311	0.00011468	7.28471E-06	2.68419E-06	2.46811E-06
	LHD1	0.8291388	0.995	365	3.05152E-05	0.000846123	0.000267033	1.26644E-05	1.62485E-06	1.49399E-06	1.279775	5.56902E-06	0.000154417	4.87335E-05	2.31126E-06	2.96535E-07	2.72653E-07
	LHD2	0.31662645	0.995	365	8.53357E-06	0.000272707	0.000109446	5.4935E-06	6.04094E-07	5.55442E-07	0.555134	1.55738E-06	4.9769E-05	1.99739E-05	1.00256E-06	1.10247E-07	1.01368E-07
	T6TS	1.97701035	0.995	365	0.000162085	0.005160905	0.001482752	6.30015E-05	3.4636E-06	3.18465E-06	6.366484	2.95804E-05	0.000941865	0.000270602	1.14978E-05	6.32107E-07	5.81199E-07
	T7IS	0.5776218	0.995	365	0.000794214	0.049051207	0.004316923	2.16322E-05	2.13695E-06	1.96485E-06	2.185996	0.000144944	0.008951845	0.000787838	3.94788E-06	3.89993E-07	3.58585E-07
	OBUS	0.26471235	0.995	365	2.56808E-05	0.000770419	0.000219144	8.66072E-06	3.7328E-07	3.43217E-07	0.87519	4.68674E-06	0.000140602	3.99938E-05	1.58058E-06	6.81236E-08	6.26371E-08
	UBUS	0.20548815	0.995	365	3.03648E-07	2.9612E-05	0.00010126	4.89196E-06	3.47537E-06	3.32503E-06	0.517471	5.54158E-08	5.40418E-06	1.848E-05	8.92782E-07	6.34255E-07	6.06818E-07
	MCY	0.3802491	0.995	365	0.001605247	0.014172665	0.000933439	1.56569E-06	1.33113E-06	1.24593E-06	0.158217	0.000292958	0.002586511	0.000170353	2.85738E-07	2.42931E-07	2.27382E-07
	SBUS	0.587286	0.995	365	1.38237E-05	0.000392785	0.00021159	8.92844E-06	9.59557E-07	8.82278E-07	0.902245	2.52282E-06	7.16832E-05	3.86152E-05	1.62944E-06	1.75119E-07	1.61016E-07
	MH	0.3611685	0.995	365	2.68613E-05	0.000811361	0.00020549	1.09969E-05	9.17738E-07	8.43826E-07	1.111267	4.90219E-06	0.000148073	3.75019E-05	2.00693E-06	1.67487E-07	1.53998E-07
Total					**0.003545084**	**0.148043185**	**0.01247575**	**0.000444288**	**0.000160697**	**0.000147908**	**44.91968**	**0.000646978**	**0.027017881**	**0.002276824**	**8.10825E-05**	**2.93271E-05**	**2.69931E-05**
Total Project					0.089975994	3.757409791	0.316640761	0.011276247	0.004078561	0.003753969	1140.084	0.016420619	0.685727287	0.057786939	0.002057915	0.000744337	0.000685099

APPENDIX B: HEALTH RISK ASSESSMENT RESULTS

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HEALTH RISK ASSESSMENT

Results Summary

Result modeling files will be provided upon request

HRA Results Summary

	Scenario	Uncontrolled	Control Scenario 1	Control Scenario 2	Operational
Project	**Offsite**	Hillsdale Hotel	Hillsdale Hotel	Hillsdale Hotel	Hillsdale Hotel
		51 6th Street	51 6th Street	51 6th Street	51 6th Street
	Receptor ID	3759	3759	3759	3759
	$UTM_{x,y}$	552020, 4181760	552020, 4181760	552020, 4181760	552020, 4181760
	Cancer Risk	**65.2**	**64.6**	**6.43**	**0.08**
	PM 2.5	**0.3**	**0.3**	**0.031**	**0.000409**
Background PM2.5	MARITIME	0.05	0.05	0.05	0.05
	STATIONARY	0.20	0.20	0.20	0.20
	TRAFFIC	4.30	4.30	4.30	4.30
	RAILWAY	0.00	0.00	0.00	0.00
	BACKGROUND	7.80	7.80	7.80	7.80
	TOTAL	*12.35*	*12.35*	*12.35*	*12.35*
Background Cancer Risk	MARITIME	38.60	38.60	38.60	38.60
	STATIONARY	7.90	7.90	7.90	7.90
	TRAFFIC	300.69	300.69	300.69	300.69
	RAILWAY	0.99	0.99	0.99	0.99
	TOTAL	*348.19*	*348.19*	*348.19*	*348.19*

Project	**Onsite**	
	$UTM_{x,y}$	552020, 418780
	Cancer Risk	**4.14**
	PM 2.5	**0.0009**
Background PM2.5	MARITIME	0.05
	STATIONARY	0.23
	TRAFFIC	3.79
	RAILWAY	0.00
	BACKGROUND	7.80
	TOTAL	*11.86*
Background Cancer Risk	MARITIME	38.96
	STATIONARY	8.07
	TRAFFIC	274.72
	RAILWAY	0.99
	TOTAL	*322.74*

APPENDIX C WIND STUDY FOR THE 469 STEVENSON STREET PROJECT

San Francisco Planning Department

Wind Study for the 469 Stevenson Street Project

CEQA Report

Final Report | January 24, 2020

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 260040
Planning Department Case No. 2017-014833ENV

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ARUP

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Appendices

Appendix A

San Francisco Planning Code Section 148

Appendix B

Drawing List for Model Construction

Appendix C

Scope of Work

Appendix D

Integration of Wind Reduction features in the Design of the Proposed Project

Executive summary

Project Summary

Arup has conducted a pedestrian wind study for the project at 469 Stevenson Street ("Proposed Project") in San Francisco, California. The wind study aims to assess the probability that the Proposed Project would create areas of windiness at publicly accessible points in the project vicinity. The criteria defined in San Francisco Planning Code section 148 are used to evaluate wind comfort and hazard, and to determine whether wind conditions are suitable for pedestrian activities.

The wind assessment has been carried out in a boundary layer wind tunnel using a 1:300 scale model of the area. Different project scenarios were tested in both existing and cumulative (future) conditions. These include: No Project, Proposed Project and two alternative developments (Environmental Impact Report (EIR) Alternative 1 and EIR Alternative 2). Wind impacts of the Proposed Project and the alternatives on the existing wind conditions and under cumulative conditions were evaluated. Additionally, the impacts of the EIR alternative developments on the local wind conditions were compared with the impacts of the Proposed Project and the existing and cumulative conditions (No Project).

The Proposed Project is a 274-foot-tall (284 feet including the elevator penthouse) mixed-used residential tower that features a 14-foot-tall podium and two 35-foot-tall volumetric elements towards Stevenson Street. The Proposed Project incorporates elements that help to achieve favorable wind conditions into the design of the tower, including the tower position (about 26 feet away from the north-east side of the podium), the height of the volumetric elements towards Stevenson (35 feet), a 20-foot-tall solid screen along the podium edge on Stevenson Street and 12-foot-tall solid screens on the 35-foot-tall volumetric elements. The Proposed Project results in exceedances of the comfort criteria under existing and cumulative conditions. It does not result in exceedance of the hazard criteria under existing or cumulative conditions.

EIR Alternative 1 (The Reduced Density Alternative) is a 160-foot-tall (170 feet including the rooftop mechanical equipment) mixed-use residential development consistent with the height and density permitted under the Planning Code.[1] EIR Alternative 1 results in exceedances of the comfort criteria under existing and cumulative conditions. This scenario does not exceed the hazard criterion under existing or cumulative conditions.

[1] The Proposed Project would construct a building of greater height and density than allowed under the San Francisco Planning Code by utilizing the State Density Bonus program. EIR Alternative 2 also reflects a project that would utilize the State Density Bonus program.

EIR Alternative 2 (No Residential Parking, Tower Only Alternative) is a 284-foot-tall mixed-use residential development (294 feet including the mechanical penthouse) that features a tower and a 14-foot-tall podium. EIR Alternative 2 incorporates wind reduction features into the design, including the tower position (about 26 feet away from the north-east side of the podium), 20-foot-tall solid screens on the podium along Stevenson Street and 15-foot-tall solid screens on the north-east side of the podium. EIR Alternative 2 results in exceedances of the comfort criteria under existing and cumulative conditions. This scenario does not result in exceedance of the hazard criterion under existing or cumulative conditions.

1 Introduction

Arup has worked with the project sponsor Build Inc., SCB Architects and the San Francisco Planning Department to conduct a pedestrian wind study for a residential tower (hereafter "469 Stevenson" or "Proposed Project") located at 469 Stevenson Street in San Francisco, CA.

The purpose of the wind study is to assess the probability that the Proposed Project would cause local wind speeds to exceed the "hazard" and "comfort" criteria specified in San Francisco Planning Code section 148 at publicly accessible points in the project vicinity and to determine whether wind effects are suitable for the pedestrian environment.

This report describes existing and cumulative (future) wind conditions in the vicinity of the project site and evaluates the potential for the Proposed Project to alter wind in the project area in a manner that would affect public areas. Two alternative development configurations are considered in this report ("EIR Alternative 1" and "EIR Alternative 2") to identify the differences in the wind conditions with respect to the Proposed Project and the No Project scenario.

1.1.1 San Francisco's Wind Environment

San Francisco sees its highest wind speeds in the afternoon and evening hours of the summer months. In general, the wind speeds are lowest in the nighttime hours in winter.

In the summer months, landscaping tends to be at its fullest and helps to absorb and control windiness at street level. This is an advantage that the City of San Francisco has over many of its northern city neighbors where the stronger winds occur in the winter months when trees and landscaping are less beneficial in improving the local wind environment.

Meteorological data collected at the old San Francisco Federal Building at 50 United Nations Plaza and available for public access show that westerly through northwesterly winds are the most frequent and strongest winds during all seasons. Of the primary 16 wind directions, four primary wind directions comprise the majority of the strong wind occurrences. These four wind directions are northwesterly (10% / 13%), west northwesterly (14% / 26%), westerly (35% / 45%), and southwesterly (2% / 2%); they make up more than 60% of the general winds (first percentage) and more than 85% of the strongest winds in San Francisco (second percentage).

Calm conditions account for approximately 2% of the time.

1.1.2 Wind Effects on People

The acceptability of windiness is subjective and depends on a number of important factors, none more so than the type of activity being performed.

The criteria defined in section 148 of the San Francisco Planning Code are used to describe frequent wind conditions and specify acceptable limits for various activities.

With regards to comfort, the San Francisco Planning Code differentiates between areas of substantial pedestrian use (hereafter "Pedestrian Areas") and public seating areas (hereafter "Seating Areas"). The Pedestrian Areas are primarily suitable for walking. The Seating Areas are considered acceptable for reading a book or dining. These criteria are the limiting thresholds for comfort.

There is also a hazard criterion used to describe a less frequent level of windiness that is to be exceeded less than one hour yearly. Exceeding this limit signifies a safety hazard for individuals, who may find themselves in difficulties at times in these strong winds. When the wind speed is above the hazard limit, aerodynamic forces approach the body weight and it rapidly becomes impossible to remain standing.

1.1.3 Wind Effects from Buildings

The local wind conditions on site will be strongly influenced by the surrounding buildings. Windiness depends both on the arrangement of buildings and structures within their surroundings and their orientation compared to the prevailing winds.

When strong winds approach a bluff façade, the façade will act to split the flow. The winds encountering the top one-third of the building will tend to accelerate up and over the top of the building as the winds seek the fastest path from the high-pressure region created on the windward façade to the low-pressure region created on the leeward façade of the building. Winds encountering the lower two-thirds of the building tend to be pushed, or *downdrafted*, to ground level. Downdrafts carry the same energy as the winds at the upper level. As a result, increased levels of windiness are experienced at ground level, especially around building corners where winds accelerate, see Figure 1 (left).

Local acceleration of winds occurs when two buildings are positioned side by side (*funneling*). This mechanism is critical when the spacing between buildings is in the range between 25-100% of the building's width, see Figure 1 (right).

Wind tunnel testing, with representations of both the Proposed Project, EIR project alternatives and the surrounding buildings, is able to capture these effects around the project site.

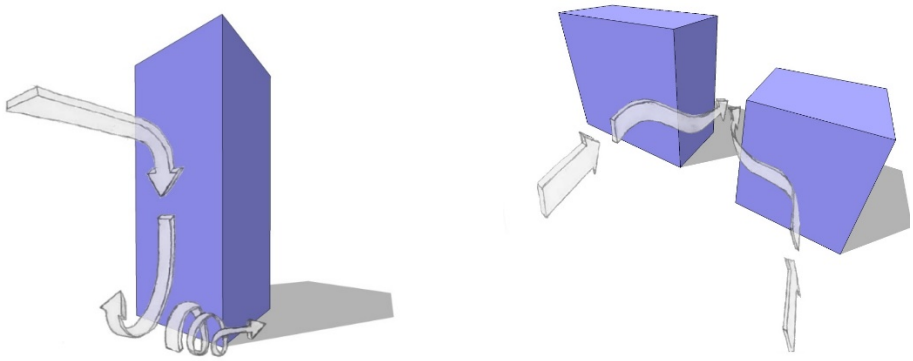


Figure 1: Downdraft with corner acceleration (left), funneling (right)

2 The Project

2.1.1 Project Site and Surroundings

The project site is located at 469 Stevenson Street in San Francisco and is currently used as a surface parking lot. The 28,790 square-foot site is bounded to the north-west by Stevenson Street, to the south-east by Jessie Street and to the north-east by the NRG Energy Center. The site shares the property line to the south-west with the neighboring properties on 6th Street, as shown in Figure 2. The project site measures 200 feet along Stevenson Street and Jessie Street, and 145 feet along its eastern and western property lines.

The immediate surroundings of the project site consist mostly of mid-rise buildings that are typically less than 100 feet tall, save for 995 Market Street (190 feet tall) to the west of the project site. Further afield, the surroundings consist of similar low- and mid-rise buildings to the south and taller buildings to the west and north. A large concentration of high-rise buildings is built in the Financial District, to the north-east of the project site.

Figure 2: Project site

2.1.2 Proposed Project and Alternatives

Proposed Project

The Proposed Project consists of a 260-foot-tall mixed-used residential tower that rises from a 14-foot-tall podium along Stevenson Street, for a total height of approximately 274 feet (284 feet including the elevator penthouse).

The Proposed Project was put through a series of wind tunnel workshops and underwent multiple design iterations in response to wind conditions. The design features that resulted from this iterative process included a reduction in the height of the two volumetric elements along Stevenson Street from 45 feet to 35 feet, the addition of a 20-foot-tall solid screen along the edge of the podium on Stevenson Street and 12-foot-tall parapets on the two volumetric elements, as marked in red in Figure 3. The tower was positioned about 38 feet from Stevenson Street and about 26 feet away from the north-east side of the podium towards the NRG Energy Center (Figure 4) to achieve favorable wind conditions.

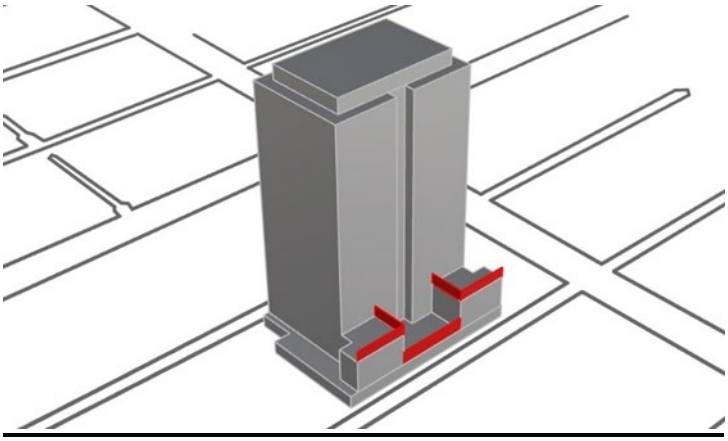


Figure 3: View of the Proposed Project from the North

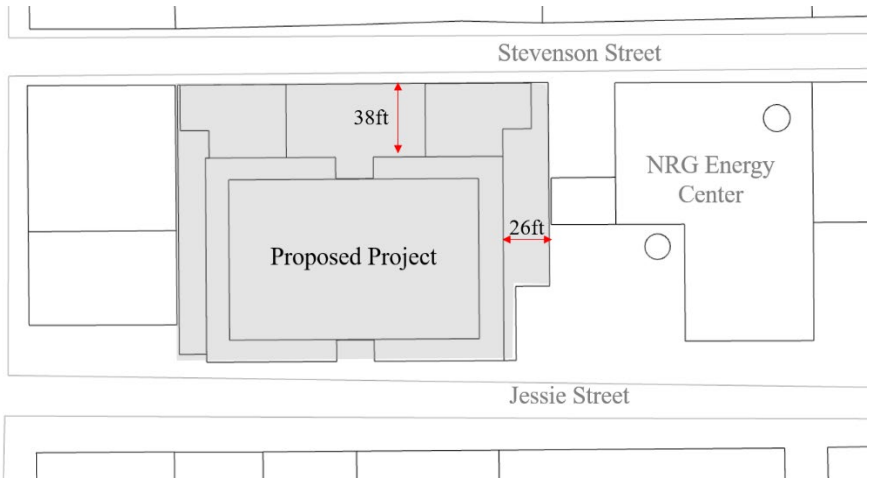


Figure 4: Position of the Proposed Project

EIR Alternative 1

EIR Alternative 1 is a 160-foot-tall (170 feet including the rooftop mechanical equipment) mixed-use residential development reaching the height and density permitted for this site under the San Francisco Planning Code. The development, shown in Figure 5, features three volumetric elements, including a 14-foot-tall podium and a 60-foot-tall building block that support an 86-foot-tall tower.

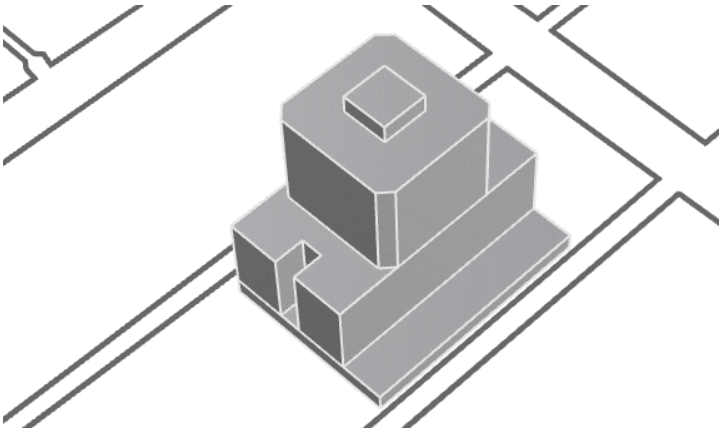


Figure 5: View of EIR Alternative 1 from the North

EIR Alternative 2

EIR Alternative 2 is a 270-foot-tall mixed-use residential development in a tower fronting along Jessie Street and rising from a 14-foot-tall podium, for a total height of 284 feet (294 feet including the mechanical penthouse).

EIR Alternative 2 was put through a series of wind tunnel workshops and underwent multiple design iterations in response to wind conditions. The design features that resulted from this iterative process include a 20-foot-tall solid screen along Stevenson Street and a 15-foot-tall solid screen along the north-east side of the podium, as marked in red in Figure 6. The tower was also positioned about 26 feet away from the north-east side of the podium towards the NRG Energy Center (Figure 7) to achieve better wind conditions.

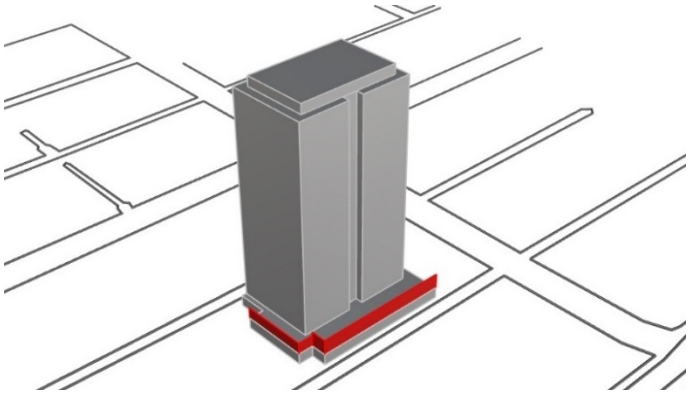


Figure 6: View of EIR Alternative 2 from the North

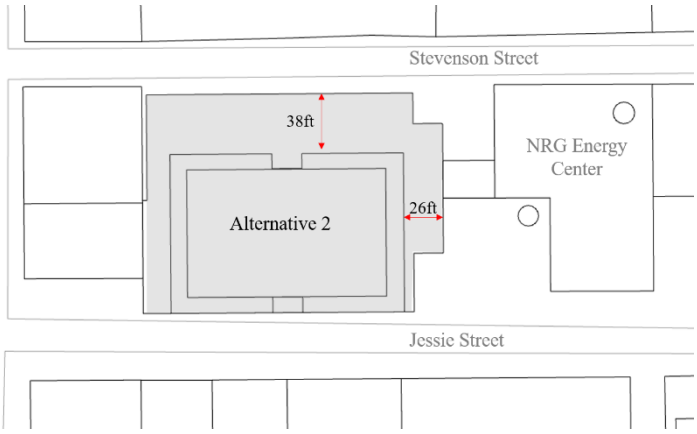


Figure 7: Position of EIR Alternative 2

3 Methodology

3.1 Wind Tunnel Testing

3.1.1 Overview

The wind tunnel employed has a working section of 8 feet wide by 7 feet high and is about 100 feet long. A 1:300 scale model of the Proposed Project, the project alternatives and the surrounding buildings (existing and planned future buildings) within a radius of 1,200 feet from the project site has been built and placed in the boundary layer wind tunnel for testing. The size of the model is constructed such that there is no influence of the wind tunnel walls on the measured wind speeds. The extent of the surrounding models allows an accurate representation of the wind conditions on site. Figure 8 shows a general view of the wind tunnel model in existing surroundings.

As mentioned in section 1.1.1, in the summer months landscaping tends to be at its fullest and helps to absorb and control windiness at the street level. In San Francisco wind speeds are typically higher during the summer months in the evening hours. As such, existing landscaping (including street trees and other green canopy) located at and near Mint Plaza were included in the model.[2] Arup and San Francisco Planning staff reviewed cumulative projects in the area to ensure that there were no reasonably foreseeable cumulative projects that could potentially result in the removal of landscaping near Mint Plaza. Because there are no cumulative projects or proposals that would result in landscaping removal near Mint Plaza, it is appropriate to consider this existing landscaping as part of the existing environmental conditions near the project site.

[2] Existing landscaping at Mint Plaza was only included under the cumulative conditions plus proposed project scenario. See Figure 13 in Section 4.

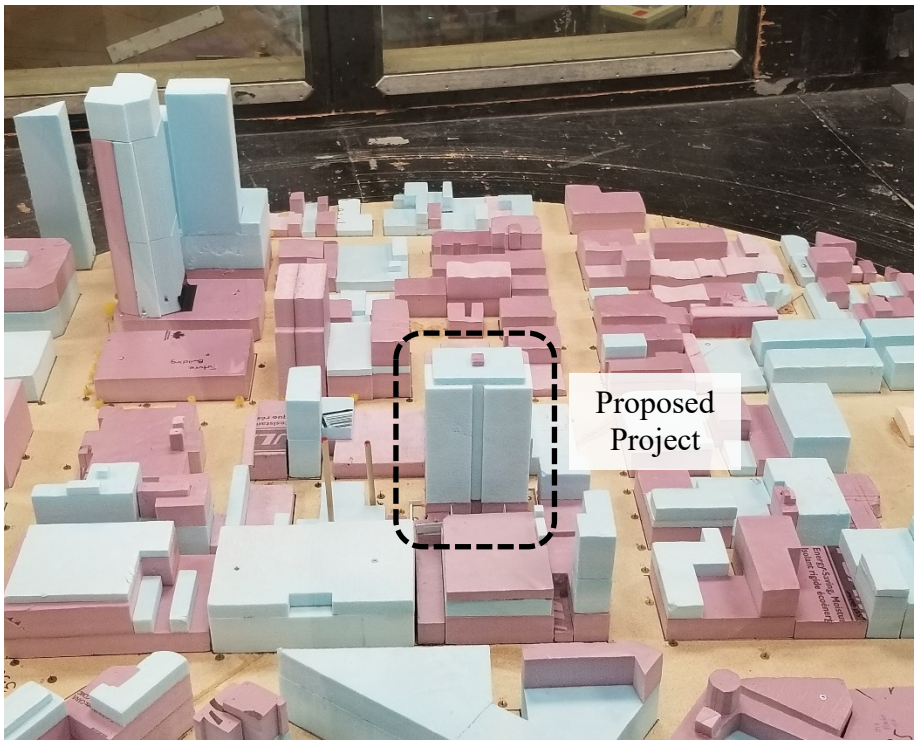


Figure 8: Wind tunnel model (scale 1:300) of the Proposed Project in the context of existing surroundings

3.1.2 Simulation of the Atmospheric Winds

The characteristics of the oncoming wind speed and turbulence are generated by using uniformly distributed roughness elements and spires upwind of the wind tunnel model (see Figure 9). The boundary layer wind speed profile, natural variation of wind turbulence with height, and the turbulence length scale are modelled in the tunnel such that they replicate the profile expected on site. Site specific boundary layer profiles are determined using ESDU (Engineering Science Data Unit) methods. The ESDU analysis takes into account the variation in upwind terrain characteristics (e.g. effective surface roughness) for different oncoming wind directions.

Figure 9: View of the wind tunnel model upwind of the site model

3.1.3 Measurement Technique

Gust and mean wind speeds are measured using 73 Irwin probes placed adjacent to the site and in areas around the site, along bike paths and in public accessways. The probes measure wind speeds at an effective full-scale height of approximately 6 feet above ground, which is the standard height used for assessing wind effects on pedestrians. These are recorded as a ratio compared to a wind speed at a reference location in the wind tunnel which is unaffected by the buildings.

The Irwin probes are located in frequently used areas (e.g. public seating areas, entrances, retail frontages, walking zones) and in areas expected to experience higher wind speeds, both on the sidewalks and along bicycle lanes. The measurement locations are shown in Figure 10 (locations on the sidewalks) and Figure 11 (locations on the bike lanes). For each test configuration, wind speeds are measured for sixteen equal increments of wind direction to cover 360 degrees of oncoming winds.

The wind tunnel measurements are analyzed together with the area's long-term meteorological statistics to predict how often selected wind speeds will occur at each location. Both mean wind speeds and equivalent wind speeds (EWS), which include the local effects of gustiness, are investigated.

$$EWS = V_{mean}*(2\ I_u + 0.7)$$

Where V_{mean} is the mean wind speed and I_u represents the turbulence intensity. Results are compared against the City of San Francisco pedestrian wind comfort and hazard criteria.

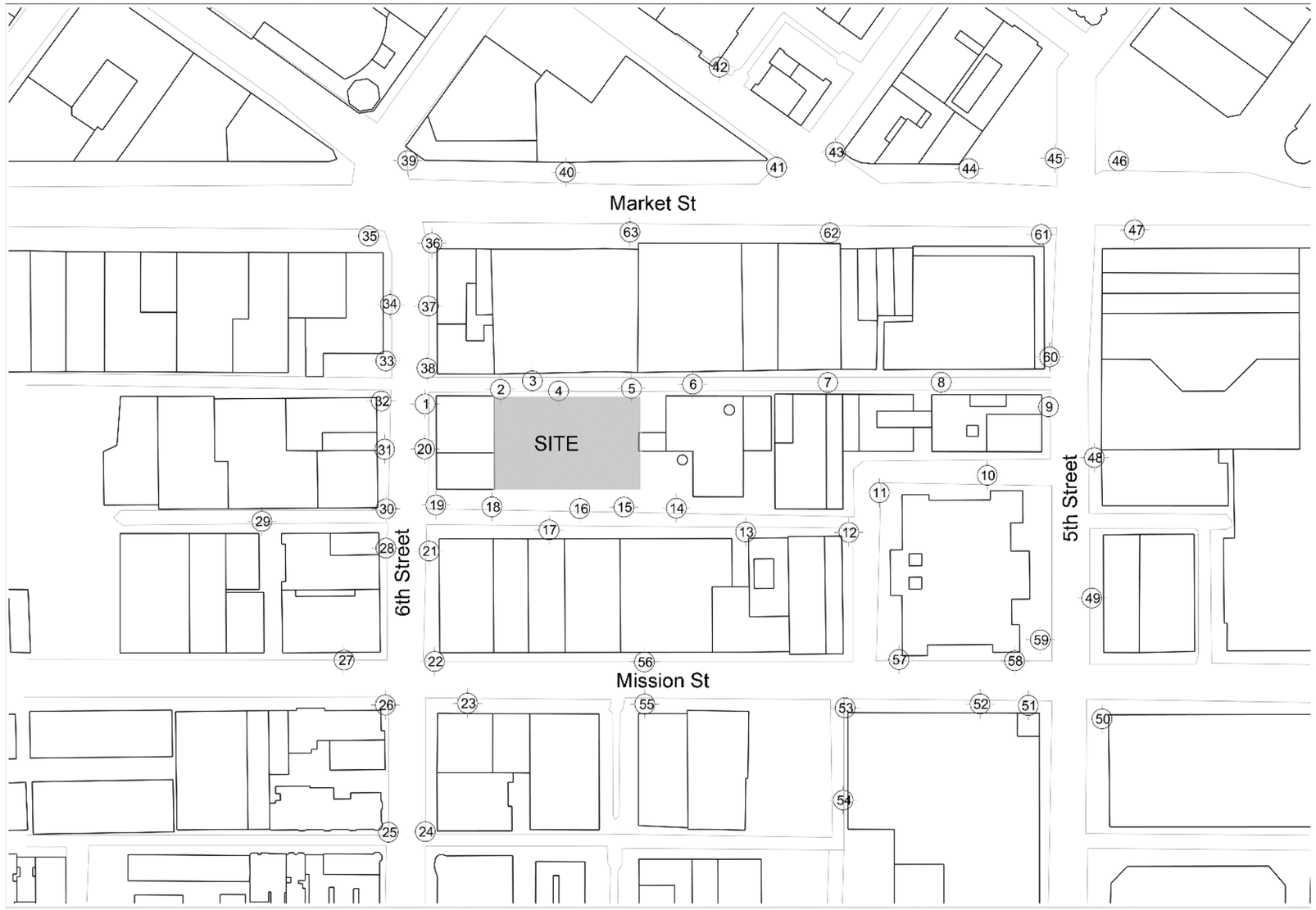


Figure 10: Map of the measurement locations on the sidewalks. The circles and numbers indicate the wind sensor locations.

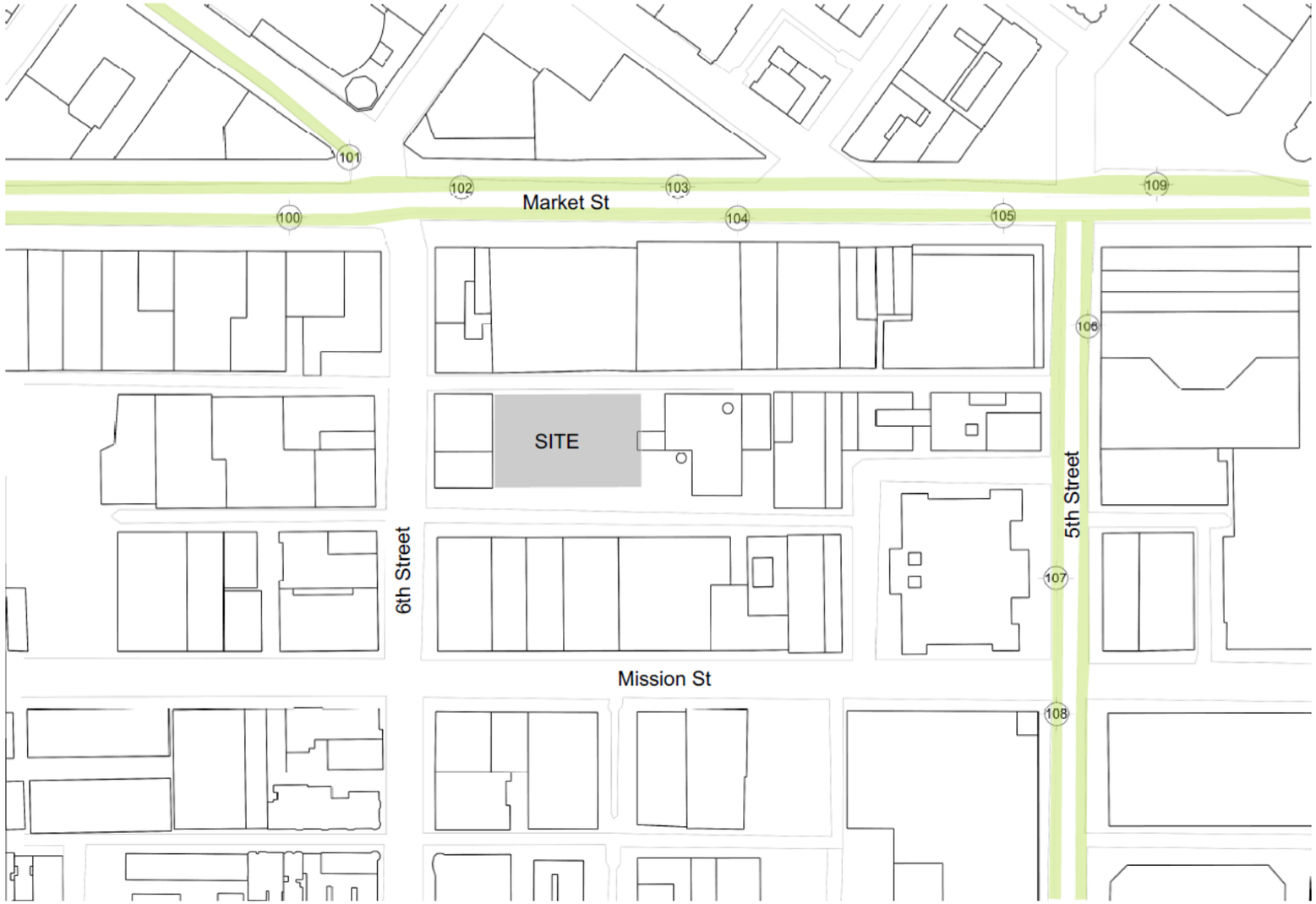


Figure 11: Map of the measurement locations on the bike lanes. The circles and numbers indicate the wind sensor locations and the green lines represent the bike lanes

3.2 Planning Code Requirements

The Proposed Project is located in one of the Downtown (C-3) Districts, an area that is subject to San Francisco Planning Code section 148 "Reduction of ground-level wind currents in C-3 districts" (Appendix A). The Planning Code specifies two sets of criteria to evaluate the wind currents at pedestrian level in terms of comfort and hazard for this area of the city.

The comfort criteria specify an acceptable wind criterion of 11 mph for pedestrian areas and 7 mph for seating areas. These conditions should not be exceeded more than 10% of the daytime (7 a.m. – 6 p.m.). The comfort criteria are based on a one-minute averaged Equivalent Wind Speed (EWS) as defined in Section 3.1.3 of this report. The wind tunnel results presented herein are displayed graphically with colored dots at every test location. The dots are color-coded according to the comfort criteria, as shown in Figure 12. The terms 'seating comfort criterion' and 'pedestrian comfort criterion' are used to describe comfort levels of windiness. Areas where the wind is in exceedance of the comfort criteria are represented graphically by a single red ring around the measurement location.

The hazard criterion is used to describe a level of windiness to be exceeded less than a single hour of the year. The hazard criterion is defined as an *hourly-mean* Equivalent Wind Speed of 26 mph or a *one-minute averaged* Equivalent Wind Speed of 36 mph. In the following assessment, the exceedance of hazard condition is represented graphically by a double red ring around the measurement location, as shown in Figure 12.

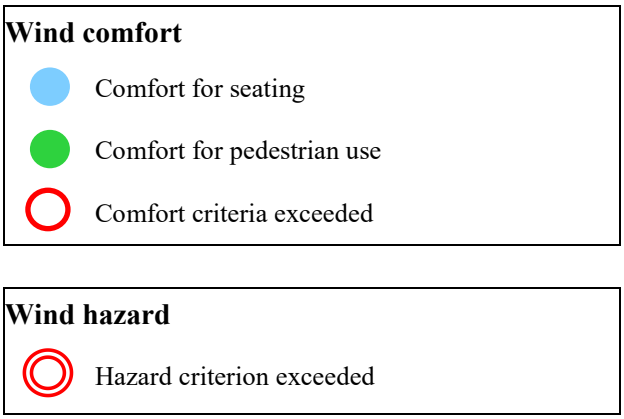


Figure 12: Graphical representation of the comfort and hazard criteria defined by the San Francisco Planning Code

4 Scenarios Investigated

This study evaluates the wind conditions for the following scenarios:

- **Existing conditions (No Project):** existing surroundings, with all buildings in the surroundings currently under construction and without the Proposed Project;
- **Existing conditions with the Proposed Project:** Proposed Project in existing surroundings;
- **Cumulative conditions (No Project):** planned future surroundings (cumulative), with any buildings currently either under review or approved in existing surroundings, and without the Proposed Project;
- **Cumulative conditions with the Proposed Project:** Proposed Project with planned future surroundings (cumulative);

The existing conditions (No Project) are tested to characterize the wind environment of the project site and vicinity as it exists today without the Proposed Project. The existing conditions with the Proposed Project are used to investigate changes to ground-level winds that the Proposed Project could affect.

The cumulative conditions involve testing the Proposed Project in conjunction with future projects in the site's vicinity that are either under review or approved. Existing mature landscaping in Mint Plaza as shown in Figure 13 was also included. To investigate effects of development on ground level wind speeds which are not attributable to the Proposed Project, testing of cumulative conditions without the Proposed Project was also conducted.

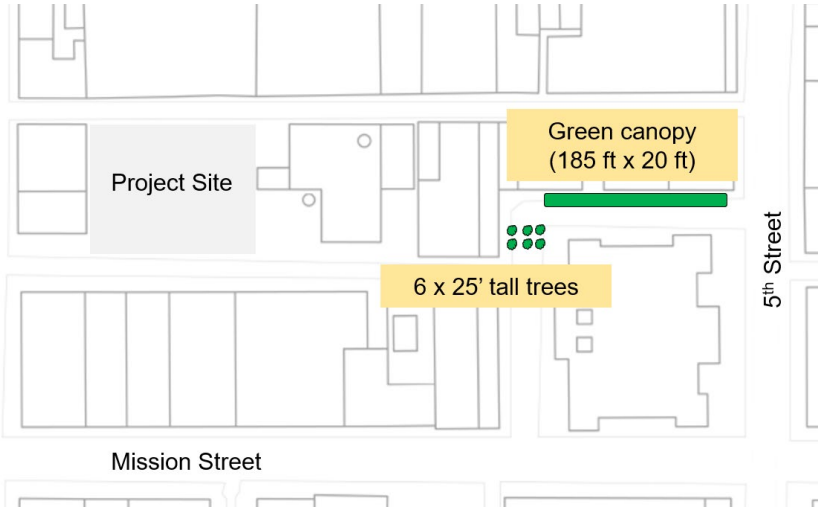


Figure 13: Map of the mature landscaping elements in Mint Plaza

In addition to the scenarios described above, two alternative developments (EIR Alternative 1 and EIR Alternative 2) are evaluated for both the existing and

cumulative conditions as introduced in Section 2.1.2. An alternative scenario assesses the relative differences in the wind conditions between the alternative building, the No Project and Proposed Project scenarios in the same existing or cumulative (future) conditions.

EIR Alternative 1 consists of a 170-foot-tall structure. The study evaluates the wind conditions for EIR Alternative 1 on the following scenarios:

- **Existing conditions with EIR Alternative 1:** the EIR Alternative 1 in existing surrounding structures
- **Cumulative conditions with EIR Alternative 1:** the EIR Alternative 1 in existing surrounding structures and planned future surroundings (cumulative)

EIR Alternative 2 consists of a 294-foot-tall structure. The study evaluates the wind conditions for EIR Alternative 2 on the following scenarios:

- **Existing conditions with EIR Alternative 2:** the EIR Alternative 2 in existing surrounding structures
- **Cumulative conditions with EIR Alternative 2:** the EIR Alternative 2 in existing surrounding structures and planned future surroundings (cumulative)

Imagery of the wind tunnel models under the existing and cumulative conditions (No Project) are shown in Figure 14. Imagery of the wind tunnel models of the project developments are shown in Figure 15, including the Proposed Project, EIR Alternative 1 and EIR Alternative 2.

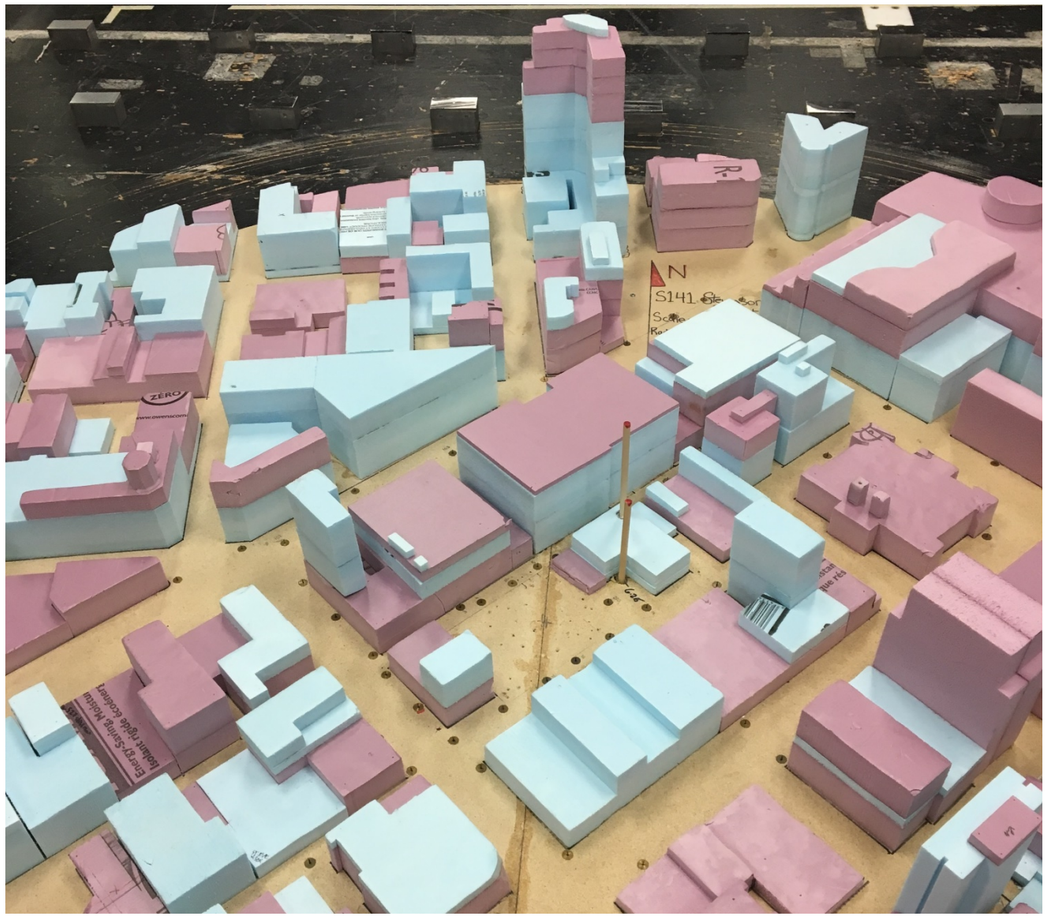
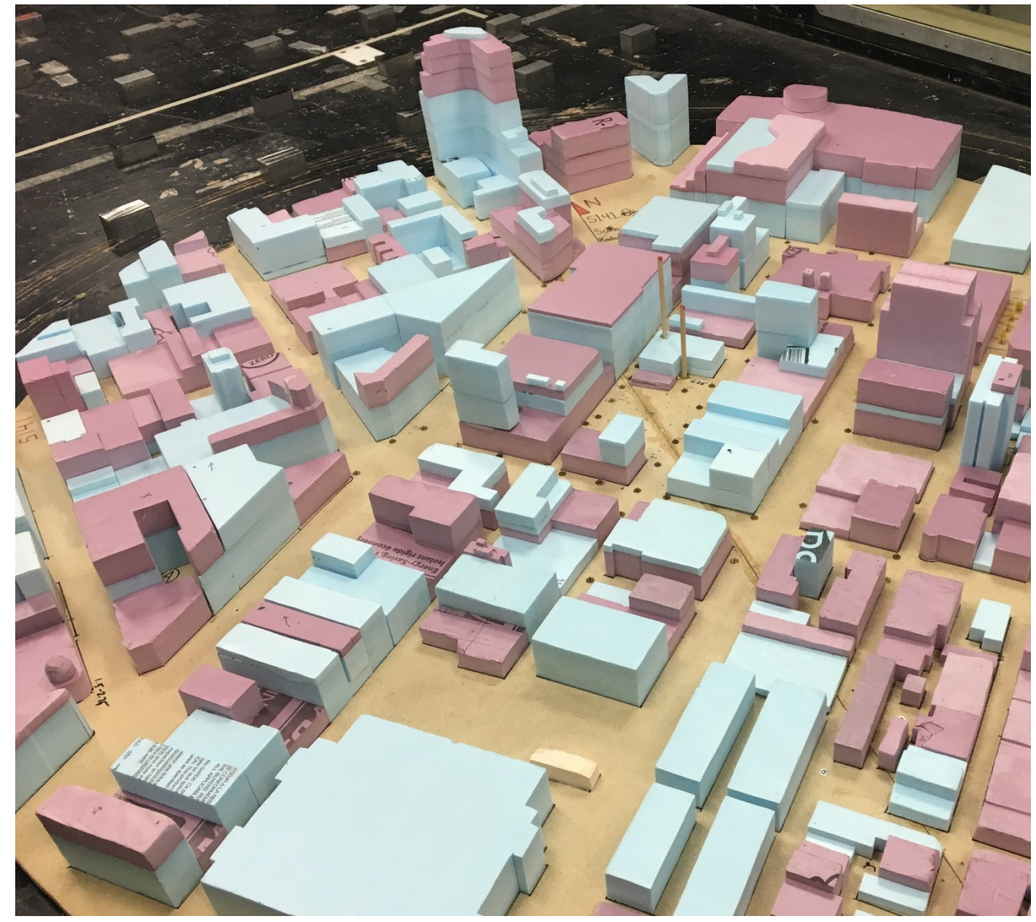
Existing surroundings	Cumulative surroundings
	

Figure 14: Wind tunnel models of the existing (left) and cumulative (right) surroundings

Proposed Project	EIR Alternative 1	EIR Alternative 2

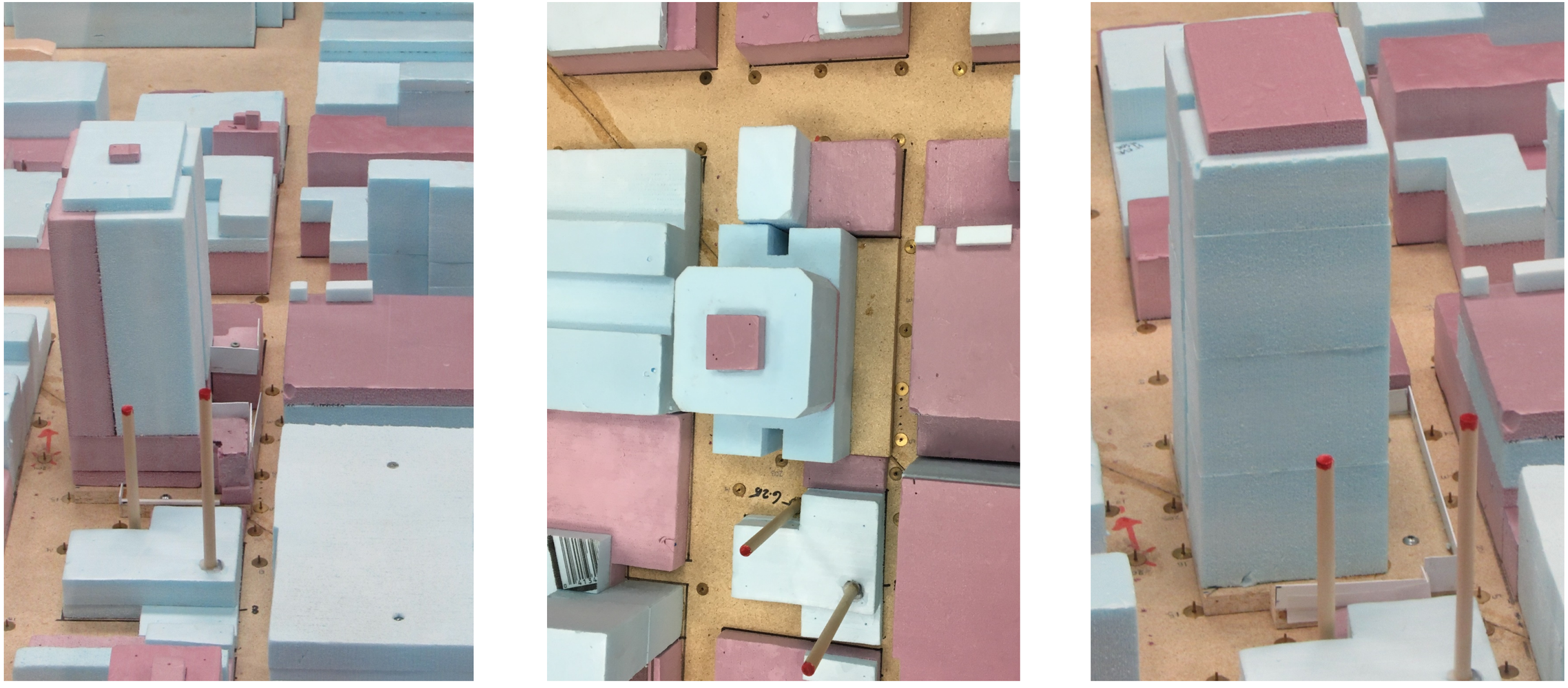


Figure 15: Wind tunnel model of the Proposed Project (left), EIR Alternative 1 (center) and EIR Alternative 2 (right)

4.1.1 Existing and Project Scenario

The existing scenario considers all existing buildings and those projects in the vicinity of the Proposed Project site that are under construction, or were recently completed as of May 15, 2019, the date of approval of the wind study's scope of work. These projects are shown in orange in Figure 16 and include:

- **925-967 Mission Street**, to the east of the Proposed Project on the southern corner of 5th Street and Mission Street. The development consists of a 200-foot-tall tower along Mission Street, a 470-foot-tall tower on 5th Street, a 350-foot-tall tower at the crossing of 5th Street and Howard Street and a 395-foot-tall tower on Howard Street. The development is under construction.
- **945 Market Street**, to the north of the Proposed Project between Market Street and Stevenson Street. The scheme consists of a 5-story, 90-foot-tall retail building.
- **950-974 Market Street**, to the north-west of the Proposed Project at the south-west crossing of Market Street and Turk Street. The scheme consists of a 12-story, 120-foot-tall mixed-used building and is currently under construction.
- **1028 Market Street**, to the west of the Proposed Project at the south-west crossing of Market Street and Golden Gate Avenue. The scheme consists of a 13-story, 120-foot-tall mixed used building containing residential units and commercial spaces at ground level.[3]
- **1066 Market Street**, to the west of the Proposed Project at the south-east crossing of Jones Street and Golden Gate Avenue and north of Market Street. The scheme consists of a 12-story, 120-foot-tall residential building and is currently under construction.

Appendix B reports the sources of massing information for the existing building listed above.

4.1.2 Cumulative (Future) Scenario

The cumulative scenario considers those projects within 1,200 feet of the Proposed Project site whose Environmental Evaluation Application has been submitted to the Planning Department or that are considered reasonably foreseeable from the Planning Department as of May 15, 2019, the date of

[3] 1028 Market Street was tested in the cumulative conditions however its impact in the existing conditions will be minimal on locations adjacent or near to the project site. Including 1028 Market in the existing conditions would locally, to 1028 Market itself, increase windiness.

approval of the wind study scope of work. These projects are shown in blue in Figure 16 and include:

- **996 Mission Street**, to the south of the Proposed Project at the north-west crossing of Mission Street and 6th Street. The scheme has been modelled as an 8-story building as agreed with the Planning Department via email (5/17/2019).
- **1055 Market Street**, to the south-west of the Proposed Project on the southern side of Market Street between 6th Street and 7th Street. The scheme consists of a 10-storey, 90-foot-tall hotel building with ground floor retail space.
- **921 Howard Street**, to the south-east of the Proposed Project on the south side of Howard Street between 5th Street and 6th Street. The scheme has been modelled as an 18-story building as agreed with the Planning Department via email (5/17/2019).
- **1025 Howard Street**, to the south-east of the Proposed Project at the south-west crossing of Howard Street and Harriet Street. The scheme consists of a 8-story, 90-foot-tall hotel building.
- **481-483 Tehama Street**, to the south-east of the Proposed Project on the south side of Tehama Street between 5th Street and 6th Street. The scheme consists of a 4-storey, 50-foot-tall residential building.
- **457-475 Minna Street**, to the south-east of the Proposed Project on the south side of Minna Street between 5th Street and 6th Street. The scheme consists of a 16-story, 160-foot-tall residential building.
- **527 Stevenson Street**, to the south-west of the Proposed Project on the south side of Stevenson between 6th Street and 7th Street. The scheme consists of a 7-story, 74-foot-tall commercial building.
- **57 Taylor Street (111 Turk Street)**, to the north-west of the Proposed Project at the south-west crossing of Turk Street and Taylor Street. The scheme consists of a 11-story, 120-foot-tall residential building.

Appendix B reports the sources of massing information for the cumulative projects listed above.

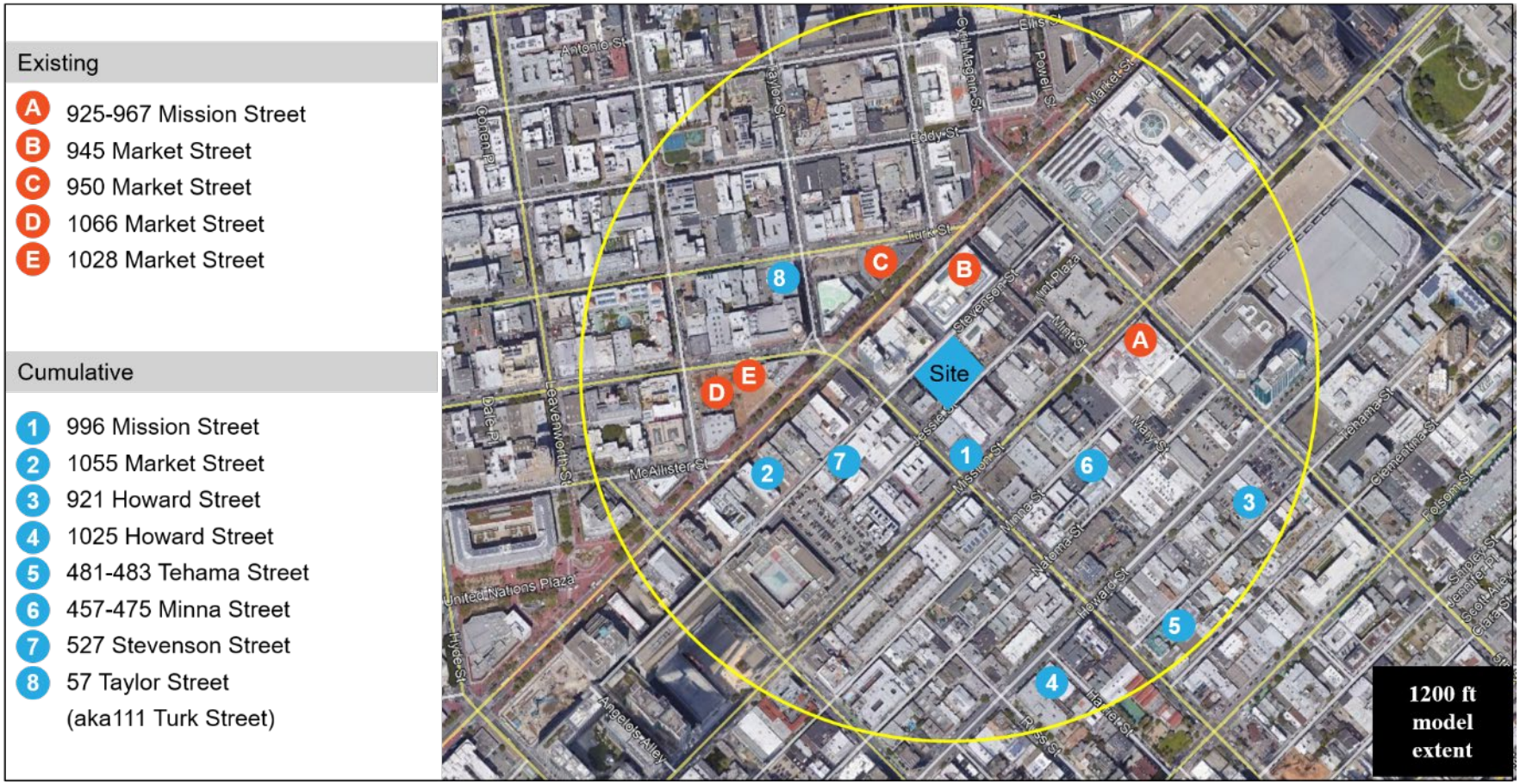


Figure 16: Map of the existing (orange, in letters) and cumulative (blue, in numbers) projects around the project site

5 Wind Results

The results of the wind comfort analysis for the cases of No Project in existing conditions are compared with the Proposed Project in Table 1, and with EIR Alternative 1 and EIR Alternative 2 in Table 2. The results of the wind comfort analysis for the cases of No Project in cumulative (future) conditions are compared with the Proposed Project in Table 3 and with EIR Alternative 1 and EIR Alternative 2 in Table 4. The results are expressed in terms of wind speed exceeded more than 10% of the time year-round for all test locations and the percentage of time when the wind speed exceeds the seating comfort criterion (7 mph) and pedestrian comfort criterion (11 mph). A graphical illustration of the comfort criteria is provided in Figure 17 to Figure 24, where colored dots highlight the comfort criteria and a single red ring around the measurement location indicate exceedance of the comfort criteria.

The results of the wind hazard analysis for all cases in existing conditions are presented in Table 5. The results of the wind hazard analysis for all cases in cumulative (future) conditions are presented in Table 6. The tables indicate the wind speed exceeded 0.0114% of the time for all test locations and the number of hours in exceedance of the hazard criteria (36 mph) for the locations in the pedestrian areas. A graphical illustration of the hazard criteria is provided in Figure 17 to Figure 24, where two red rings indicate the locations subjected to hazardous wind conditions.

The results of the wind speeds for the test points on the bicycle lanes for all cases in existing conditions are listed in Table 7 and for all cases in cumulative (future) conditions are reported in Table 8. These wind speeds are not compared against the comfort and hazard criteria as the wind speeds at bicycle lanes are provided for informational purposes only.

5.1 Wind Comfort

5.1.1 Existing Conditions

The comfort wind speeds and percentage of time in exceedance of the pedestrian comfort criterion and the seating comfort criterion for the existing conditions are listed in Table 1 and Table 2, and summarized below.

For the Existing Conditions (No Project), the wind speeds are on average 11.6 mph for all test locations shown in Figure 17. In the immediate vicinity of the project site (Locations #1 to #21), the highest wind speeds are 15 mph at Location #12 and 14 mph at Locations #1 and #13, where the seating comfort criterion is exceeded 40-50% of the time and the pedestrian comfort criterion is exceeded 20-24% of the time.

For the Existing conditions with the Proposed Project the average wind speed for all test locations shown in Figure 18 is 12.4 mph. The highest wind speeds in the immediate vicinity of the site are 19 mph at Location #12 and 17 mph at Location #13. In these conditions, the wind exceeds the seating comfort criterion approximately 55-57% of the time and the pedestrian comfort criterion about 32-35% of the time.

For the Existing conditions with the EIR Alternative 1, the average wind speed for all test locations shown in Figure 19 is 11.3 mph. The highest wind speed in the immediate vicinity of the site is 13 mph at Location #1, #2 and #19. In these conditions, the wind exceeds the seating comfort criterion approximately 40-46% of the time and the pedestrian comfort criterion about 16-18% of the time.

For the Existing conditions with EIR Alternative 2 the average wind speeds for all test locations shown in Figure 20 is 12.5 mph. The highest wind speeds in the immediate vicinity of the site are 19 mph at Location #12 and 17 mph at Locations #4, #5, #13 and #17. In these conditions, the wind exceeds the seating comfort criterion approximately 56-60% of the time and the pedestrian comfort criterion about 30-35% of the time.

5.1.2 Cumulative (Future) Conditions

The comfort wind speeds and percentage of time in exceedance of the pedestrian comfort criterion and the seating comfort criterion in the cumulative (future) conditions are listed in Table 3 and Table 4, and summarized below.

For the Cumulative conditions (No Project), the wind speeds are on average 11 mph for all test locations shown in Figure 21. In the immediate vicinity of the project site (Locations #1 to #21), the highest wind speed (13 mph) occurs at Locations #12 and #13. In these conditions, the winds exceed the seating comfort criterion approximately 43-47% of the time and the pedestrian comfort criterion approximately 16-19% of the time.

For the Cumulative conditions with the Proposed Project and landscaping in Mint Plaza, the average wind speed for all test locations shown in Figure 22 is 12.3 mph. The highest wind speed in the immediate vicinity of the site is 19 mph at Locations #12 and #17 along Jessie Street. In these conditions, the wind exceeds the seating comfort criterion approximately 56-62% of the time and the comfort criterion about 35-40% of the time.

For the Cumulative conditions with the EIR Alternative 1, the average wind speed for all test locations shown in Figure 23 is 11.1 mph. The highest wind speed in the immediate vicinity of the site is 12 mph at Locations #1, #2, #4 and #5 along Stevenson Street, and Locations #12, #13 and #19 along Jessie Street. In these conditions, the wind exceeds the seating comfort criterion approximately 29-42% of the time and the pedestrian comfort criterion about 10-14% of the time.

For the Cumulative conditions with the EIR Alternative 2, the average wind speed for all test locations shown in Figure 24 is 12.1 mph. The highest wind speeds in the immediate vicinity of the site are 19 mph at Locations #12 along Jessie Street towards Mint Plaza and 18 mph at Locations #4 and #17 along Stevenson Street and Jessie Street, respectively. In these conditions, the wind exceeds the seating comfort criterion approximately 55-61% of the time and the pedestrian comfort criterion about 29-37% of the time.

5.2 Wind hazard

5.2.1 Existing Conditions

The hazard wind speeds and hours of exceedance for the existing conditions are listed in Section 6.2, Table 5.

For the Existing Conditions (No Project), none of the locations tested exceeds the hazard criterion of 36 mph.

For the Existing conditions with the Proposed Project, none of the locations tested exceeds the hazard criterion of 36 mph.

For the Existing conditions with EIR Alternative 1, none of the locations tested exceeds the hazard criterion of 36 mph.

For the Existing conditions with EIR Alternative 2, none of the locations tested exceeds the hazard criterion of 36 mph.

5.2.2 Cumulative (Future) Conditions

The hazard wind speeds and hours of exceedance for the cumulative (future) conditions are listed in Section 6.2, Table 6.

For the Cumulative conditions (No Project), none of the locations tested exceeds the hazard criterion of 36 mph.

For the Cumulative conditions with the Proposed Project and landscaping in and near Mint Plaza, none of the locations tested exceeds the hazard criterion of 36 mph.

For the Cumulative conditions with the EIR Alternative 1, none of the locations tested exceeds the hazard criterion of 36 mph.

For the Cumulative conditions with EIR Alternative 2, none of the locations tested exceeds the hazard criterion of 36 mph.

6 Tables

6.1 Wind Comfort Results

Table 1: Wind comfort criteria for existing conditions with No Project and Proposed Project

Reference			Existing Conditions (No Project)					Existing conditions with Proposed Project					
Location Number	Comfort criterion for seating areas (mph)	Comfort criterion for pedestrian areas (mph)	Wind Speed exceeded 10% of time (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)		Wind Speed exceeded 10% of time (mph)	Speed Change Relative to Existing (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)	
1	7	11	14	41	e	20	e	14	0	51	e	24	e
2	7	11	13	36	e	14	e	13	0	48	e	19	e
3	7	11	11	28	e	9		15	4	51	e	24	e
4	7	11	9	17	e	2		16	7	52	e	26	e
5	7	11	7	9		1		15	8	53	e	25	e
6	7	11	8	16	e	2		12	4	41	e	13	e
7	7	11	10	30	e	5		11	1	33	e	9	
8	7	11	10	25	e	4		10	0	28	e	5	
9	7	11	10	31	e	6		11	1	35	e	10	
10	7	11	7	7		1		8	1	16	e	1	
11	7	11	11	36	e	9		10	-1	31	e	6	
12	7	11	15	50	e	24	e	19	4	55	e	35	e
13	7	11	14	49	e	21	e	17	3	57	e	32	e
14	7	11	10	28	e	4		15	5	56	e	27	e
15	7	11	12	40	e	14	e	14	2	56	e	24	e
16	7	11	12	41	e	14	e	14	2	52	e	22	e
17	7	11	9	25	e	3		16	7	58	e	30	e
18	7	11	12	42	e	13	e	12	0	41	e	11	e
19	7	11	13	44	e	18	e	15	2	52	e	26	e
20	7	11	12	36	e	13	e	14	2	49	e	22	e
21	7	11	11	34	e	9		14	3	47	e	20	e
22	7	11	9	25	e	3		14	5	43	e	20	e
23	7	11	9	23	e	3		10	1	31	e	6	
24	7	11	11	36	e	9		10	-1	29	e	5	
25	7	11	10	29	e	5		9	-1	19	e	2	
26	7	11	13	36	e	14	e	9	-4	20	e	2	
27	7	11	9	17	e	3		8	-1	14	e	1	
28	7	11	8	15	e	1		9	1	21	e	3	
29	7	11	11	30	e	7		11	0	31	e	7	
30	7	11	10	25	e	4		13	3	48	e	19	e
31	7	11	10	25	e	4		12	2	43	e	14	e
32	7	11	11	33	e	9		11	0	39	e	10	
33	7	11	12	37	e	12	e	13	1	42	e	15	e
34	7	11	10	27	e	4		8	-2	13	e	2	
35	7	11	11	33	e	10		15	4	45	e	24	e
36	7	11	13	45	e	15	e	15	2	53	e	25	e
37	7	11	11	32	e	7		12	1	41	e	14	e
38	7	11	15	44	e	23	e	13	-2	40	e	16	e

Reference			Existing Conditions (No Project)					Existing conditions with Proposed Project					
Location Number	Comfort criterion for seating areas (mph)	Comfort criterion for pedestrian areas (mph)	Wind Speed exceeded 10% of time (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)		Wind Speed exceeded 10% of time (mph)	Speed Change Relative to Existing (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)	
39	7	11	12	36	e	11	e	11	-1	36	e	8	
40	7	11	17	55	e	31	e	15	-2	47	e	24	e
41	7	11	8	15	e	2		8	0	16	e	2	
42	7	11	12	38	e	13	e	13	1	41	e	14	e
43	7	11	15	49	e	23	e	14	-1	49	e	22	e
44	7	11	14	45	e	18	e	14	0	45	e	18	e
45	7	11	13	47	e	18	e	15	2	49	e	22	e
46	7	11	13	47	e	18	e	14	1	48	e	20	e
47	7	11	12	40	e	12	e	12	0	38	e	11	e
48	7	11	13	42	e	15	e	13	0	43	e	18	e
49	7	11	11	36	e	10		11	0	32	e	7	
50	7	11	13	48	e	17	e	13	0	49	e	18	e
51	7	11	14	42	e	20	e	10	-4	27	e	6	
52	7	11	16	45	e	25	e	11	-5	31	e	7	
53	7	11	14	50	e	21	e	12	-2	33	e	11	e
54	7	11	15	52	e	24	e	11	-4	31	e	7	
55	7	11	12	42	e	12	e	14	2	50	e	22	e
56	7	11	12	42	e	12	e	11	-1	38	e	9	
57	7	11	12	41	e	14	e	13	1	44	e	17	e
58	7	11	12	40	e	13	e	10	-2	28	e	5	
59	7	11	8	14	e	2		10	2	28	e	4	
60	7	11	13	44	e	15	e	12	-1	40	e	12	e
61	7	11	12	32	e	11	e	12	0	29	e	11	e
62	7	11	11	36	e	8		10	-1	27	e	4	
63	7	11	13	47	e	18	e	13	0	45	e	19	e
			Mean	**Mean**	**Sum**	**Mean**	**Sum**	**Mean**	**Mean**	**Mean**	**Sum**	**Mean**	**Sum**
			11.6	**35.0**	**61**	**11.5**	**34**	**12.4**	**0.8**	**39.3**	**63**	**14.5**	**39**

Table 2: Wind comfort criteria for existing conditions with No Project, EIR Alternative 1 and EIR Alternative 2

	Existing Conditions (No Project)					Existing conditions with EIR Alternative 1					Existing conditions with EIR Alternative 2				
Location Number	Wind Speed exceeded 10% of time (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)		Wind Speed exceeded 10% of time (mph)	Speed Change Relative to Existing (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)		Wind Speed exceeded 10% of time (mph)	Speed Change Relative to Existing (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)	
1	14	41	e	20	e	13	-1	40	e	18	e	15	1	53	e	25	e
2	13	36	e	14	e	13	0	46	e	18	e	15	2	52	e	25	e
3	11	28	e	9		12	1	40	e	12	e	13	2	47	e	17	e
4	9	17	e	2		12	3	35	e	10	e	17	8	56	e	30	e
5	7	9		1		10	3	27	e	7		17	10	57	e	31	e
6	8	16	e	2		11	3	35	e	10		14	6	48	e	22	e
7	10	30	e	5		9	-1	24	e	3		12	2	36	e	10	e
8	10	25	e	4		10	0	25	e	4		10	0	28	e	4	
9	10	31	e	6		10	0	30	e	6		11	1	35	e	9	
10	7	7		1		7	0	6		1		8	1	15	e	1	
11	11	36	e	9		11	0	34	e	9		10	-1	30	e	5	
12	15	50	e	24	e	12	-3	41	e	13	e	19	4	56	e	35	e
13	14	49	e	21	e	12	-2	43	e	14	e	17	3	58	e	33	e
14	10	28	e	4		9	-1	20	e	3		16	6	57	e	29	e
15	12	40	e	14	e	8	-4	14	e	2		16	4	57	e	27	e
16	12	41	e	14	e	9	-3	18	e	2		14	2	50	e	20	e
17	9	25	e	3		12	3	36	e	12	e	17	8	60	e	34	e
18	12	42	e	13	e	10	-2	24	e	3		14	2	51	e	21	e
19	13	44	e	18	e	13	0	40	e	16	e	15	2	51	e	25	e
20	12	36	e	13	e	12	0	33	e	11	e	14	2	47	e	20	e
21	11	34	e	9		11	0	34	e	10		14	3	48	e	20	e
22	9	25	e	3		10	1	28	e	4		14	5	42	e	19	e
23	9	23	e	3		9	0	23	e	3		10	1	30	e	6	
24	11	36	e	9		11	0	33	e	8		10	-1	29	e	5	
25	10	29	e	5		9	-1	25	e	3		9	-1	20	e	3	
26	13	36	e	14	e	14	1	39	e	17	e	9	-4	22	e	2	
27	9	17	e	3		9	0	17	e	3		8	-1	15	e	1	
28	8	15	e	1		8	0	15	e	1		8	0	14	e	1	
29	11	30	e	7		11	0	31	e	7		11	0	32	e	8	
30	10	25	e	4		9	-1	23	e	2		13	3	46	e	16	e
31	10	25	e	4		9	-1	24	e	4		12	2	43	e	13	e
32	11	33	e	9		11	0	30	e	7		11	0	38	e	10	
33	12	37	e	12	e	12	0	34	e	11	e	12	0	42	e	14	e
34	10	27	e	4		9	-1	23	e	3		9	-1	17	e	3	
35	11	33	e	10		11	0	29	e	8		15	4	46	e	24	e
36	13	45	e	15	e	12	-1	43	e	13	e	15	2	53	e	24	e

Location Number	Existing Conditions (No Project)					Existing conditions with EIR Alternative 1						Existing conditions with EIR Alternative 2					
	Wind Speed exceeded 10% of time (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)		Wind Speed exceeded 10% of time (mph)	Speed Change Relative to Existing (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)		Wind Speed exceeded 10% of time (mph)	Speed Change Relative to Existing (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)	
37	11	32	e	7		10	-1	29	e	6		12	1	41	e	13	e
38	15	44	e	23	e	14	-1	39	e	18	e	13	-2	41	e	17	e
39	12	36	e	11	e	11	-1	34	e	9		11	-1	34	e	7	
40	17	55	e	31	e	16	-1	55	e	30	e	14	-3	44	e	21	e
41	8	15	e	2		8	0	14	e	2		8	0	17	e	2	
42	12	38	e	13	e	12	0	39	e	12	e	13	1	41	e	15	e
43	15	49	e	23	e	15	0	48	e	23	e	14	-1	48	e	22	e
44	14	45	e	18	e	13	-1	44	e	17	e	14	0	45	e	18	e
45	13	47	e	18	e	13	0	45	e	17	e	15	2	49	e	22	e
46	13	47	e	18	e	13	0	46	e	17	e	14	1	48	e	21	e
47	12	40	e	12	e	12	0	39	e	11	e	12	0	39	e	11	e
48	13	42	e	15	e	13	0	41	e	15	e	13	0	42	e	17	e
49	11	36	e	10		11	0	34	e	9		11	0	31	e	7	
50	13	48	e	17	e	13	0	47	e	16	e	13	0	49	e	18	e
51	14	42	e	20	e	13	-1	40	e	17	e	11	-3	32	e	8	
52	16	45	e	25	e	14	-2	43	e	22	e	10	-6	29	e	6	
53	14	50	e	21	e	13	-1	46	e	17	e	12	-2	33	e	10	e
54	15	52	e	24	e	14	-1	47	e	19	e	10	-5	29	e	7	
55	12	42	e	12	e	12	0	42	e	13	e	14	2	49	e	21	e
56	12	42	e	12	e	11	-1	36	e	8		11	-1	36	e	8	
57	12	41	e	14	e	12	0	38	e	10	e	13	1	45	e	18	e
58	12	40	e	13	e	12	0	39	e	12	e	10	-2	28	e	5	
59	8	14	e	2		8	0	15	e	2		10	2	27	e	4	
60	13	44	e	15	e	12	-1	43	e	14	e	12	-1	39	e	12	e
61	12	32	e	11	e	12	0	32	e	11	e	12	0	30	e	11	e
62	11	36	e	8		11	0	36	e	8		10	-1	26	e	4	
63	13	47	e	18	e	13	0	47	e	18	e	13	0	44	e	18	e
	Mean	**Mean**	**Sum**	**Mean**	**Sum**	**Mean**	**Mean**	**Mean**	**Sum**	**Mean**	**Sum**	**Mean**	**Mean**	**Mean**	**Sum**	**Mean**	**Sum**
	11.6	**35.0**	**61**	**11.5**	**34**	**11.3**	**-0.3**	**33.7**	**62**	**10.3**	**32**	**12.5**	**0.9**	**39.6**	**63**	**14.8**	**40**

Table 3: Wind comfort criteria for cumulative (future) conditions with No Project and Proposed Project

Reference			Cumulative (future) conditions (No Project)					Cumulative (future) conditions with Proposed Project					
Location Number	Comfort criterion for seating areas (mph)	Comfort criterion for pedestrian areas (mph)	Wind Speed exceeded 10% of time (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)		Wind Speed exceeded 10% of time (mph)	Speed Change Relative to Existing (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)	
1	7	11	12	38	e	13	e	14	2	47	e	21	e
2	7	11	10	25	e	5		12	2	39	e	12	e
3	7	11	9	17	e	2		14	5	42	e	17	e
4	7	11	7	7		1		15	8	45	e	21	e
5	7	11	7	8		1		13	6	49	e	19	e
6	7	11	8	14	e	2		11	3	32	e	6	
7	7	11	10	28	e	4		11	1	35	e	9	
8	7	11	10	24	e	4		10	0	30	e	5	
9	7	11	10	31	e	6		12	2	37	e	11	e
10	7	11	7	6		1		7	0	8		1	
11	7	11	11	34	e	8		9	-2	21	e	2	
12	7	11	13	43	e	16	e	19	6	56	e	35	e
13	7	11	13	47	e	19	e	15	2	54	e	27	e
14	7	11	10	27	e	4		14	4	55	e	24	e
15	7	11	12	38	e	12	e	14	2	55	e	23	e
16	7	11	11	37	e	10		16	5	57	e	30	e
17	7	11	9	21	e	2		19	10	62	e	40	e
18	7	11	11	38	e	10		11	0	38	e	9	
19	7	11	12	37	e	11	e	14	2	50	e	20	e
20	7	11	10	25	e	4		11	1	35	e	9	
21	7	11	10	29	e	5		11	1	39	e	10	
22	7	11	11	32	e	7		14	3	45	e	20	e
23	7	11	10	31	e	5		13	3	44	e	18	e
24	7	11	11	36	e	9		11	0	36	e	8	
25	7	11	9	24	e	3		10	1	29	e	5	
26	7	11	13	38	e	15	e	14	1	44	e	21	e
27	7	11	9	17	e	2		9	0	17	e	3	
28	7	11	8	14	e	1		11	3	34	e	8	
29	7	11	11	31	e	7		10	-1	28	e	5	
30	7	11	10	23	e	4		14	4	46	e	19	e
31	7	11	8	15	e	1		11	3	34	e	8	
32	7	11	10	26	e	4		10	0	32	e	6	
33	7	11	10	30	e	6		12	2	37	e	10	e

Reference			Cumulative (future) conditions (No Project)					Cumulative (future) conditions with Proposed Project					
Location Number	Comfort criterion for seating areas (mph)	Comfort criterion for pedestrian areas (mph)	Wind Speed exceeded 10% of time (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)		Wind Speed exceeded 10% of time (mph)	Speed Change Relative to Existing (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)	
34	7	11	9	20	e	2		9	0	24	e	3	
35	7	11	10	26	e	6		10	0	21	e	5	
36	7	11	11	38	e	9		12	1	41	e	11	e
37	7	11	10	29	e	7		11	1	31	e	7	
38	7	11	12	38	e	12	e	11	-1	32	e	9	
39	7	11	11	36	e	10		12	1	39	e	11	e
40	7	11	14	49	e	22	e	15	1	51	e	24	e
41	7	11	8	12	e	2		8	0	13	e	2	
42	7	11	12	38	e	12	e	19	7	69	e	44	e
43	7	11	15	49	e	23	e	14	-1	49	e	22	e
44	7	11	14	45	e	19	e	14	0	48	e	21	e
45	7	11	14	47	e	19	e	14	0	49	e	21	e
46	7	11	14	48	e	20	e	13	-1	48	e	19	e
47	7	11	12	41	e	13	e	12	0	40	e	13	e
48	7	11	13	42	e	16	e	13	0	44	e	18	e
49	7	11	12	35	e	10	e	11	-1	31	e	7	
50	7	11	13	47	e	16	e	13	0	46	e	15	e
51	7	11	14	41	e	19	e	10	-4	25	e	5	
52	7	11	15	45	e	24	e	9	-6	23	e	3	
53	7	11	14	50	e	20	e	11	-3	31	e	8	
54	7	11	14	49	e	21	e	13	-1	48	e	18	e
55	7	11	12	42	e	12	e	16	4	51	e	25	e
56	7	11	12	40	e	11	e	11	-1	36	e	8	
57	7	11	12	40	e	12	e	13	1	43	e	16	e
58	7	11	12	41	e	14	e	10	-2	32	e	6	
59	7	11	8	16	e	2		10	2	33	e	6	
60	7	11	13	44	e	15	e	13	0	43	e	15	e
61	7	11	12	34	e	12	e	12	0	31	e	12	e
62	7	11	11	32	e	7		10	-1	30	e	5	
63	7	11	11	38	e	10		12	1	40	e	11	e

Mean	Mean	Sum	Mean	Sum
11.0	**32.4**	**60**	**9.5**	**27**

Mean	Mean	Mean	Sum	Mean	Sum
12.3	**1.2**	**39.0**	**62**	**13.8**	**35**

Table 4: Wind comfort criteria for cumulative (future) conditions with No Project, EIR Alternative 1and EIR Alternative 2

	Cumulative (future) conditions (No Project)					Cumulative (future) conditions with EIR Alternative 1					Cumulative (future) conditions with EIR Alternative 2				
Location Number	Wind Speed exceeded 10% of time (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)		Wind Speed exceeded 10% of time (mph)	Speed Change Relative to Existing (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)		Wind Speed exceeded 10% of time (mph)	Speed Change Relative to Existing (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)	
1	12	38	e	13	e	12	0	37	e	11	e	13	1	48	e	19	e
2	10	25	e	5		12	2	40	e	13	e	15	5	45	e	19	e
3	9	17	e	2		11	2	34	e	8		12	3	38	e	11	e
4	7	7		1		12	5	32	e	12	e	18	11	55	e	29	e
5	7	8		1		12	5	29	e	10	e	17	10	57	e	31	e
6	8	14	e	2		11	3	35	e	10		14	6	48	e	22	e
7	10	28	e	4		9	-1	24	e	3		12	2	37	e	12	e
8	10	24	e	4		10	0	24	e	4		10	0	27	e	4	
9	10	31	e	6		10	0	30	e	6		11	1	34	e	8	
10	7	6		1		7	0	6		1		8	1	15	e	1	
11	11	34	e	8		10	-1	31	e	6		10	-1	29	e	5	
12	13	43	e	16	e	12	-1	38	e	12	e	19	6	56	e	35	e
13	13	47	e	19	e	12	-1	42	e	14	e	17	4	58	e	33	e
14	10	27	e	4		9	-1	21	e	3		16	6	56	e	28	e
15	12	38	e	12	e	8	-4	14	e	2		15	3	54	e	24	e
16	11	37	e	10		8	-3	16	e	1		13	2	49	e	19	e
17	9	21	e	2		11	2	33	e	10		18	9	61	e	37	e
18	11	38	e	10		9	-2	23	e	3		13	2	49	e	19	e
19	12	37	e	11	e	12	0	35	e	11	e	13	1	44	e	16	e
20	10	25	e	4		10	0	24	e	4		12	2	40	e	12	e
21	10	29	e	5		10	0	30	e	6		12	2	42	e	13	e
22	11	32	e	7		11	0	35	e	9		13	2	41	e	17	e
23	10	31	e	5		11	1	33	e	7		13	3	41	e	15	e
24	11	36	e	9		11	0	35	e	9		11	0	32	e	8	
25	9	24	e	3		9	0	24	e	3		9	0	22	e	3	
26	13	38	e	15	e	14	1	40	e	18	e	10	-3	26	e	5	
27	9	17	e	2		9	0	17	e	3		9	0	17	e	3	
28	8	14	e	1		8	0	14	e	1		6	-2	4		1	
29	11	31	e	7		11	0	31	e	7		11	0	33	e	8	
30	10	23	e	4		9	-1	20	e	2		12	2	40	e	11	e
31	8	15	e	1		8	0	16	e	1		11	3	35	e	7	
32	10	26	e	4		10	0	24	e	3		10	0	33	e	6	
33	10	30	e	6		10	0	30	e	6		11	1	35	e	8	

Location Number	Cumulative (future) conditions (No Project)					Cumulative (future) conditions with EIR Alternative 1						Cumulative (future) conditions with EIR Alternative 2					
	Wind Speed exceeded 10% of time (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)		Wind Speed exceeded 10% of time (mph)	Speed Change Relative to Existing (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)		Wind Speed exceeded 10% of time (mph)	Speed Change Relative to Existing (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)	
34	9	20	e	2		9	0	18	e	2		8	-1	10	e	2	
35	10	26	e	6		10	0	25	e	6		9	-1	18	e	4	
36	11	38	e	9		11	0	39	e	10		12	1	41	e	11	e
37	10	29	e	7		10	0	28	e	6		11	1	35	e	9	
38	12	38	e	12	e	11	-1	33	e	9		11	-1	32	e	7	
39	11	36	e	10		11	0	36	e	10		12	1	42	e	13	e
40	14	49	e	22	e	15	1	51	e	24	e	11	-3	31	e	7	
41	8	12	e	2		8	0	12	e	1		8	0	17	e	2	
42	12	38	e	12	e	12	0	39	e	12	e	12	0	39	e	13	e
43	15	49	e	23	e	15	0	49	e	23	e	14	-1	48	e	21	e
44	14	45	e	19	e	14	0	45	e	18	e	14	0	45	e	18	e
45	14	47	e	19	e	13	-1	46	e	17	e	14	0	48	e	21	e
46	14	48	e	20	e	13	-1	46	e	19	e	14	0	48	e	20	e
47	12	41	e	13	e	12	0	39	e	11	e	12	0	37	e	10	e
48	13	42	e	16	e	13	0	42	e	16	e	13	0	42	e	17	e
49	12	35	e	10	e	12	0	36	e	10	e	10	-2	30	e	7	
50	13	47	e	16	e	13	0	48	e	17	e	13	0	48	e	17	e
51	14	41	e	19	e	13	-1	40	e	17	e	10	-4	28	e	6	
52	15	45	e	24	e	15	0	44	e	23	e	11	-4	34	e	9	
53	14	50	e	20	e	14	0	46	e	18	e	12	-2	33	e	10	e
54	14	49	e	21	e	14	0	48	e	20	e	12	-2	42	e	13	e
55	12	42	e	12	e	12	0	44	e	15	e	15	3	49	e	22	e
56	12	40	e	11	e	11	-1	36	e	8		11	-1	39	e	9	
57	12	40	e	12	e	11	-1	37	e	10		13	1	44	e	16	e
58	12	41	e	14	e	12	0	40	e	14	e	10	-2	28	e	5	
59	8	16	e	2		8	0	14	e	2		10	2	26	e	4	
60	13	44	e	15	e	13	0	44	e	15	e	11	-2	34	e	10	
61	12	34	e	12	e	12	0	33	e	11	e	12	0	28	e	11	e
62	11	32	e	7		11	0	33	e	7		9	-2	24	e	3	
63	11	38	e	10		12	1	39	e	11	e	13	2	42	e	16	e
	Mean	**Mean**	**Sum**	**Mean**	**Sum**	**Mean**	**Mean**	**Mean**	**Sum**	**Mean**	**Sum**	**Mean**	**Mean**	**Mean**	**Sum**	**Mean**	**Sum**
	11.0	**32.4**	**60**	**9.5**	**27**	**11.1**	**0.0**	**32.5**	**62**	**9.5**	**27**	**12.1**	**1.0**	**37.5**	**62**	**13.0**	**36**

6.2 Wind Hazard Results

Table 5: Wind hazard criteria for existing conditions

Reference		Existing Conditions (No Project)		Existing conditions with Proposed Project			Existing conditions with EIR Alternative 1			Existing conditions with EIR Alternative 2		
Location Number	Hazard Criterion (mph)	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria ("e" = exceeds)	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria ("e" = exceeds)	Hours Change Relative to Existing	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria ("e" = exceeds)	Hours Change Relative to Existing	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria ("e" = exceeds)	Hours Change Relative to Existing
1	36	25	0	24	0	0	24	0	0	25	0	0
2	36	23	0	25	0	0	22	0	0	30	0	0
3	36	20	0	29	0	0	20	0	0	25	0	0
4	36	17	0	33	0	0	22	0	0	35	0	0
5	36	19	0	31	0	0	20	0	0	33	0	0
6	36	19	0	22	0	0	22	0	0	25	0	0
7	36	22	0	25	0	0	20	0	0	24	0	0
8	36	19	0	18	0	0	18	0	0	17	0	0
9	36	19	0	19	0	0	18	0	0	19	0	0
10	36	19	0	19	0	0	19	0	0	18	0	0
11	36	21	0	20	0	0	21	0	0	20	0	0
12	36	25	0	35	0	0	24	0	0	35	0	0
13	36	24	0	29	0	0	24	0	0	29	0	0
14	36	17	0	28	0	0	23	0	0	31	0	0
15	36	20	0	34	0	0	21	0	0	35	0	0
16	36	20	0	25	0	0	16	0	0	24	0	0
17	36	16	0	29	0	0	21	0	0	29	0	0
18	36	21	0	23	0	0	17	0	0	24	0	0
19	36	23	0	26	0	0	22	0	0	26	0	0
20	36	22	0	26	0	0	21	0	0	25	0	0
21	36	20	0	23	0	0	20	0	0	23	0	0
22	36	18	0	25	0	0	17	0	0	24	0	0
23	36	19	0	20	0	0	19	0	0	20	0	0
24	36	20	0	17	0	0	20	0	0	17	0	0
25	36	20	0	17	0	0	20	0	0	17	0	0
26	36	27	0	19	0	0	28	0	0	19	0	0
27	36	19	0	17	0	0	19	0	0	17	0	0
28	36	16	0	19	0	0	16	0	0	18	0	0
29	36	21	0	20	0	0	19	0	0	21	0	0
30	36	18	0	25	0	0	16	0	0	26	0	0
31	36	17	0	22	0	0	17	0	0	21	0	0
32	36	19	0	20	0	0	18	0	0	20	0	0
33	36	21	0	21	0	0	20	0	0	21	0	0

Reference		Existing Conditions (No Project)			Existing conditions with Proposed Project				Existing conditions with EIR Alternative 1				Existing conditions with EIR Alternative 2			
Location Number	Hazard Criterion (mph)	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria ("e" = exceeds)		Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria ("e" = exceeds)		Hours Change Relative to Existing	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria ("e" = exceeds)		Hours Change Relative to Existing	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria ("e" = exceeds)		Hours Change Relative to Existing
34	36	25	0		27	0		0	25	0		0	26	0		0
35	36	22	0		31	0		0	21	0		0	31	0		0
36	36	24	0		29	0		0	24	0		0	28	0		0
37	36	19	0		22	0		0	18	0		0	23	0		0
38	36	27	0		23	0		0	25	0		0	23	0		0
39	36	20	0		22	0		0	20	0		0	22	0		0
40	36	28	0		26	0		0	28	0		0	24	0		0
41	36	20	0		23	0		0	21	0		0	23	0		0
42	36	24	0		24	0		0	23	0		0	24	0		0
43	36	27	0		26	0		0	26	0		0	26	0		0
44	36	33	0		30	0		0	32	0		0	30	0		0
45	36	27	0		27	0		0	26	0		0	27	0		0
46	36	23	0		25	0		0	23	0		0	25	0		0
47	36	26	0		24	0		0	26	0		0	25	0		0
48	36	22	0		23	0		0	22	0		0	23	0		0
49	36	20	0		19	0		0	20	0		0	19	0		0
50	36	26	0		26	0		0	26	0		0	25	0		0
51	36	23	0		19	0		0	22	0		0	19	0		0
52	36	26	0		20	0		0	25	0		0	19	0		0
53	36	31	0		31	0		0	31	0		0	31	0		0
54	36	34	0		30	0		0	33	0		0	29	0		0
55	36	26	0		27	0		0	27	0		0	26	0		0
56	36	23	0		26	0		0	23	0		0	26	0		0
57	36	21	0		23	0		0	20	0		0	22	0		0
58	36	27	0		27	0		0	28	0		0	27	0		0
59	36	22	0		23	0		0	22	0		0	22	0		0
60	36	24	0		23	0		0	24	0		0	23	0		0
61	36	26	0		27	0		0	26	0		0	28	0		0
62	36	21	0		22	0		0	21	0		0	22	0		0
63	36	23	0		23	0		0	22	0		0	22	0		0
		Mean	**Sum**	**Sum**	**Mean**	**Sum**	**Sum**	**Sum**	**Mean**	**Sum**	**Sum**	**Sum**	**Mean**	**Sum**	**Sum**	**Sum**
		22.3	**0**	**0**	**24.3**	**0**	**0**	**0**	**22.1**	**0**	**0**	**0**	**24.3**	**0**	**0**	**0**

Table 6: Wind hazard criteria for cumulative (future) conditions

Reference		Cumulative (future) conditions (No Project)		Cumulative (future) conditions with Proposed Project			Cumulative (future) conditions with EIR Alternative 1			Cumulative (future) conditions with EIR Alternative 2		
Location Number	Hazard Criterion (mph)	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria ("e" = exceeds)	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria ("e" = exceeds)	Hours Change Relative to Existing	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria ("e" = exceeds)	Hours Change Relative to Existing	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria ("e" = exceeds)	Hours Change Relative to Existing
1	36	23	0	23	0	0	21	0	0	24	0	0
2	36	18	0	22	0	0	23	0	0	30	0	0
3	36	17	0	27	0	0	21	0	0	25	0	0
4	36	17	0	32	0	0	24	0	0	36	0	0
5	36	19	0	23	0	0	24	0	0	34	0	0
6	36	20	0	18	0	0	22	0	0	25	0	0
7	36	23	0	23	0	0	20	0	0	24	0	0
8	36	19	0	18	0	0	18	0	0	17	0	0
9	36	19	0	20	0	0	19	0	0	19	0	0
10	36	18	0	18	0	0	18	0	0	18	0	0
11	36	21	0	20	0	0	20	0	0	20	0	0
12	36	25	0	36	0	0	25	0	0	35	0	0
13	36	24	0	26	0	0	24	0	0	29	0	0
14	36	17	0	29	0	0	24	0	0	30	0	0
15	36	20	0	29	0	0	21	0	0	35	0	0
16	36	19	0	27	0	0	16	0	0	23	0	0
17	36	16	0	33	0	0	20	0	0	30	0	0
18	36	19	0	24	0	0	17	0	0	24	0	0
19	36	21	0	25	0	0	21	0	0	22	0	0
20	36	16	0	21	0	0	16	0	0	23	0	0
21	36	22	0	19	0	0	19	0	0	21	0	0
22	36	19	0	24	0	0	20	0	0	23	0	0
23	36	20	0	22	0	0	20	0	0	22	0	0
24	36	20	0	19	0	0	20	0	0	21	0	0
25	36	20	0	20	0	0	20	0	0	18	0	0
26	36	28	0	28	0	0	29	0	0	20	0	0
27	36	18	0	18	0	0	18	0	0	18	0	0
28	36	18	0	23	0	0	16	0	0	18	0	0
29	36	19	0	18	0	0	18	0	0	20	0	0
30	36	19	0	28	0	0	16	0	0	26	0	0
31	36	16	0	20	0	0	16	0	0	21	0	0
32	36	17	0	19	0	0	17	0	0	20	0	0
33	36	20	0	20	0	0	20	0	0	21	0	0
34	36	24	0	25	0	0	23	0	0	26	0	0

Reference		Cumulative (future) conditions (No Project)		Cumulative (future) conditions with Proposed Project			Cumulative (future) conditions with EIR Alternative 1			Cumulative (future) conditions with EIR Alternative 2		
Location Number	Hazard Criterion (mph)	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria ("e" = exceeds)	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria ("e" = exceeds)	Hours Change Relative to Existing	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria ("e" = exceeds)	Hours Change Relative to Existing	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria ("e" = exceeds)	Hours Change Relative to Existing
35	36	19	0	21	0	0	20	0	0	21	0	0
36	36	23	0	24	0	0	23	0	0	26	0	0
37	36	21	0	20	0	0	21	0	0	22	0	0
38	36	21	0	20	0	0	21	0	0	20	0	0
39	36	20	0	21	0	0	20	0	0	22	0	0
40	36	24	0	24	0	0	24	0	0	22	0	0
41	36	20	0	22	0	0	20	0	0	23	0	0
42	36	23	0	34	0	0	23	0	0	24	0	0
43	36	27	0	26	0	0	27	0	0	26	0	0
44	36	33	0	33	0	0	33	0	0	30	0	0
45	36	27	0	27	0	0	26	0	0	27	0	0
46	36	24	0	24	0	0	23	0	0	25	0	0
47	36	26	0	27	0	0	26	0	0	24	0	0
48	36	22	0	22	0	0	22	0	0	23	0	0
49	36	21	0	19	0	0	20	0	0	20	0	0
50	36	26	0	25	0	0	26	0	0	25	0	0
51	36	23	0	19	0	0	22	0	0	18	0	0
52	36	26	0	19	0	0	25	0	0	21	0	0
53	36	31	0	28	0	0	31	0	0	31	0	0
54	36	33	0	30	0	0	34	0	0	29	0	0
55	36	26	0	29	0	0	27	0	0	27	0	0
56	36	23	0	23	0	0	23	0	0	26	0	0
57	36	20	0	24	0	0	20	0	0	22	0	0
58	36	27	0	28	0	0	27	0	0	27	0	0
59	36	21	0	24	0	0	22	0	0	22	0	0
60	36	25	0	24	0	0	24	0	0	23	0	0
61	36	26	0	27	0	0	26	0	0	27	0	0
62	36	21	0	21	0	0	21	0	0	22	0	0
63	36	22	0	20	0	0	22	0	0	23	0	0

Mean	Sum	Sum
21.8	**0**	**0**

Mean	Sum	Sum	Sum
23.8	**0**	**0**	**0**

Mean	Sum	Sum	Sum
22.0	**0**	**0**	**0**

Mean	Sum	Sum	Sum
24.1	**0**	**0**	**0**

6.3 Wind Conditions on the Bicycle Lanes

Table 7: Wind speed exceeded 10% of the time and 1 hour per year measured at the locations along the bicycle lanes for the existing conditions. Wind speeds provided for informational purposes only.

	Existing Conditions (No Project)		**Existing conditions with Proposed Project**		**Existing conditions with EIR Alternative 1**		**Existing conditions with EIR Alternative 2**	
Location Number	Wind Speed Exceeded 10% of time (mph)	Wind Speed Exceeded 1 Hour per Year (mph)	Wind Speed Exceeded 10% of time (mph)	Wind Speed Exceeded 1 Hour per Year (mph)	Wind Speed Exceeded 10% of time (mph)	Wind Speed Exceeded 1 Hour per Year (mph)	Wind Speed Exceeded 10% of time (mph)	Wind Speed Exceeded 1 Hour per Year (mph)
100	14	25	16	30	13	24	16	30
101	11	22	11	22	11	21	11	21
102	12	21	12	23	11	21	12	23
103	11	23	12	25	12	23	12	25
104	13	23	12	21	13	22	12	21
105	14	30	14	31	14	30	14	31
106	10	22	10	22	10	21	10	21
107	12	27	12	27	12	27	12	27
108	9	21	10	21	9	21	10	21
109	14	24	14	25	14	24	14	26

Table 8: Wind speed exceeded 10% of the time and 1 hour per year measured at the locations along the bicycle lanes for the cumulative (future) conditions. Wind speeds provided for informational purposes only.

	Cumulative (future) conditions (No Project)		**Cumulative (future) conditions with Proposed Project**		**Cumulative (future) conditions with EIR Alternative 1**		**Cumulative (future) conditions with EIR Alternative 2**	
Location Number	Wind Speed Exceeded 10% of time (mph)	Wind Speed Exceeded 1 Hour per Year (mph)	Wind Speed Exceeded 10% of time (mph)	Wind Speed Exceeded 1 Hour per Year (mph)	Wind Speed Exceeded 10% of time (mph)	Wind Speed Exceeded 1 Hour per Year (mph)	Wind Speed Exceeded 10% of time (mph)	Wind Speed Exceeded 1 Hour per Year (mph)
100	13	25	14	26	14	24	13	26
101	11	22	12	23	11	23	12	25
102	12	20	12	23	12	21	12	23
103	10	22	12	25	10	23	12	25
104	12	22	12	22	12	22	12	21
105	14	31	14	31	14	30	14	31
106	10	21	10	21	10	21	9	21
107	12	27	12	27	12	26	12	27
108	9	21	11	20	9	21	10	21
109	14	25	14	25	14	25	14	25

7 Wind Comfort and Hazard Maps

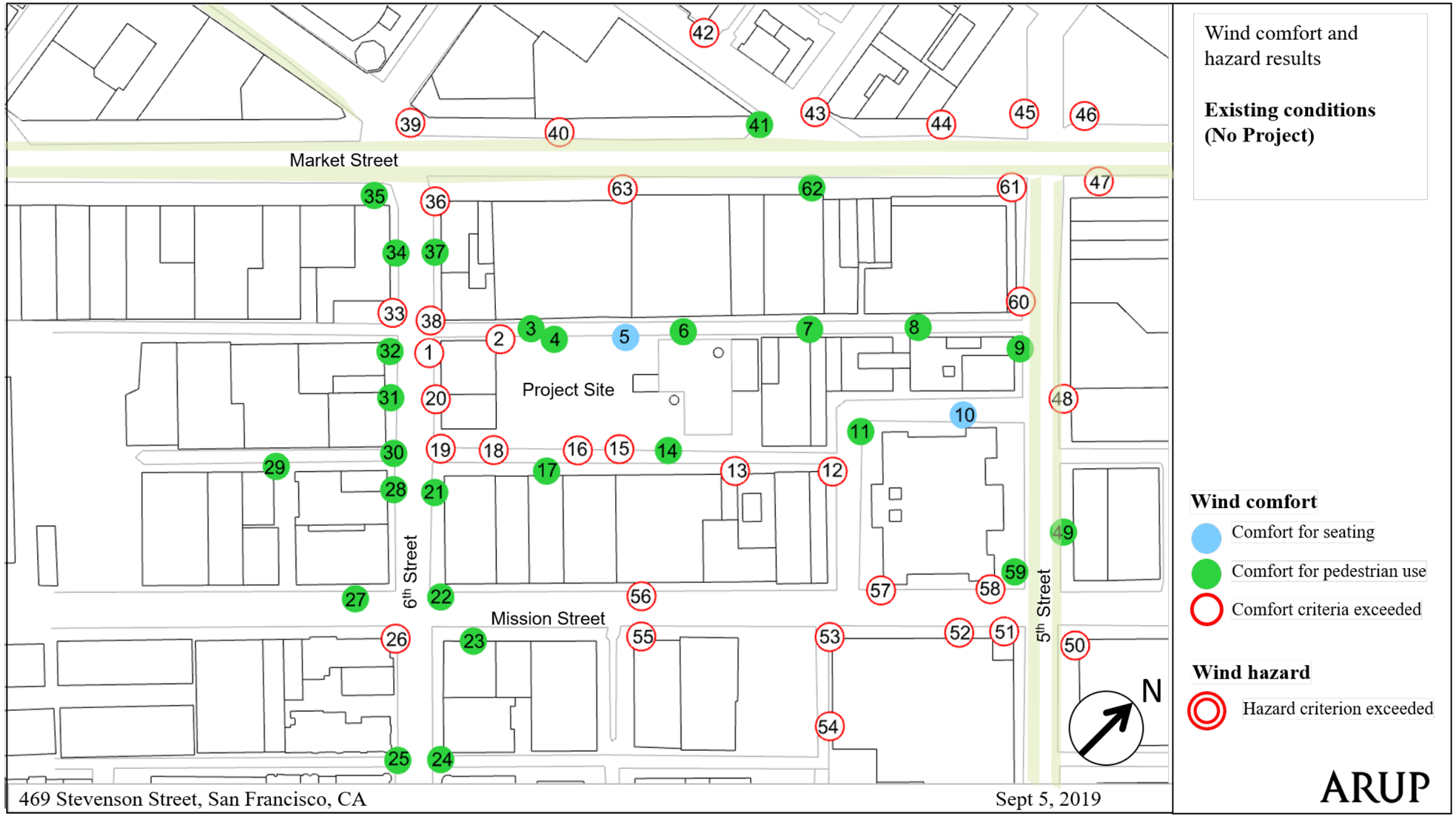


Figure 17: Existing conditions (No Project) – Pedestrian wind comfort and hazard conditions

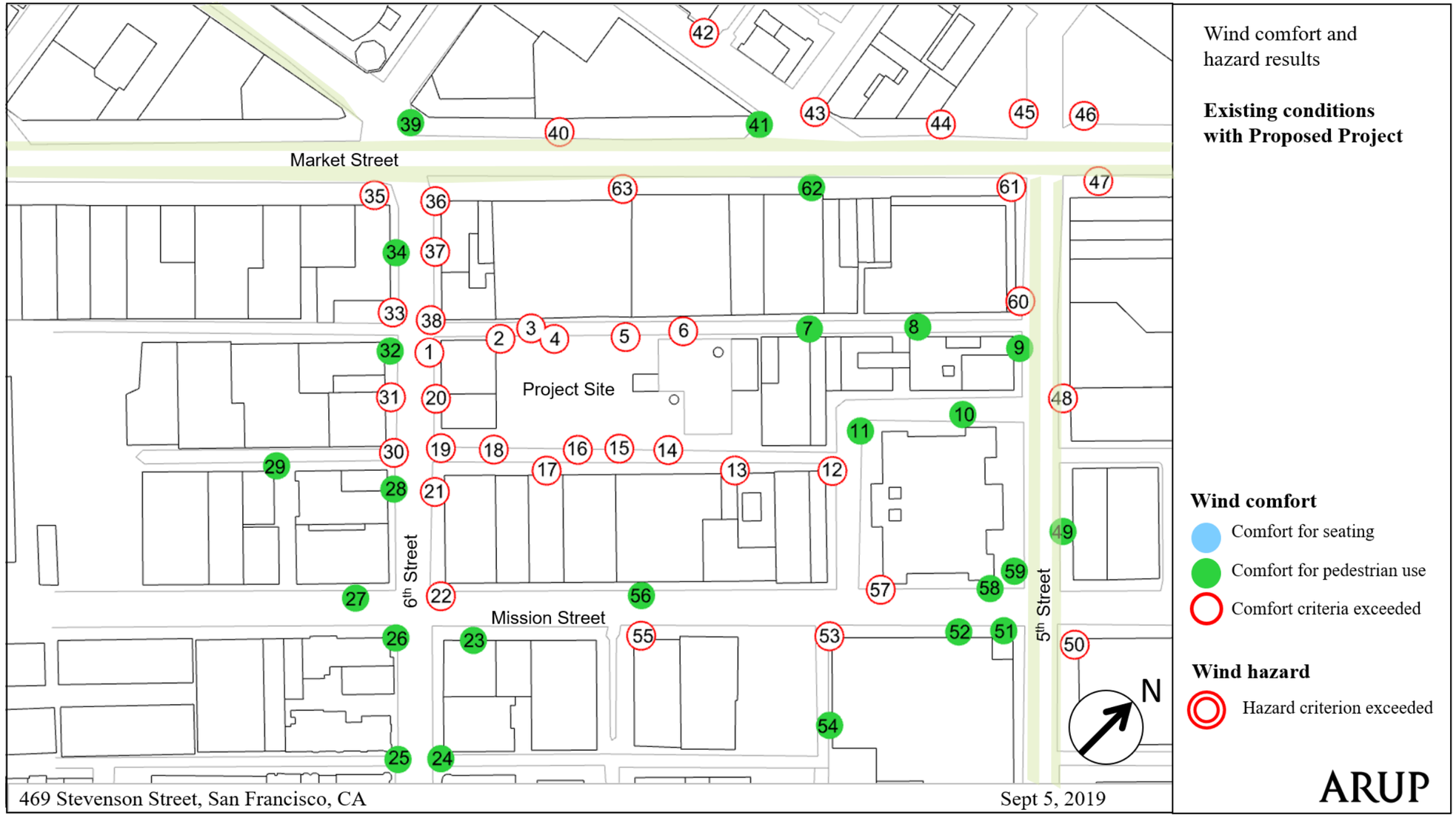


Figure 18: Existing conditions with Proposed Project– Pedestrian wind comfort and hazard conditions

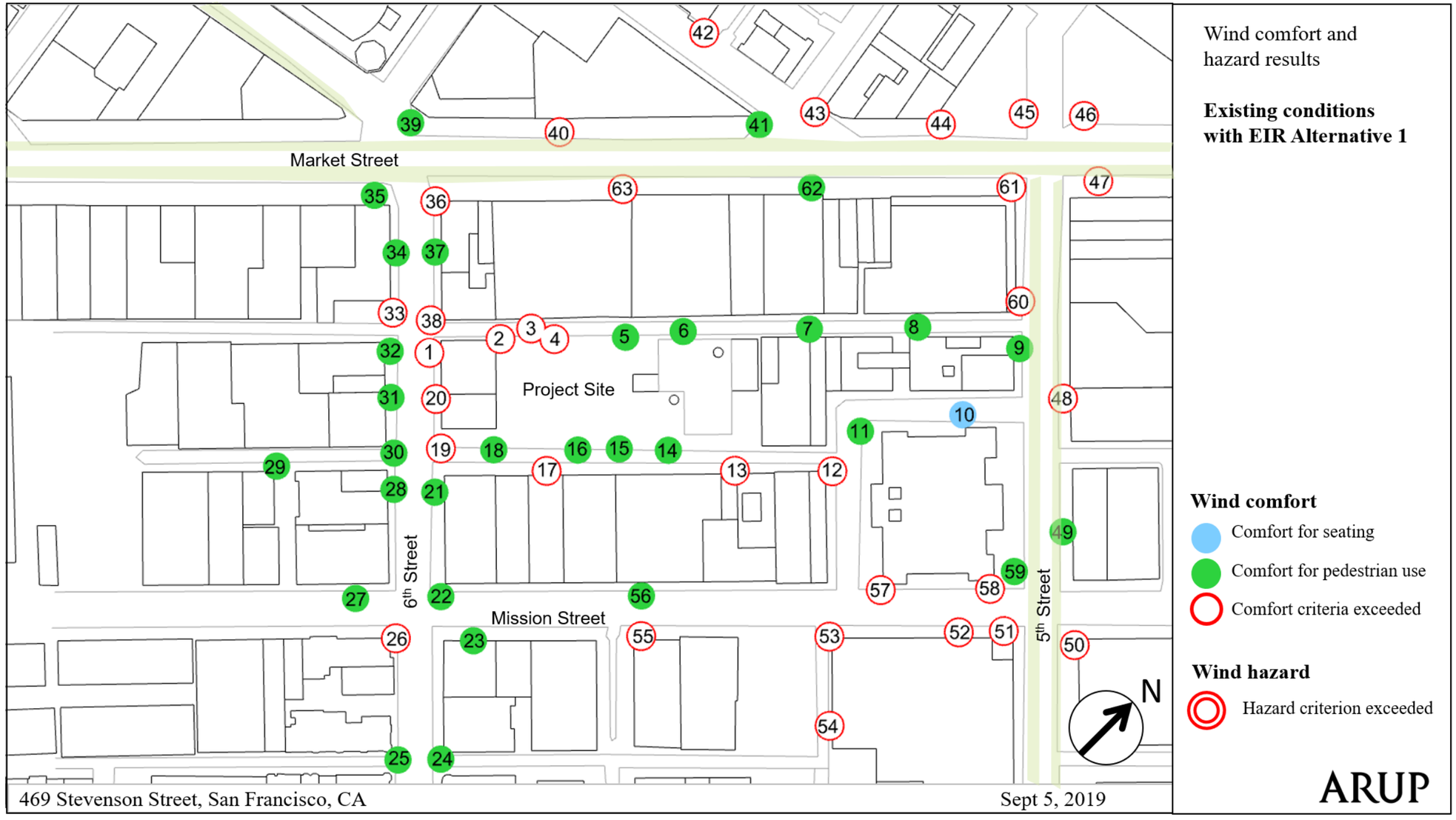


Figure 19: Existing conditions with EIR Alternative 1 – Pedestrian wind comfort and hazard conditions

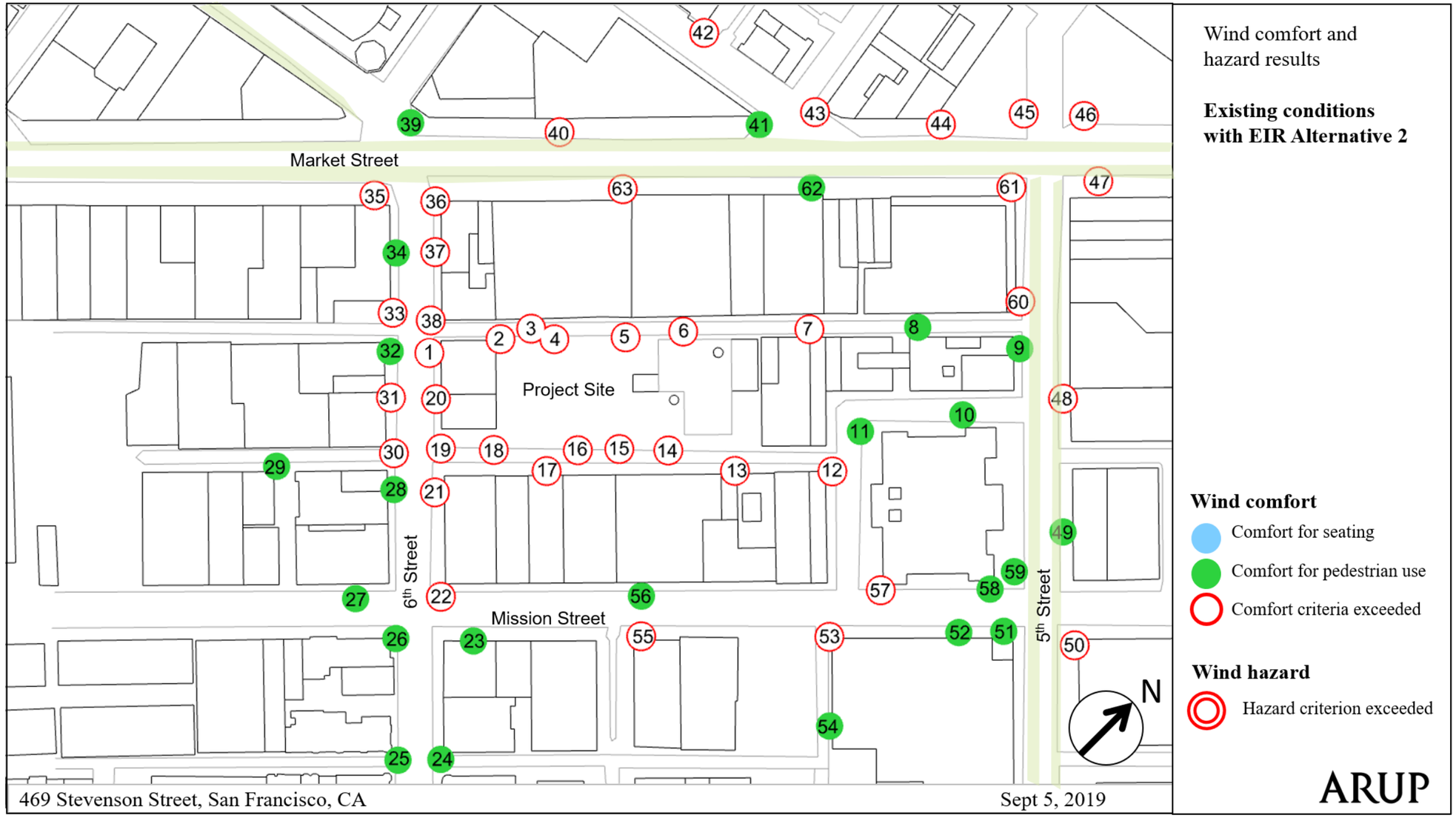


Figure 20: Existing conditions with EIR Alternative 2– Pedestrian wind comfort and hazard conditions

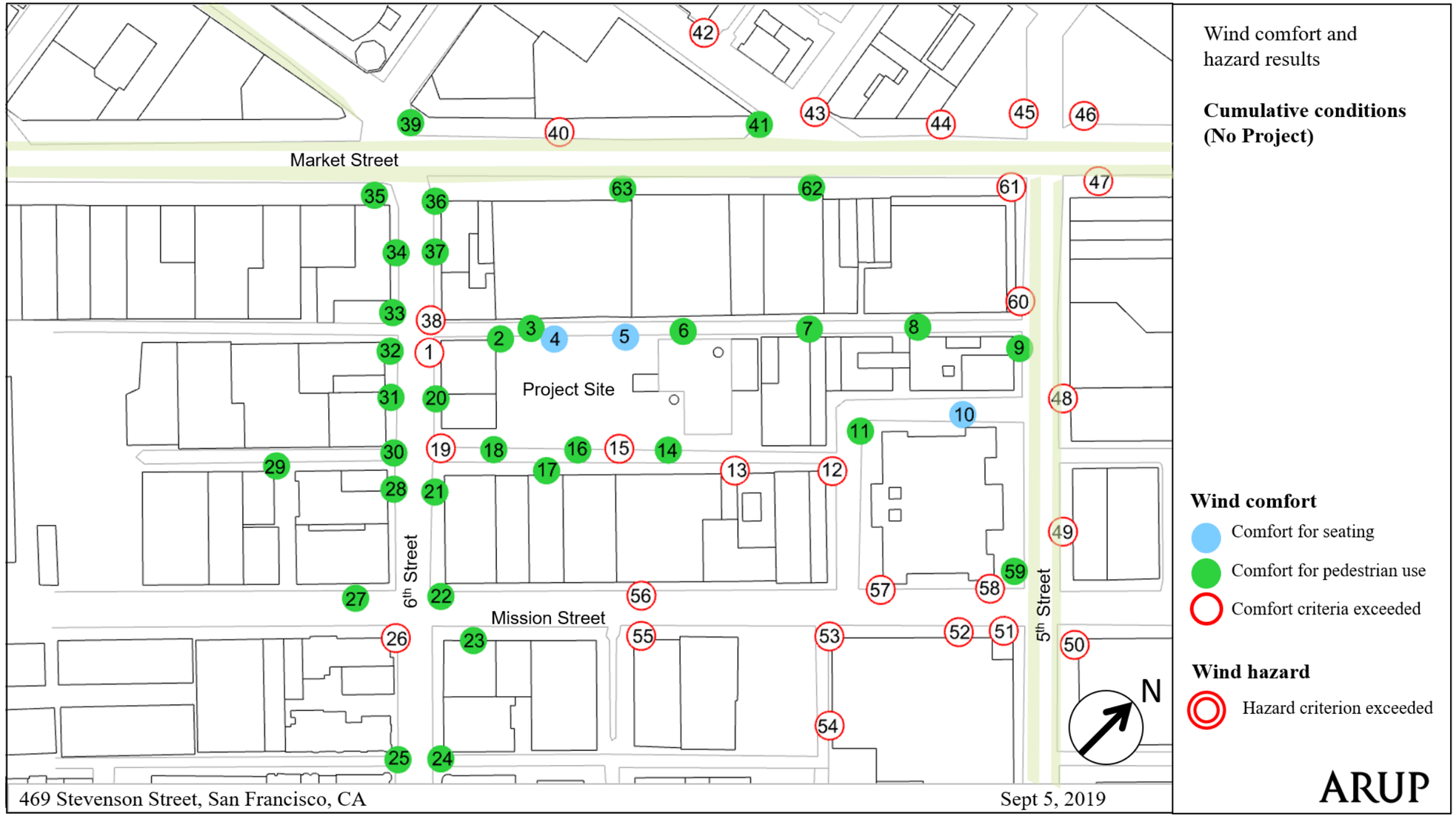


Figure 21: Cumulative conditions (No Project) – Pedestrian wind comfort and hazard conditions

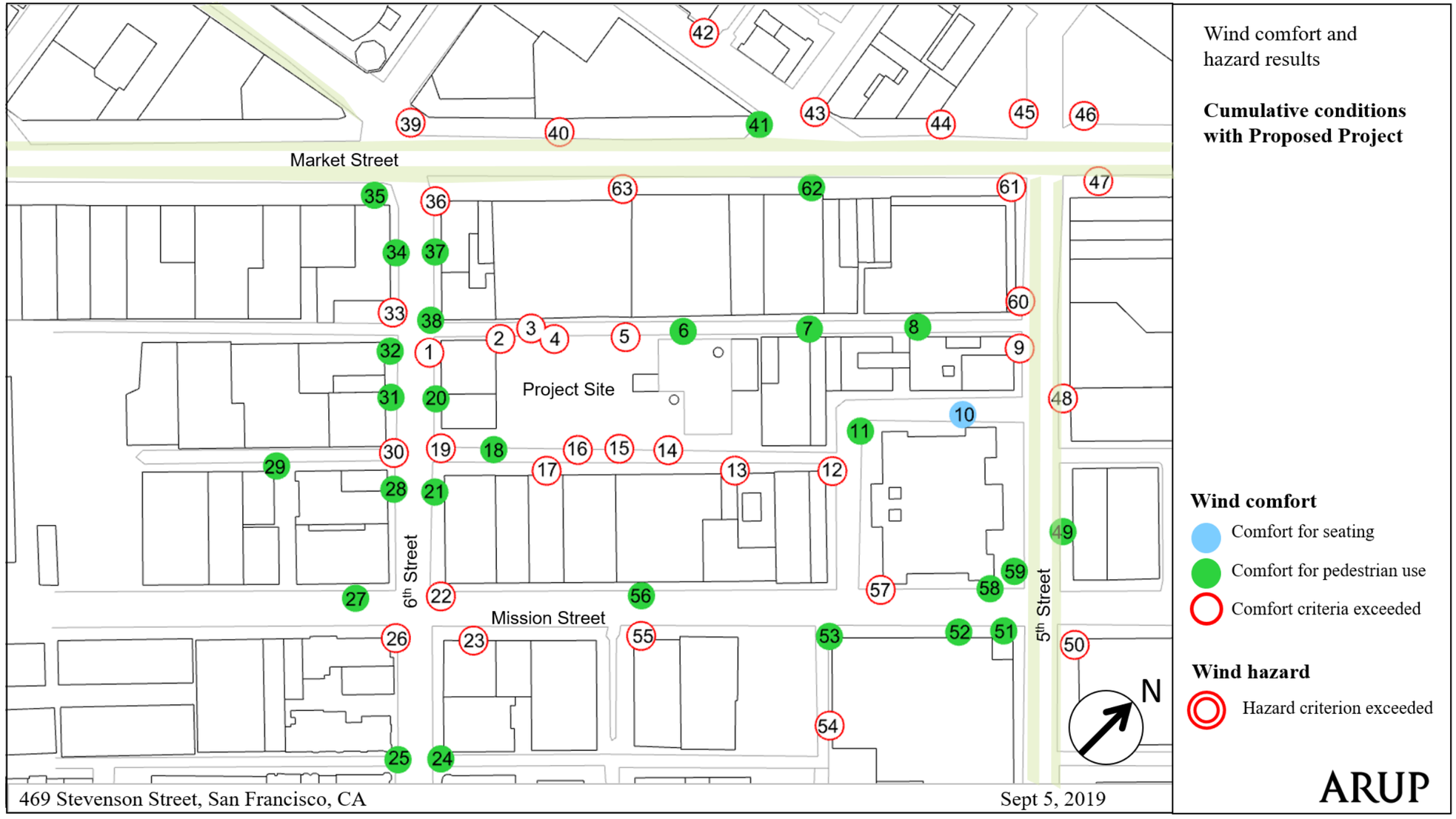


Figure 22: Cumulative conditions with Proposed Project– Pedestrian wind comfort and hazard conditions

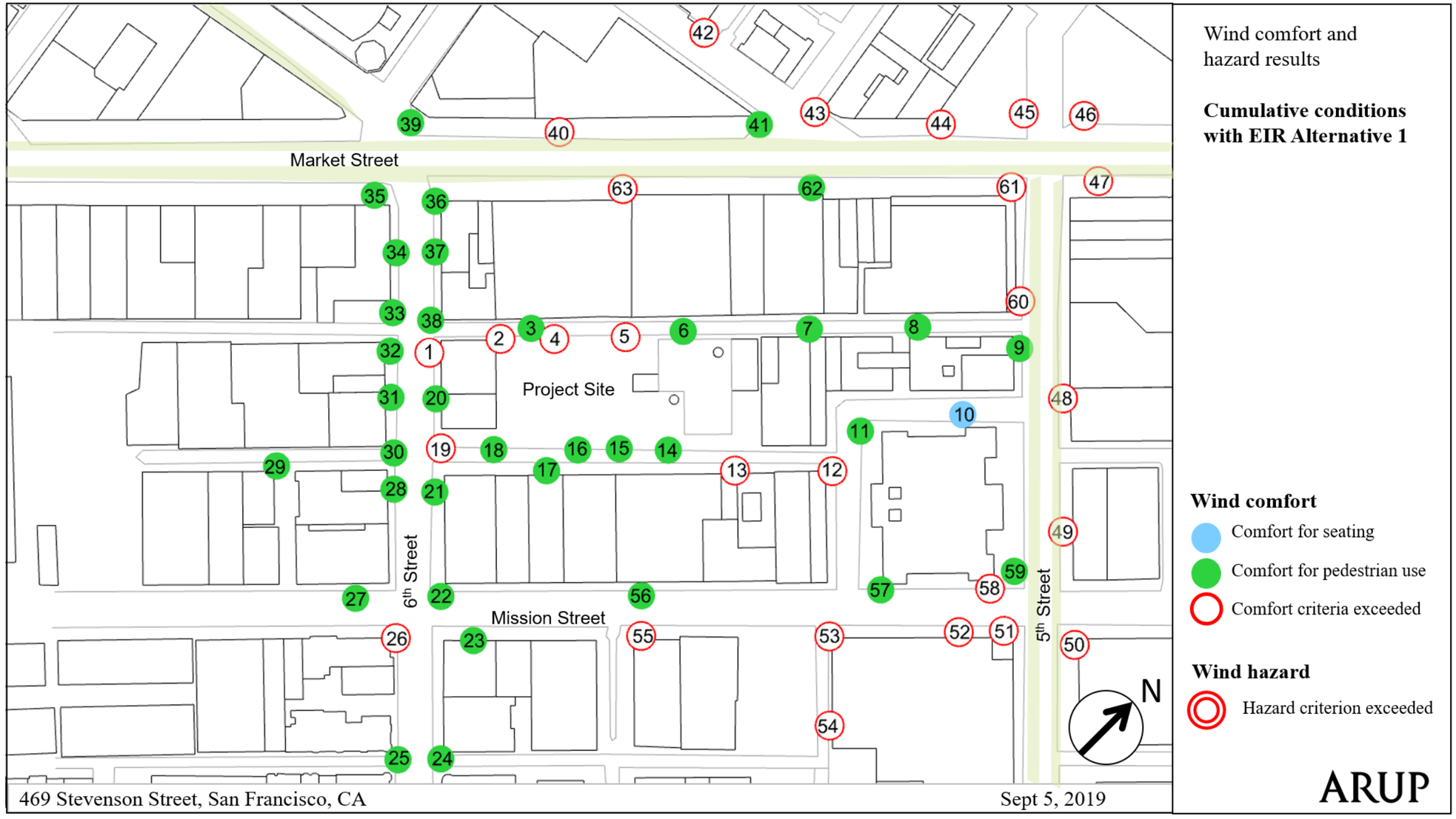


Figure 23: Cumulative conditions with EIR Alternative 1 – Pedestrian wind comfort and hazard conditions

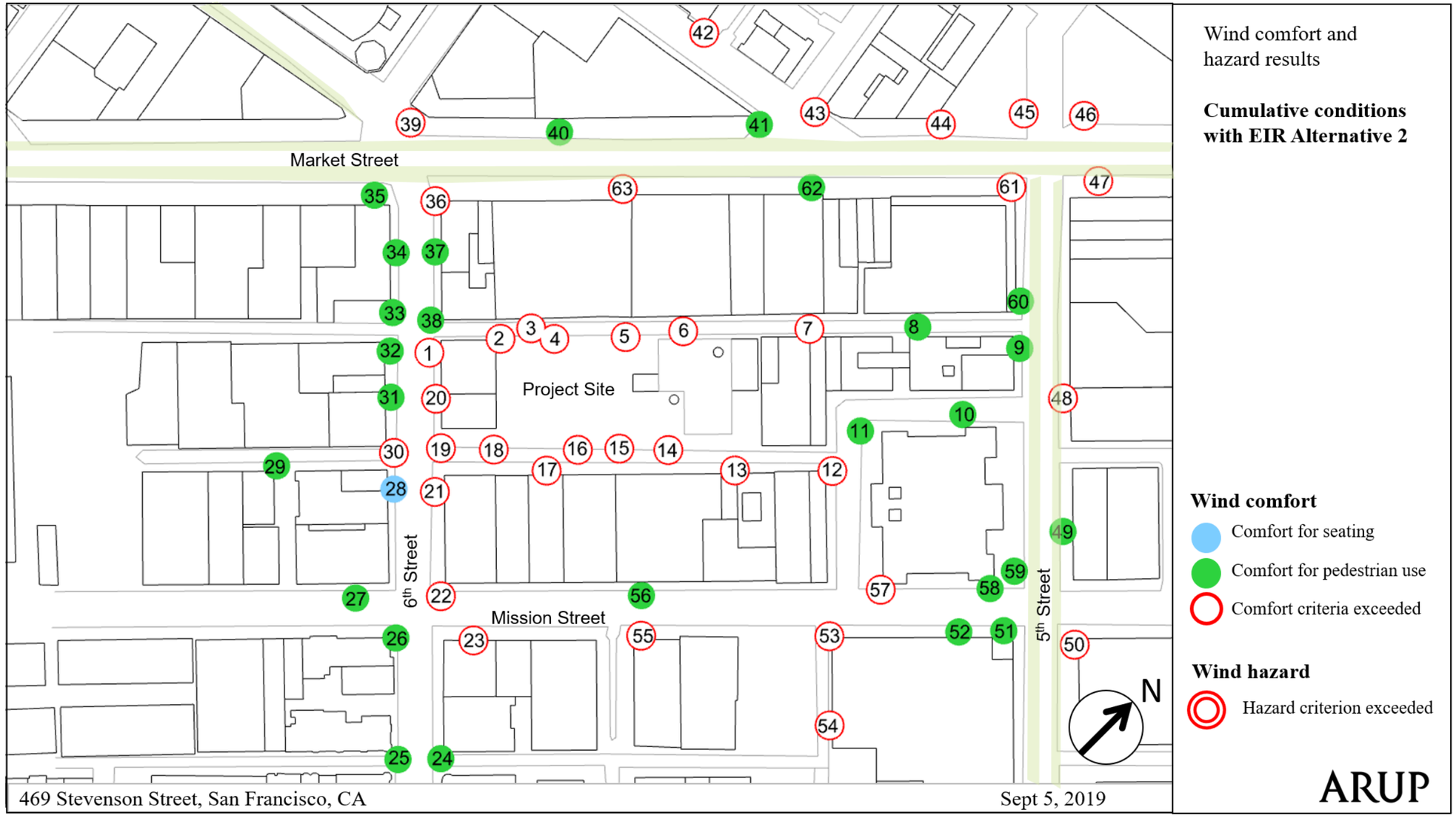


Figure 24: Cumulative conditions with EIR Alternative 2– Pedestrian wind comfort and hazard conditions

Appendix A

San Francisco Planning Code
Section 148

A1 San Francisco Planning Code Section 148

Reduction of Ground-level Wind Currents

a) Requirement and Exception. Buildings and additions to existing buildings shall be shaped, or other wind-baffling measures shall be adopted, so that the developments will not cause ground level wind currents to exceed, more than 10 percent of the time year round, between 7:00 a.m. and 6:00 p.m., the comfort level of 11 m.p.h. equivalent wind speed in areas of substantial pedestrian use and seven m.p.h. equivalent wind speed in public seating areas.

When preexisting ambient wind speeds exceed the comfort level, or when a proposed building or addition may cause ambient wind speeds to exceed the comfort level, the building shall be designed to reduce the ambient wind speeds to meet the requirements. An exception may be granted, in accordance with the provisions of Section 309, allowing the building or addition to add to the amount of time that the comfort level is exceed by the least practical amount if (1) it can be shown that a building or addition cannot be shaped and other wind-baffling measures cannot be adopted to meet the foregoing requirements without creating an unattractive and ungainly building form and without unduly restricting the development potential of the building site in question, and (2) it is concluded that, because of the limited amount by which the comfort level is exceeded, the limited location in which the comfort level is exceeded, or the limited time during which the comfort level is exceeded, the addition is insubstantial.

No exception shall be granted and no building or addition shall be permitted that causes equivalent wind speeds to reach or exceed the hazard level of 26 miles per hour for a single hour of the year.

b) Definition. The term "equivalent wind speed" shall mean an hourly mean wind speed adjusted to incorporate the effects of gustiness or turbulence on pedestrians.

c) Guidelines. Procedures and Methodologies for implementing this section shall be specified by the Office of Environmental Review of the Department of City Planning. (added by Ord. 414-85, App. 9/17/85)

SEC. 148. REDUCTION OF GROUND-LEVEL WIND CURRENTS IN C-3 DISTRICTS.

(a) **Requirement and Exception.** In C-3 Districts, buildings and additions to existing buildings shall be shaped, or other wind-baffling measures shall be adopted, so that the developments will not cause ground-level wind currents to exceed, more than 10 percent of the time year round, between 7:00 a.m. and 6:00 p.m., the comfort level of 11 m.p.h. equivalent wind speed in areas of substantial pedestrian use and 7 m.p.h. equivalent wind speed in public seating areas. When preexisting ambient wind speeds exceed the comfort level, or when a proposed building or addition may cause ambient wind speeds to exceed the comfort level,

the building shall be designed to reduce the ambient wind speeds to meet the requirements. An exception may be granted, in accordance with the provisions of Section 309, allowing the building or addition to add to the amount of time that the comfort level is exceeded by the least practical amount if (1) it can be shown that a building or addition cannot be shaped and other wind-baffling measures cannot be adopted to meet the foregoing requirements without creating an unattractive and ungainly building form and without unduly restricting the development potential of the building site in question, and (2) it is concluded that, because of the limited amount by which the comfort level is exceeded, the limited location in which the comfort level is exceeded, or the limited time during which the comfort level is exceeded, the addition is insubstantial. No exception shall be granted and no building or addition shall be permitted that causes equivalent wind speeds to reach or exceed the hazard level of 26 miles per hour for a single hour of the year.

(b) Definition. The term "equivalent wind speed" shall mean an hourly mean wind speed adjusted to incorporate the effects of gustiness or turbulence on pedestrians.

(c) Guidelines. Procedures and Methodologies for implementing this section shall be specified by the Office of Environmental Review of the Department of City Planning.

Appendix B

Drawing List for Model Construction

B1 Drawing List for Model Construction

Development reference	Existing / Cumulative	Reference
925-967 Mission Street	Existing	Planning Commission Packet for September 17, 2015, Case No. 2011.0409ENV/CUA/DVA/OFA/MAP/PCA/SHD, September 3, 2015 Retrieved from sfplanning.org
945 Market Street	Existing	Conditional Use Authorization and Office Allocation – 945 Market Street, Case No. 2017-011465CUA/OFA, March 8, 2018. Retrieved from sfplanning.org
950-974 Market Street	Existing	Mitigated Negative Declaration – 950-974 Market Street, Case No. 2013.1049E, November 17, 2016. Retrieved from sfplanning.org
1066 Market Street	Existing	Preliminary Mitigated Negative Declaration – 1066 Market Street, Case No. 2013.1753E, January 13, 2016. Retrieved from sfplanning.org
1028 Market Street	Existing	Final Environmental Impact Report – 1028 Market Street, Case No. 2014.0241E, January 26, 2017. Retrieved from sfplanning.org
996 Mission Street	Cumulative	Per e-mail communication with SF Planning Department (May 17, 2019)
1055 Market Street	Cumulative	Mitigated Negative Declaration – 1055 Market Street, Case No. 2014.0408E, November 13, 2017. Retrieved from sfplanning.org
921 Howard Street	Cumulative	Per e-mail communication with SF Planning Department (May 17, 2019).

Development reference	Existing / Cumulative	Reference
1025 Howard Street	Cumulative	Architectural Drawings issued for 1025 Howard Street by Stanton Architecture. Issued for NOPDR #1 Response, 2016. Retrieved from sfplanning.org
481-483 Tehama Street	Cumulative	Architectural Drawings issued for 483 Tehama Street by Studio 12 Architecture. Site Permit Set Version 3 – Draft, April 17, 2017. Retrieved from sfplanning.org
457-475 Minna Street	Cumulative	Architectural Drawings issued for 457-475 Minna Street by Brick, inc. Planning Submission Set, November 21, 2018. Retrieved from sfplanning.org
527 Stevenson Street	Cumulative	Architectural Drawings issued for 527 Stevenson by SIA Consulting Corporation. Proposed new construction of commercial building, Revised Date January 15, 2019. Retrieved from sfplanning.org
57 Taylor Street (111 Turk Street)	Cumulative	Architectural Drawings issued for 111 Turk Street by Architecture International. Response to UDAT Comments, August 24, 2016. Retrieved from sfplanning.org

Appendix C

Scope of Work

C1 Scope of Work

Introduction / Approach

The proposed project at 469 Stevenson consists of a 274-foot-tall residential tower (284 feet including the elevator penthouse) that is located near the junction of Stevenson and 6th Street in San Francisco, CA. The proposed project is over 80' in height and is therefore subjected to wind analysis. Wind tunnel testing will be carried out to investigate the pedestrian level wind conditions around the proposed project and will include the development of wind reduction measures if necessary. The following conditions will be tested:

1. **Existing conditions (No Project)**: the existing surroundings, with any buildings in the surroundings currently under construction and without the proposed project;
2. **Existing conditions with the project**: the proposed project in existing surroundings without mitigation;
3. **Existing conditions with the project + wind reduction measures (if necessary)**: the proposed project in existing surroundings with wind reduction measures;
4. **Cumulative conditions (No Project)**: the planned future surroundings (Cumulative) in existing surroundings;
5. **Cumulative conditions with the project**: the proposed project in existing surrounding structures and planned future surroundings (Cumulative).
6. **Cumulative conditions with the project + wind reduction measures (if necessary)**: the proposed project in existing surrounding structures and planned future surroundings (Cumulative).
7. **Existing conditions with EIR Alternative 1**
8. **Existing conditions with EIR Alternative 2**
9. **Existing conditions with EIR Alternative 1 + wind reduction measures (if necessary)**
10. **Existing conditions with EIR Alternative 2 + wind reduction measures (if necessary)**
11. **Cumulative conditions with EIR Alternative 1**
12. **Cumulative conditions with EIR Alternative 2**
13. **Cumulative conditions with EIR Alternative 1 + wind reduction measures (if necessary)**

14. Cumulative conditions with EIR Alternative 2 + wind reduction measures (if necessary)

Methodology

Wind tunnel testing will be organized by Arup in collaboration with the San Francisco Planning Department, Project Sponsor and SCB Architects. The boundary layer wind tunnel has a cross section 8 ft wide by 7 ft high and is about 100 ft long. A 1:300 scale model of the proposed project and its surroundings within a radius of 1,200 ft has been built and placed in the boundary layer wind tunnel for testing. The size of the model is constructed such that there is no influence of the wind tunnel walls on the measured wind speeds. The extent of the surrounding models allows an accurate representation of the wind conditions on site. Figure C1 and C2 show a general view of the wind tunnel model of the existing surroundings.

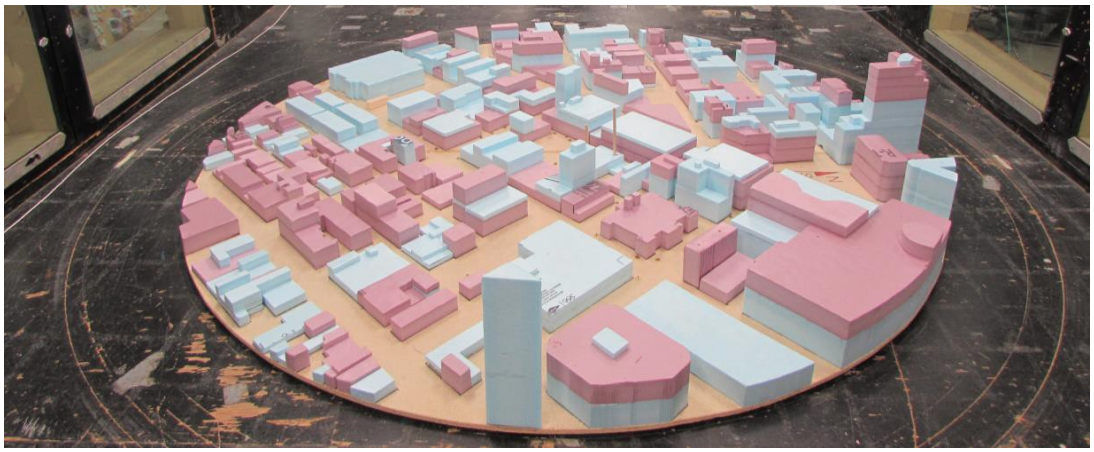


Figure C1: View of the wind tunnel model from the East

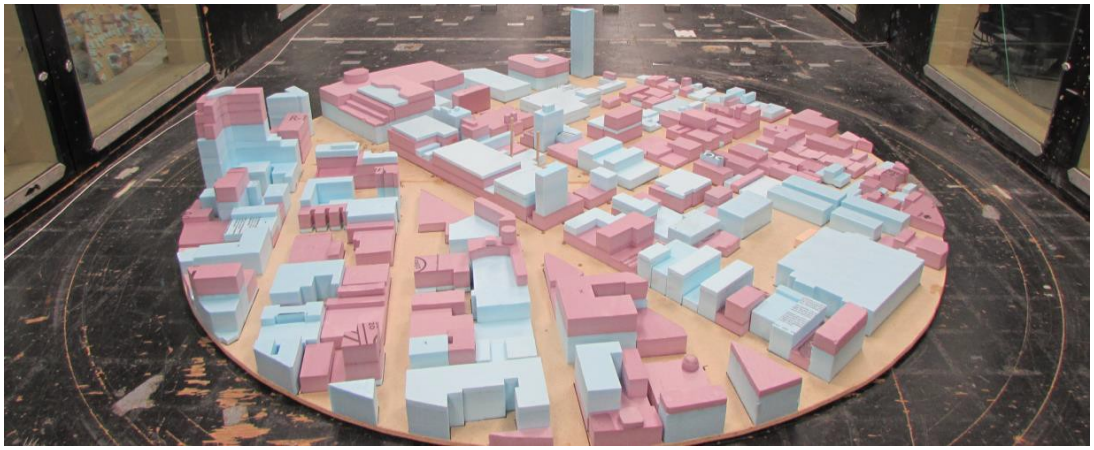


Figure C2: View of the wind tunnel model from the West

Simulation of atmospheric winds

The characteristics of the oncoming wind speed and turbulence are generated by using uniformly distributed roughness elements and spires upwind of the wind tunnel model (see Figure C3). The boundary layer wind speed profile, natural variation of wind turbulence with height, and the turbulence length scale are modelled in the tunnel such that they replicate the profile expected on site. Site specific boundary layer profiles are determined using ESDU (Engineering Science Data Unit) methods. The ESDU analysis takes into account the variation in upwind terrain characteristics (e.g. effective surface roughness) for different oncoming wind directions. Two upwind exposures will be used for the wind tunnel testing to simulate the site specific wind profiles. Figure C3 shows the upwind roughness blocks and spire configuration for exposure 1 and 2. The upwind configuration is very similar for the two exposures, save for the height of the roughness blocks which vary by 0.5 inches between simulation profiles.

Figure C3: View of the two upwind exposure configurations, EXP 1 and EXP 2

Measurement technique

Wind speeds are measured using approximately 70 Irwin probes placed both adjacent to the site and in areas around the site. The probes measure wind speeds at an effective full-scale height of approximately 6 ft above ground, which is the standard height used for assessing wind effects on pedestrians. The Irwin probes are located in frequently used areas (e.g. public seating areas, entrances, retail frontages, walking zones) and in areas expected to experience higher wind speeds. For each test configuration, wind speeds are measured for sixteen directions, at 22.5° intervals.

The wind tunnel measurements are analyzed together with the area's long term meteorological statistics to predict how often selected wind speed ranges will occur at each location. Both mean wind speeds and equivalent wind speeds (EWS), which include the local effects of gustiness, are investigated.

$$EWS = V_{mean}*(2I_u + 0.7)$$

Where V_{mean} is the mean wind speed and I_u represents the turbulence intensity. Results are compared against the City of San Francisco pedestrian wind comfort and hazard criteria.

Measurement locations

The measurement points are located in frequently used areas (e.g. public seating areas, bike lanes, entrances, retail frontages, walking zones) and in areas expected to experience higher wind speeds. The measurement locations are shown in Figure C5 (locations on the sidewalks) and Figure C6 (locations on the bike lanes).

Existing Schemes

The existing scheme includes all existing buildings within the modeling domain and those building currently under construction. Buildings that are currently under construction include:

- 925-967 Mission Street
- 950 Market Street
- 1066 Market Street

Cumulative Schemes

The cumulative scenario tested in the wind tunnel will include the proposed project, along with the existing surrounding structures and the future (cumulative) buildings. The following schemes (Figure C4) are considered for the cumulative configuration:

- 1028 Market Street (#1)
- 180 Jones Street (#2)
- 996 Mission Street (#3)
- 945 Market Street (#4)
- 1055 Market Street (#5)
- 921 Howard Street (#6)
- 1025 Howard Street (#7)
- 481-483 Tehama Street (#8)
- 457-475 Minna Street (#9)
- 527 Stevenson Street (#10)
- 57 Taylor Street (aka111 Turk Street) (#11)

Figure C4: Map of the cumulative schemes around the Project

Wind Reduction Measures

Wind reduction measures will be evaluated for all project scenarios that exceed the comfort or hazard criteria. The wind reduction measures will be identified in the following preferential order: 1) onsite physical features, 2) onsite landscaping, 3) offsite landscaping, and 4) offsite physical features. The goal will be to identify and exhaust all possible on-site wind reduction measures prior to identifying offsite wind reduction measures.

Meetings

Web or phone meetings with Planning to review the scope and wind tunnel testing results form part of the deliverable. Prior to submittal of the first draft of the wind report, ARUP will meet with Planning to present the preliminary findings of the wind analysis and mitigation measures. Any comments provided by Planning during this meeting shall be incorporated into the first draft of the wind report.

Deliverables

The wind tunnel testing results will be presented in a wind comfort and hazard assessment report that will include the following draft reporting stages:

1. First draft
2. Second draft
3. Screencheck
4. Final report

Preliminary testing results and potential wind reduction measures will be included in the report. The results will be presented to show the 10% and one hour per year exceedance wind speed in mph, the percent of time that the threshold comfort (for seating and pedestrian areas) and hazard wind speeds are exceeded and also the number of hours that exceed 36 mph 1-min mean at each measurement location. The results will also present the wind speeds for the test points in bicycle lanes. However, the data will not be compared against any criterion (comfort criterion, hazard criterion, or Lawson criterion).

Also included will be information provided that covers the important attributes of any wind tunnel test; boundary layer wind profile simulation, proximity model details, and wind tunnel size / wind speed details.

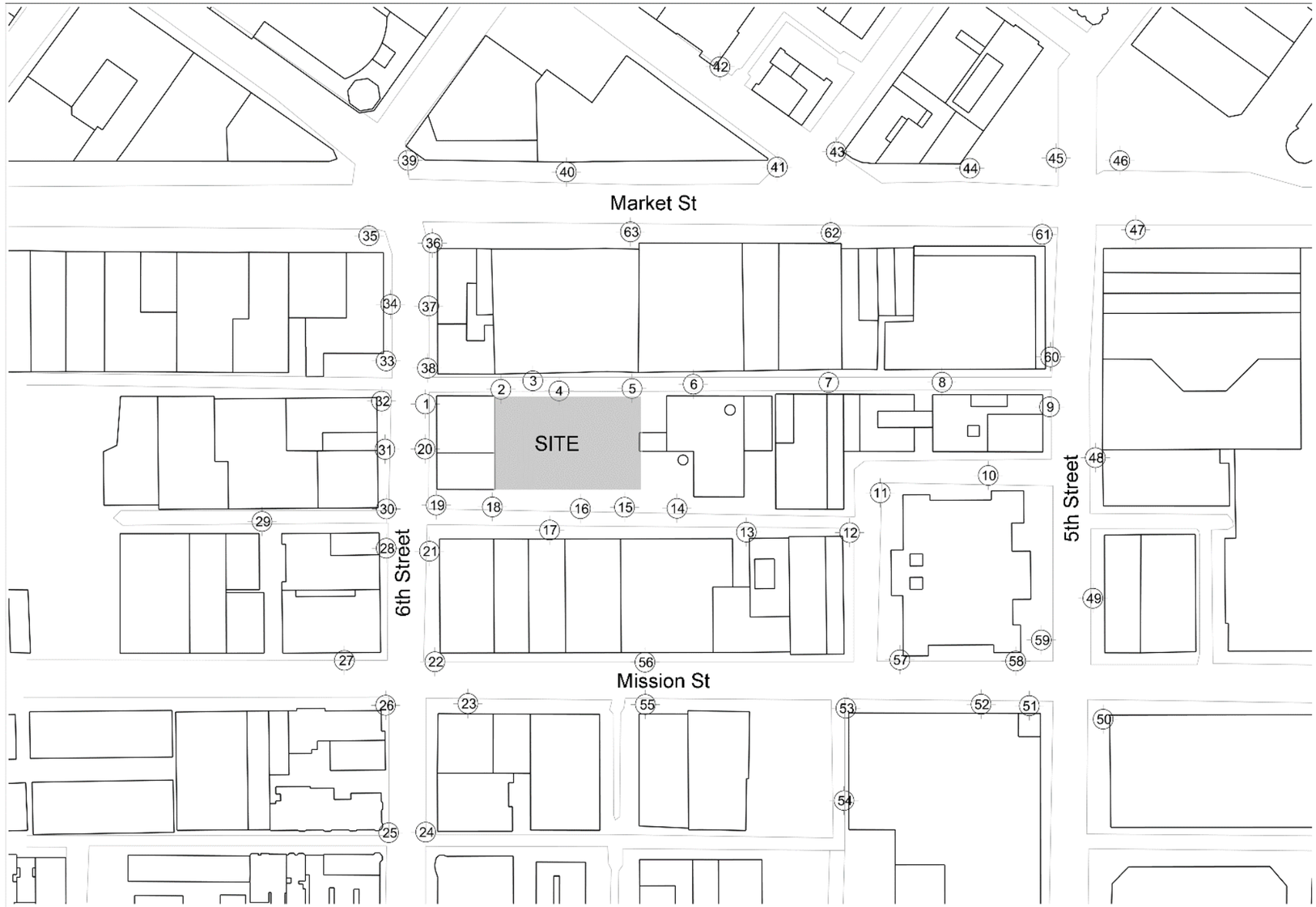


Figure C5: Map of the measurement locations on the sidewalks

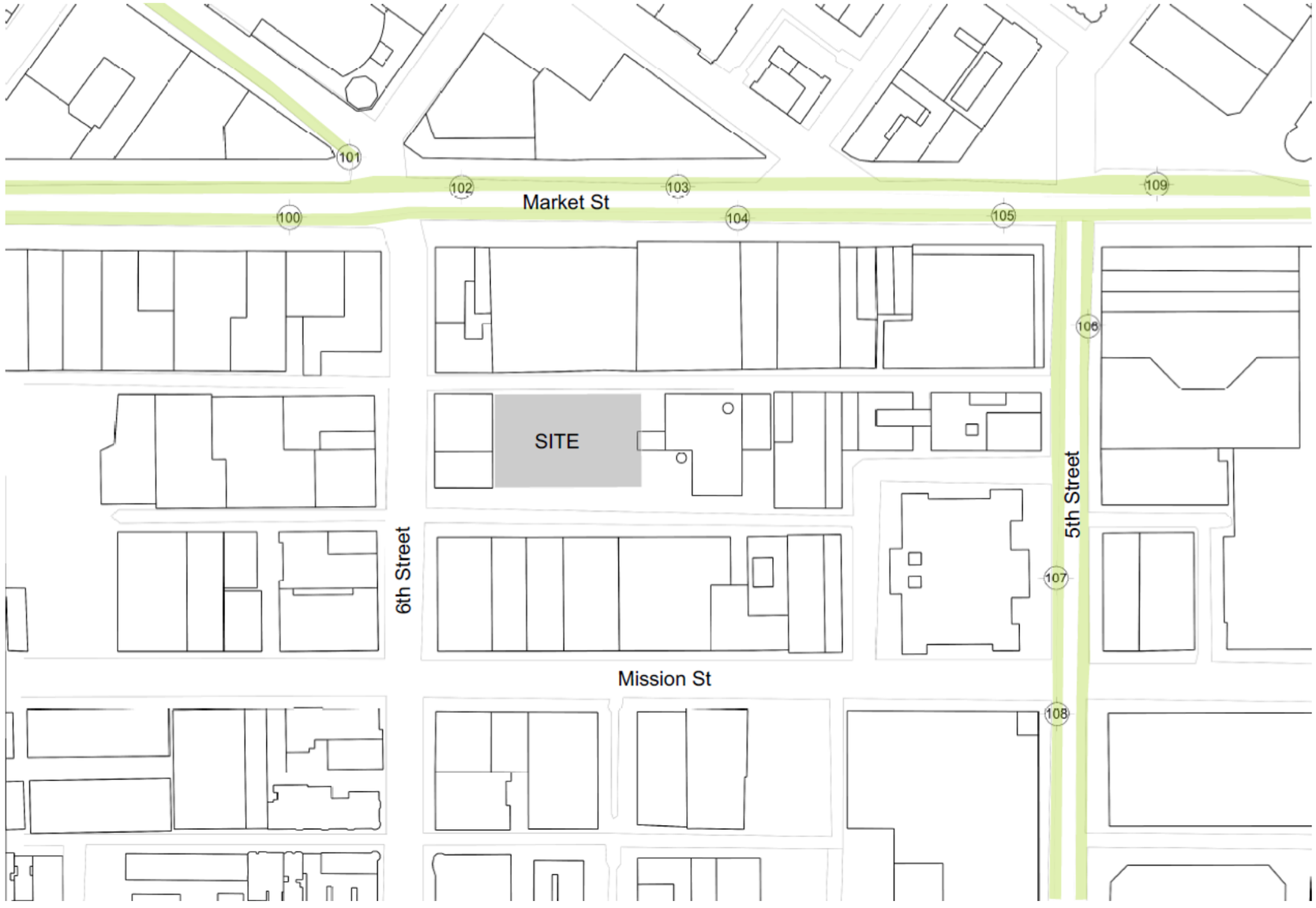


Figure C6: Map of the measurement locations on the bike lanes

Appendix D

Integration of Wind Reduction features in the Design of the Proposed Project

D1 Integration of Wind Reduction Features in the Design of the Proposed Project

The final design of the Proposed Project is the result of an iterative process that used a series of wind tunnel workshops and design reviews to reduce the impact of the Proposed Project on the wind conditions in publicly accessible areas around the development.

Figure D1 shows a comparison between the original and final design of the Proposed Project. In the original design, the tower was closer to the NRG Energy Center, about 18 feet away from the north-east side of the podium and 38 feet away from Stevenson Street. The two volumetric elements wrapped around the corners of the tower on Stevenson Street were about 45 feet tall. The design had no screens along Stevenson Street.

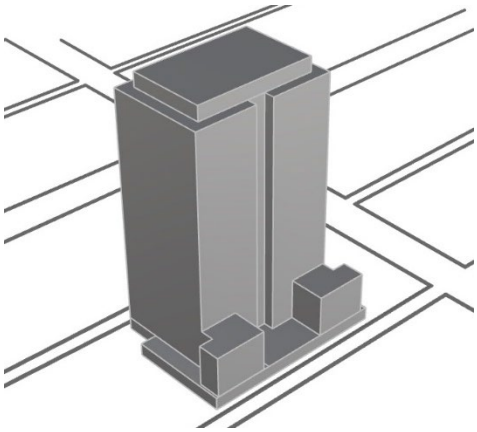
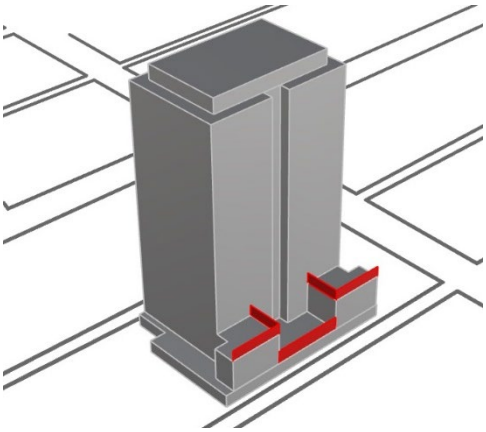
Original design	Final design
	

Figure D1: Comparison of the original and final design of the Proposed Project; view from the North

The impact of the original design of the Proposed Project on the wind conditions at pedestrian level was investigated for both existing and cumulative conditions. and the results are briefly summarized below.

Wind Comfort

The comfort wind speeds and percentage of time in exceedance of the pedestrian comfort criterion and the seating comfort criterion for the existing and cumulative conditions are listed in Table D1 and Table D2, respectively.

For the Existing conditions, the average wind speed for all test locations shown in Figure D2 is 12.4 mph. The highest wind speed in the immediate vicinity of the site is 18 mph at Locations #4 and #5 along Stevenson Street and Location #12 towards Mint Plaza. In these conditions, the wind exceeds the seating comfort criterion approximately 52-58% of the time and the pedestrian comfort criterion about 29-34% of the time.

For the Cumulative conditions, the average wind speed for all test locations shown in Figure D3 is 12.2 mph. The highest wind speed in the immediate vicinity of the site is 18 mph at Locations #4 and #5 along Stevenson Street. In these conditions, the wind exceeds the seating comfort criterion approximately 55-57% of the time and the comfort criterion about 30-33% of the time.

Wind Hazard

The hazard wind speeds and hours of exceedance for the existing and cumulative conditions are listed in Table D3 and Table D4 respectively and summarized below.

For the Existing conditions, the hazard criterion is exceeded at Location #4 (39 mph, 3 hours/year) on Stevenson Street and at Location #12 (40 mph, 5 hours/year) on Jessie Street towards Mint Plaza.

For the Cumulative conditions, the hazard criterion is exceeded at Location #4 (37 mph, 1 hour/year) on Stevenson Street and Location #12 (39 mph, 3 hours/year) on Jessie Street towards Mint Plaza.

Table D1: Wind comfort criteria for existing conditions with the original design of the Proposed Project.

Reference			Existing conditions Original design of the Proposed Project				
Location Number	Comfort criterion for seating areas (mph)	Comfort criterion for pedestrian areas (mph)	Wind Speed exceeded 10% of time (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)	
1	7	11	13	46	e	18	e
2	7	11	15	42	e	19	e
3	7	11	12	37	e	12	e
4	7	11	18	57	e	33	e
5	7	11	18	58	e	34	e
6	7	11	17	52	e	30	e
7	7	11	12	40	e	13	e
8	7	11	10	26	e	4	
9	7	11	11	33	e	8	
10	7	11	7	7		1	
11	7	11	11	31	e	7	
12	7	11	18	52	e	29	e
13	7	11	15	53	e	25	e
14	7	11	15	57	e	27	e
15	7	11	14	54	e	22	e
16	7	11	13	48	e	19	e
17	7	11	17	59	e	35	e
18	7	11	13	48	e	19	e
19	7	11	14	51	e	23	e
20	7	11	14	47	e	20	e
21	7	11	13	44	e	15	e
22	7	11	13	41	e	18	e
23	7	11	10	29	e	5	
24	7	11	10	31	e	6	
25	7	11	9	25	e	4	
26	7	11	14	42	e	20	e
27	7	11	9	16	e	3	
28	7	11	12	39	e	11	e
29	7	11	11	31	e	8	
30	7	11	12	41	e	13	e
31	7	11	11	38	e	9	
32	7	11	10	33	e	6	
33	7	11	11	35	e	9	
34	7	11	9	22	e	3	
35	7	11	11	27	e	7	
36	7	11	12	42	e	12	e
37	7	11	10	25	e	3	
38	7	11	11	31	e	9	
39	7	11	11	31	e	6	
40	7	11	16	55	e	30	e

Reference			Existing conditions Original design of the Proposed Project				
Location Number	Comfort criterion for seating areas (mph)	Comfort criterion for pedestrian areas (mph)	Wind Speed exceeded 10% of time (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)	
41	7	11	9	18	e	2	
42	7	11	12	40	e	14	e
43	7	11	15	50	e	24	e
44	7	11	14	45	e	18	e
45	7	11	14	47	e	19	e
46	7	11	13	46	e	19	e
47	7	11	12	42	e	14	e
48	7	11	13	42	e	18	e
49	7	11	12	35	e	10	e
50	7	11	12	45	e	14	e
51	7	11	11	31	e	9	
52	7	11	11	29	e	7	
53	7	11	12	34	e	11	e
54	7	11	13	46	e	17	e
55	7	11	15	49	e	23	e
56	7	11	11	36	e	8	
57	7	11	12	38	e	12	e
58	7	11	10	25	e	4	
59	7	11	9	20	e	2	
60	7	11	12	44	e	14	e
61	7	11	12	33	e	12	e
62	7	11	11	37	e	8	
63	7	11	13	46	e	17	e
			Mean	**Mean**	**Sum**	**Mean**	**Sum**
			12.4	**39.0**	**62**	**14.1**	**39**

Table D2: Wind comfort criteria for cumulative (future) conditions with the original design of the Proposed Project.

Reference			Cumulative (future) conditions Original design of the Proposed Project				
Location Number	Comfort criterion for seating areas (mph)	Comfort criterion for pedestrian areas (mph)	Wind Speed exceeded 10% of time (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)	
1	7	11	12	42	e	14	e
2	7	11	15	43	e	20	e
3	7	11	12	38	e	12	e
4	7	11	18	55	e	30	e
5	7	11	18	57	e	33	e
6	7	11	16	51	e	28	e
7	7	11	12	39	e	12	e
8	7	11	10	24	e	4	
9	7	11	11	32	e	7	
10	7	11	7	7		1	
11	7	11	11	31	e	9	
12	7	11	17	50	e	26	e
13	7	11	15	53	e	25	e
14	7	11	15	57	e	27	e
15	7	11	14	54	e	22	e
16	7	11	14	48	e	19	e
17	7	11	17	59	e	34	e
18	7	11	13	45	e	15	e
19	7	11	13	45	e	16	e
20	7	11	12	40	e	14	e
21	7	11	12	39	e	10	e
22	7	11	14	41	e	18	e
23	7	11	12	40	e	13	e
24	7	11	11	32	e	6	
25	7	11	9	24	e	4	
26	7	11	15	42	e	22	e
27	7	11	8	16	e	3	
28	7	11	11	34	e	8	
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30	7	11	12	38	e	11	e
31	7	11	11	33	e	7	
32	7	11	10	30	e	4	
33	7	11	10	31	e	6	
34	7	11	9	19	e	2	
35	7	11	10	22	e	5	
36	7	11	11	38	e	9	

Reference			Cumulative (future) conditions Original design of the Proposed Project				
Location Number	Comfort criterion for seating areas (mph)	Comfort criterion for pedestrian areas (mph)	Wind Speed exceeded 10% of time (mph)	Percentage of time wind speed exceeds comfort criterion for seating areas ("e" = exceeds)		Percentage of time wind speed exceeds comfort criterion for pedestrian areas ("e" = exceeds)	
37	7	11	10	25	e	4	
38	7	11	9	23	e	4	
39	7	11	11	36	e	10	
40	7	11	14	49	e	21	e
41	7	11	8	15	e	2	
42	7	11	12	40	e	13	e
43	7	11	15	49	e	24	e
44	7	11	14	46	e	19	e
45	7	11	14	46	e	19	e
46	7	11	14	47	e	20	e
47	7	11	12	42	e	14	e
48	7	11	13	42	e	18	e
49	7	11	11	34	e	9	
50	7	11	12	44	e	13	e
51	7	11	11	30	e	8	
52	7	11	11	29	e	7	
53	7	11	12	34	e	11	e
54	7	11	15	49	e	22	e
55	7	11	15	49	e	23	e
56	7	11	11	35	e	7	
57	7	11	12	37	e	12	e
58	7	11	10	25	e	4	
59	7	11	9	18	e	2	
60	7	11	13	44	e	15	e
61	7	11	12	33	e	11	e
62	7	11	11	34	e	7	
63	7	11	12	41	e	12	e

Mean	Mean	Sum	Mean	Sum
12.2	**37.7**	**62**	**13.2**	**37**

Table D3: Wind hazard criteria for existing conditions with the original design of the Proposed Project

Reference		**Existing conditions Original design of the Proposed Project**			
Location Number	Hazard Criterion (mph)	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria ("e" = exceeds)		Hours Change Relative to Existing
1	36	22	0		0
2	36	32	0		0
3	36	24	0		0
4	36	39	3	e	3
5	36	36	0		0
6	36	33	0		0
7	36	24	0		0
8	36	21	0		0
9	36	19	0		0
10	36	18	0		0
11	36	20	0		0
12	36	40	5	e	5
13	36	28	0		0
14	36	30	0		0
15	36	29	0		0
16	36	25	0		0
17	36	30	0		0
18	36	23	0		0
19	36	24	0		0
20	36	25	0		0
21	36	21	0		0
22	36	23	0		0
23	36	19	0		0
24	36	18	0		0
25	36	20	0		0
26	36	29	0		0
27	36	18	0		0
28	36	24	0		0
29	36	21	0		0
30	36	24	0		0
31	36	20	0		0
32	36	18	0		0
33	36	20	0		0
34	36	26	0		0
35	36	22	0		0
36	36	24	0		0
37	36	18	0		0
38	36	21	0		0
39	36	20	0		0
40	36	28	0		0

Reference		Existing conditions Original design of the Proposed Project			
Location Number	Hazard Criterion (mph)	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria ("e" = exceeds)		Hours Change Relative to Existing
41	36	21	0		0
42	36	23	0		0
43	36	27	0		0
44	36	32	0		0
45	36	26	0		0
46	36	24	0		0
47	36	26	0		0
48	36	23	0		0
49	36	22	0		0
50	36	26	0		0
51	36	22	0		0
52	36	21	0		0
53	36	31	0		0
54	36	34	0		0
55	36	27	0		0
56	36	24	0		0
57	36	24	0		0
58	36	27	0		0
59	36	21	0		0
60	36	23	0		0
61	36	26	0		0
62	36	20	0		0
63	36	22	0		0
		Mean	**Sum**	**Sum**	**Sum**
		24.6	**8**	**2**	**8**

Table D4: Wind hazard criteria for cumulative (future) conditions with the original design of the Proposed Project

Reference		Cumulative (future) conditions Original design of the Proposed Project			
Location Number	Hazard Criterion (mph)	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria ("e" = exceeds)		Hours Change Relative to Existing
1	36	21	0		0
2	36	32	0		0
3	36	24	0		0
4	36	37	1	e	1
5	36	35	0		0
6	36	32	0		0
7	36	25	0		0
8	36	21	0		0
9	36	19	0		0
10	36	18	0		0
11	36	21	0		0
12	36	39	3	e	3
13	36	28	0		0
14	36	30	0		0
15	36	31	0		0
16	36	25	0		0
17	36	30	0		0
18	36	22	0		0
19	36	23	0		0
20	36	24	0		0
21	36	20	0		0
22	36	23	0		0
23	36	21	0		0
24	36	18	0		0
25	36	20	0		0
26	36	31	0		0
27	36	18	0		0
28	36	23	0		0
29	36	20	0		0
30	36	24	0		0
31	36	20	0		0
32	36	19	0		0
33	36	19	0		0
34	36	26	0		0
35	36	20	0		0
36	36	25	0		0
37	36	19	0		0
38	36	19	0		0

Reference		Cumulative (future) conditions Original design of the Proposed Project		
Location Number	Hazard Criterion (mph)	Wind Speed Exceeded 1 Hour per Year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria ("e" = exceeds)	Hours Change Relative to Existing
39	36	20	0	0
40	36	24	0	0
41	36	21	0	0
42	36	23	0	0
43	36	27	0	0
44	36	33	0	0
45	36	27	0	0
46	36	24	0	0
47	36	26	0	0
48	36	23	0	0
49	36	21	0	0
50	36	26	0	0
51	36	21	0	0
52	36	21	0	0
53	36	31	0	0
54	36	34	0	0
55	36	28	0	0
56	36	23	0	0
57	36	25	0	0
58	36	27	0	0
59	36	21	0	0
60	36	24	0	0
61	36	26	0	0
62	36	21	0	0
63	36	21	0	0

Mean	Sum	Sum	Sum
24.4	**4**	**2**	**4**

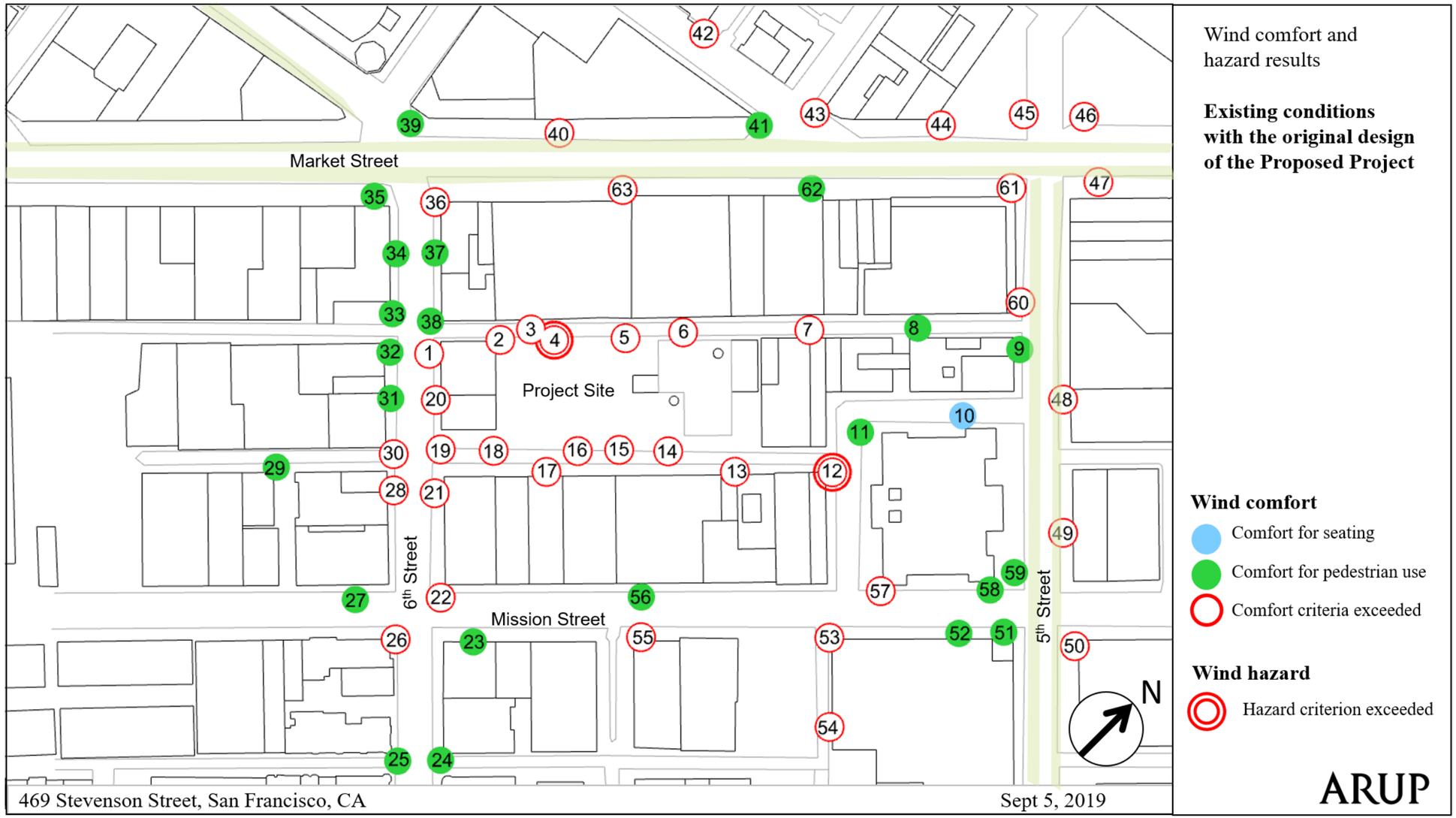

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Figure D2: Existing conditions with the original design of the Proposed Project – Pedestrian wind comfort and hazard conditions

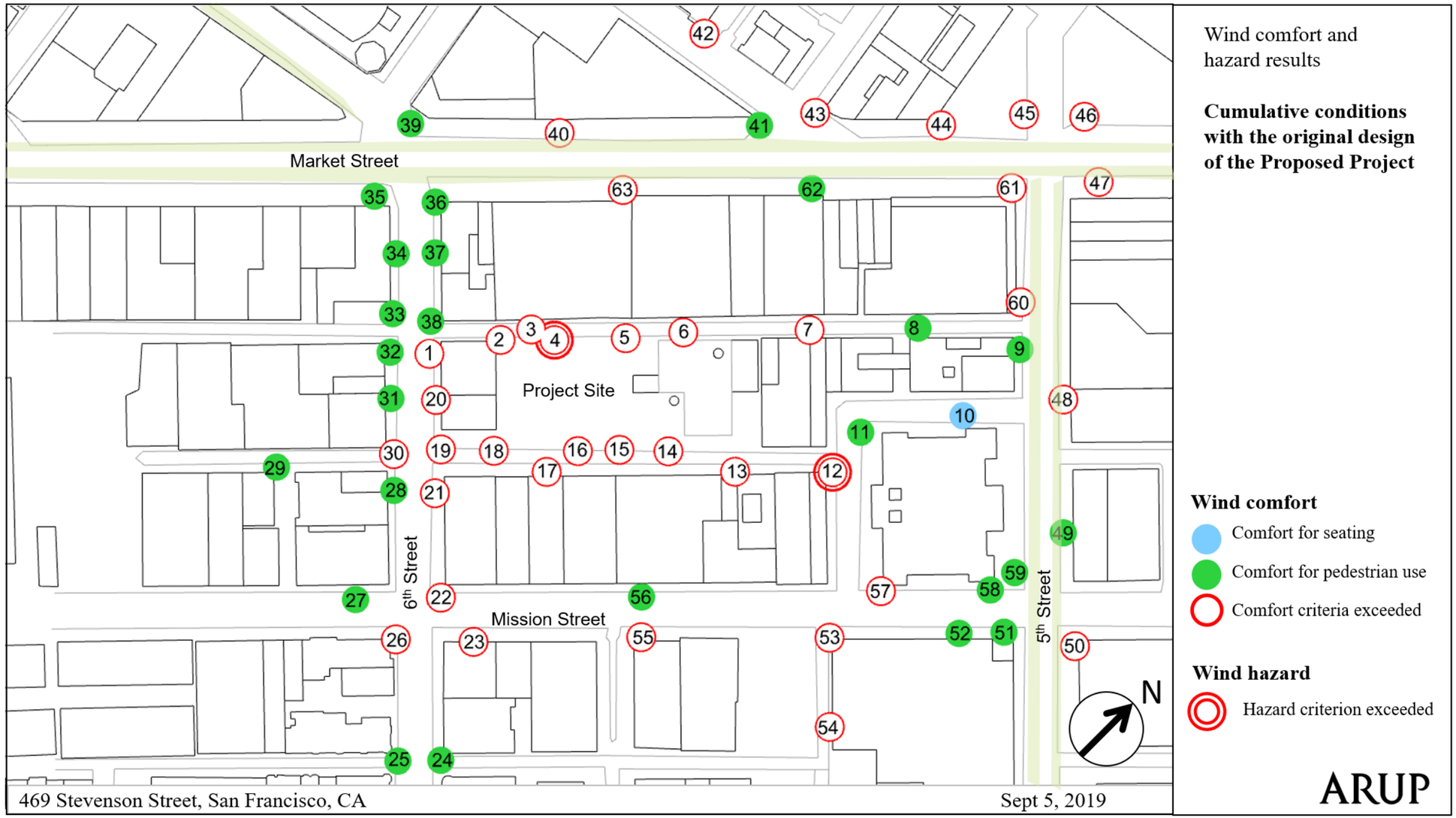

Figure D3: Cumulative (future) conditions with the original design of the Proposed Project – Pedestrian wind comfort and hazard conditions

APPENDIX D SHADOW ANALYSIS REPORT FOR THE PROPOSED 469 STEVENSON STREET PROJECT

PREVISION DESIGN

MARCH 5, 2020
FINAL

SHADOW ANALYSIS REPORT FOR THE PROPOSED 469 STEVENSON STREET PROJECT PER SAN FRANCISCO PLANNING STANDARDS

FROM:
ADAM PHILLIPS
PRINCIPAL
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I. INTRODUCTION AND OVERVIEW

This report details the results of an analysis conducted by Prevision Design to identify the shadow effects that could be caused by the proposed construction of a 274-ft tall (plus 10-ft mechanical penthouse) mixed use project at 469 Stevenson Street ("the project") on United Nations Plaza ("UN Plaza") and Mint Plaza, which are publicly accessible open spaces subject to review for possible environmental impacts under the California Environmental Quality Act (CEQA). This report also includes an analysis of the project alternatives being studied in an environmental impact report for the project.

The analysis was conducted according to criteria and methodology as described in (1) the February 3, 1989 memorandum titled "Proposition K – The Sunlight Ordinance" ("the 1989 memorandum") prepared by the San Francisco Recreation and Parks Department ("RPD") and the San Francisco Planning Department ("Planning"), (2) the July 2014 memorandum titled "Shadow Analysis Procedures and Scope Requirements" ("the 2014 memorandum") prepared by Planning, and (3) direction from current Planning and RPD staff regarding the appropriate approach, deliverables, and scope of analysis appropriate in consideration of the open spaces affected.

This report includes the results and discussion of all criteria factored into the analysis, including discussion of the analysis approach and methodology, a description and depictions of the project as proposed, description of the affected publicly-accessible open spaces, and the results of the study, including both quantitative and qualitative reporting of net new shadow generated by the project, graphical simulations of the location and extent of the project's net new shadow.

This report does not present opinions nor conclusions on the part of Prevision Design about whether the shadow from the proposed project could or should be considered significant/insignificant or acceptable/unacceptable. These determinations shall be made by the San Francisco Planning Commission with input and recommendations from Planning Staff. ■

II. REGULATORY FRAMEWORK AND SIGNIFICANCE CRITERIA

While there are no specific federal nor state regulations which deal with solar access or shadow effects on publicly accessible open spaces, San Francisco has established several provisions, policies, and procedures that provide the framework by which shadow cast by proposed projects is evaluated.

San Francisco General Plan

The Recreation and Open Space Element of the City of San Francisco General Plan (2014) includes Policy 1.9 applicable to potential solar access or shading impacts of new development on public open spaces, partially excerpted below:

> *Solar access to public open space should be protected. In San Francisco, presence of the sun's warming rays is essential to enjoying open space. Climatic factors, including ambient temperature, humidity, and wind, generally combine to create a comfortable climate only when direct sunlight is present. Therefore, the shadows created by new development nearby can critically diminish the utility and comfort of the open space.*
>
> *Shadows are particularly a problem in downtown districts and in neighborhoods immediately adjacent to the downtown core, where there is a limited amount of open space, where there is pressure for new development, and where zoning controls allow tall buildings. But the problem potentially exists wherever tall buildings near open space are permitted.*
>
> *…The City should support more specific protections elsewhere to maintain sunlight in these spaces during the hours of their most intensive use while balancing this with the need for new development to accommodate a growing population in the City*

The 469 Stevenson Street project would be subject to evaluation of potential shadow effects on public spaces under the General Plan.

San Francisco Planning Code

Planning Code Section 295, adopted in 1984 pursuant to voter approval of Proposition K (The Sunlight Ordinance), prohibits the issuance of building permits for structures over 40 feet in height that would cast net new shadow on property under the jurisdiction of, or designated to be acquired by, the Recreation and Park Commission between one hour after sunrise to one hour before sunset at any time of year, unless the Planning Commission determines that the net new shadow (1) would not have an adverse impact

on the use of the property or (2) the impact would not be significant. Planning Code Section 295 provides that:

> *The City Planning Commission shall conduct a hearing and shall disapprove the issuance of any building permit governed by the provisions of this Section if it finds that the proposed project will have any adverse impact on the use of the property under the jurisdiction of, or designated for acquisition by, the Recreation and Park Commission because of the shading or shadowing that it will cause, unless it is determined that the impact would be insignificant. The City Planning Commission shall not make the determination required by the provisions of this Subsection until the general manager of the Recreation and Park Department in consultation with the Recreation and Park Commission has had an opportunity to review and comment to the City Planning Commission upon the proposed project.*

Net new shadow cast by the 469 Stevenson Street project would not affect any open space under the jurisdiction of, or designated for acquisition by, the Recreation and Park Commission, so these specific provisions do not apply.

Other Local Regulations

Planning Code Sections 146 and 147, both added in 1985, establish additional design guidelines for buildings in C-3 Downtown Commercial, South of Market Mixed Use, and Eastern Neighborhoods Mixed Use Districts for the purpose of limiting shadow on public sidewalks, public plazas, and other publicly accessible spaces other than those protected under Section 295.

The 469 Stevenson Project is not located in an area subject to Section 146 regulations, however the project would be subject to the provisions of Section 147. Accordingly, the project will be required to comply with Section 147 through the Section 309 process to establish that the project has been shaped, consistent with the dictates of good design and without unduly restricting the development potential of the site in question, to reduce substantial shadow impacts on public plazas and other publicly accessible spaces.

Environmental Impacts under CEQA

It is generally considered that implementation of a project would have significant impacts under CEQA if that project were to create net new shadow in a manner that substantially and adversely affects the use and enjoyment of existing publicly accessible open space. ■

III. ANALYSIS METHODOLOGY

Technical Standards

The technical standards for evaluation of shadow effects follow the criteria adopted by the Recreation and Parks Commission and the Planning Commission in 1987 and 1989, as stated below:

> *Shadow is quantitatively measured by multiplying the area of the shadow by the amount of time the shadow is present on the open space, in units called square foot-hours (sfh). Determining the annual net new shadow load generated by a project begins with a calculation of the number of square foot-hours that would theoretically fall on a qualifying publicly accessible open space each day from an hour after sunrise to an hour before sunset summed over the course of a year, ignoring all shadow from any source. This total is referred to as the Theoretical Annual Available Sunlight (TAAS) for that park. The second step is the calculation of the baseline (or current) shading conditions, which factors in the square foot-hours of shadow cast by existing buildings and other structures on the open space. Lastly, the shadow effects of the project are calculated, with the difference between the baseline shadow condition and project shadow condition considered being net new project shadow. The amount of shadow is defined as the shadow in square foot-hours cast by the project divided by the TAAS, expressed as a percentage.*
>
> *Further, in addition to quantitative criteria, the adopted criteria set forth qualitative criteria for evaluation of shadow. Those criteria for assessing net new shadow are based on existing shadow profiles* [graphics]*, important times of day, important seasons in the year, location of the net new shadow, size, and duration of net new shadows and the public good served by buildings casting net new shadow.*

As there are no broadly established or accepted methodologies for technical evaluation of shadow effects under the San Francisco General Plan or CEQA, for review of shadow effects on open spaces not subject to Section 295, the Planning Department typically adapts many of the Section 295 technical standards for use on projects not subject to Section 295 review. For this analysis, the Planning Department has directed Prevision Design to use many of the standards for review of shadow under Section 295, as further described in Section IV.

3D Modeling Assumptions

For the purposes of this analysis, Prevision Design has built a 3D computer model reflecting representation of the local San Francisco urban building context and landform surrounding the project generated by Light Intensity Distance and Ranging [or Laser Imaging Detection and Ranging] (LIDAR). This model is reflective of actual building massing and articulation circa 2010, so for new buildings built[1] after that date, Prevision Design has generated individual building models using available architectural plans and records. Prevision Design also obtained or generated 3D models of reasonably foreseeable future projects[2] that would have the potential to generate additional net new shadow on the same publicly accessible open spaces that were shown to be affected by the project and project alternatives (cumulative condition projects).

Precise locations, boundaries, and sizes of the affected open spaces are input using GIS data provided by the Planning Department.

The model for the proposed project was provided to Prevision Design by the project architect on July 15, 2019 and is consistent with project plans dated November 27, 2019. The models for the proposed project alternatives were provided to Prevision Designs by the project architect on January 8th, 2020. ■

1 The final form of buildings currently under construction are included as if they are complete for the purposes of this study.

2 Qualifying cumulative projects are those that are currently in some stage of the planning or permitting process but have not yet been approved or have been approved but are not yet under construction.

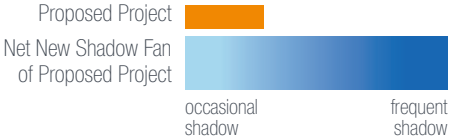


FIGURE 1: Net New Shadow Fan and Affected Open Spaces

IV. SCOPE OF WORK AND ANALYSIS PERFORMED

Initial Scoping Study

In order to establish the scope of review and approach to analysis and deliverables, Prevision Design followed guidelines as encoded in the 1989 and 2014 memorandums, as modified for project-specific considerations via input and direction from Planning and RPD staff.

To determine the area and features that would be affected by net new project shadow generated by the project, Prevision Design used the 3D computer context model to generate a full-year shadow fan diagram, which depicts all areas which would receive net *new* shadow (factoring in the presence of current and intervening shadow from existing buildings) between one hour after sunrise through one hour before sunset ("the daily analysis period") throughout the year. This diagram showing the extent of annual net new shadow was submitted to the Planning Department August 22, 2019 and

approved on August 23, 2019. The shadow fan identified that UN Plaza and Mint Plaza would receive net new shadow from the project, as shown by Figure 1 (previous page).

Based on the number and type of publicly accessible open spaces affected by the project, Prevision Design generated a draft the scope of work and analysis methodology, which was submitted to Planning for review on August 23, 2019 and was approved with modifications on September 12, 2019. The approved scope of work for this analysis is discussed below. Prevision Design additionally generated a list of qualifying cumulative projects for Planning review on September 16, 2019 which was approved with modifications on September 26, 2019 and is listed below as Table 1.

CUMULATIVE PROJECT ADDRESS	PROJECT HEIGHT	DATE OF DESIGN DATA
1125 Market St. (Case 2013.0511)	119'-3"+22' parapet	5/14/2019
1055 Market St. (Case 2014.0408)	94'+12' parapet	10/25/2017
475 Minna St. (Case 2018-016055)	173'-6"+12' parapet	5/24/2019
57 Taylor St. (Case 2015-007525)	118'+10' parapet	7/15/2016
921 Howard St. (Case 2017-000275)	180'+10' parapet	11/18/2016
996 Mission St. (Case 2015-015253)	85'+10'-8.25' parapet	12/18/2015
30 Van Ness Ave. (Case 2017-008051)	520'+20' parapet	9/20/2018
10 South Van Ness Ave. (Case 2015-004568)	400'+20' parapet	3/1/2017
95 Hawthorne St. (Case 2016--001794PRJ)	320'+38' parapet	9/26/2016
101 Hyde St. (Case 2012.0086)	80'	1/25/2012

TABLE 1: Cumulative Project List

Quantitative Calculations

Using the 3D project and urban context model developed as part of the scoping study, Prevision Design performed snapshot shadow measurements at 15-minute intervals within the daily analysis period, repeating these daily measurements every seven days between the Summer Solstice (June 21) and Winter Solstice (December 20), with interim times and dates extrapolated to approximate shadow conditions on other days and times. This half-year period (between the Summer and Winter Solstices) is referred to by Planning as a "solar year." As the path of the sun is roughly mirrored over the second half of the year (December 21 through June 20), analysis of this half-year period allows for a reasonable extrapolation to arrive at a full-year estimated calculation of the

areas and durations of existing (baseline) shadow that currently falls on the affected open spaces.

In addition to the quantitative analysis of existing shadow conditions, calculations were generated to reflect the addition of the project, with the difference between the existing conditions and those with the project representing the net new shadow effect.

Lastly, 3D models of cumulative projects were added to the model in order to generate the baseline + project + cumulative scenario, depicting the reasonably foreseeable combined shadow effect of all projects in the current development pipeline.

Full annual quantitative data findings for UN Plaza are included as Exhibit H, and as Exhibit J for Mint Plaza.

Shadow Profile Graphics

To provide a spatial and contextual understanding of the location, size, and features affected by net new shadow, Prevision Design prepared the following shadow profile graphics:

- **Sweep Shadow diagrams.** Graphics showing "snapshot" shadow profiles at hourly intervals over the entire area affected by the project as well as cumulative condition projects. Graphics differentiate between existing shadow, net new project shadow, and cumulative condition shadow within the daily analysis period on the Summer Solstice (June 21), the approximate equinoxes (March 22/September 20), and the Winter Solstice (December 20). These graphics appear as Exhibits B, C and D.

- **Detail Shadow diagrams.** Additional graphics are produced showing existing, project and cumulative shadow profiles at each affected open space at hourly intervals within the daily analysis period on the date with the greatest quantitative net new project shadow as well as greatest net new cumulative condition shadow (if different). At times when the project is (or cumulative projects are) casting net new shadow on an open space, additional graphics are provided at 15-minute intervals. These graphics appear as Exhibits E, F & G.

Qualitative Analysis

To gain an understanding of how net new shadow may affect existing patterns of use, Prevision Design conducted six 30-minute site visits to each open space to observe the nature and intensity of uses. Two site visits were performed in the morning, two at midday, and two late in the day, with one visit from each pair on a weekday and one on a weekend.

The qualitative effects of net new shadow on the affected open spaces are discussed based on the size, timing, and duration of net new shadow and how such shadow might potentially affect observed existing patterns of use.

Project Alternative Analyses

Two project alternatives were additionally analyzed as part of this study:
(1) a Reduced Density alternative (Alternative B), and
(2) a No Residential Parking, Tower Only alternative (Alternative C).

The approach to analysis, including the list of cumulative projects, is the same for the project alternatives as it is for the proposed project.

A description of these alternatives is included in Section V and a discussion of the effects of shadow cast by these project alternatives is included in Section IX. Full annual quantitative data findings for the shadow effects on UN Plaza of these two project alternatives is included as Exhibit K, and quantitative data findings for Mint Plaza is included as Exhibit L. ■

469 Stevenson Street

Parks and Open Spaces (Jurisdiction)

1. UN Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)
7. Yerba Buena Gardens (OCII)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

FIGURE 2: Vicinity Map

FIGURE 3: 469 Stevenson Street Project from Jesse Street

V. PROJECT DESCRIPTION

FIGURE 4: Stevenson Street View

Proposed Project

The proposed project would be located on an approximately 28,790-square-foot (sf) mid-block lot in the South of Market (SoMa) neighborhood of San Francisco on Assessor's Block 3704 / Lot 045. The lot is located on the block bounded by Stevenson Street to the north, Jesse Street to the south, Fifth Street to the east, and Sixth Street to the west (the "Property"). The project site is located within the C-3-G (Downtown General Commercial) zoning district the 160-F height & bulk district, and the Downtown Plan area. Figure 2 shows the location of the proposed project and the surrounding context, including the locations of cumulative projects and parks and open spaces. Figures 3 and 4 show renderings of the project. Figure 5 shows the proposed project site plan, and Figures 6 and 7 show proposed building elevations.

The area surrounding the proposed project site is generally comprised of mixed-use buildings including commercial, residential and industrial uses between 1 and 7 stories tall, as well as surface parking areas. The existing site is level, largely paved and surrounded by a chain link fence. The property is currently used as a surface parking lot.

The project sponsor proposes an approximately 534,726 gross-square-foot (gsf) mixed-use project with approximately 495 dwelling units over 3,985 square feet of ground-floor commercial space and three basement levels with vehicular and bicycle parking. The building would be approximately 274 feet tall with an additional 10 feet for the rooftop mechanical parapet.

The project sponsor is 469 Stevenson Owner, LLC and the project architects are Solomon Cordwell Buenz.

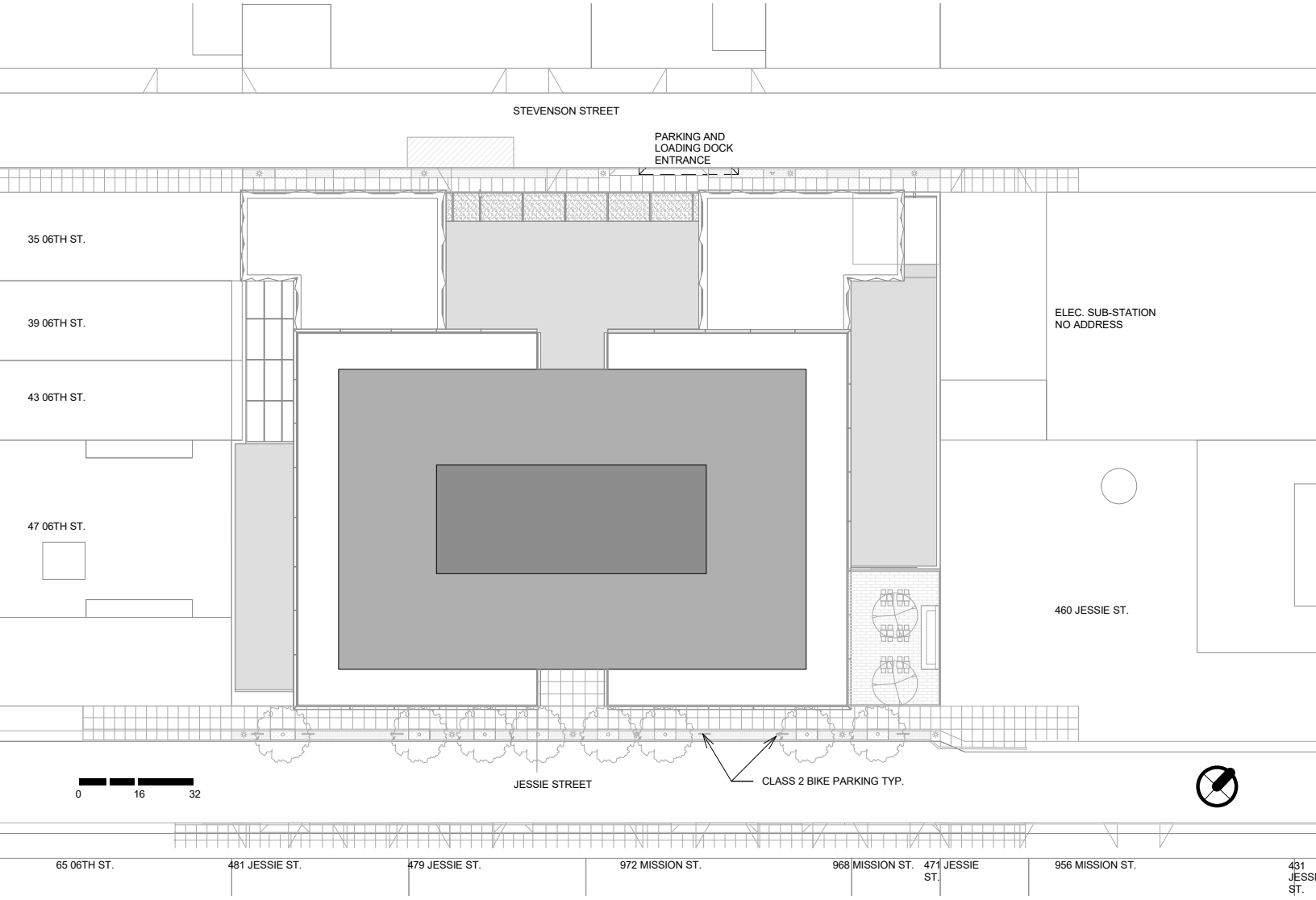


FIGURE 5: Proposed Site Plan

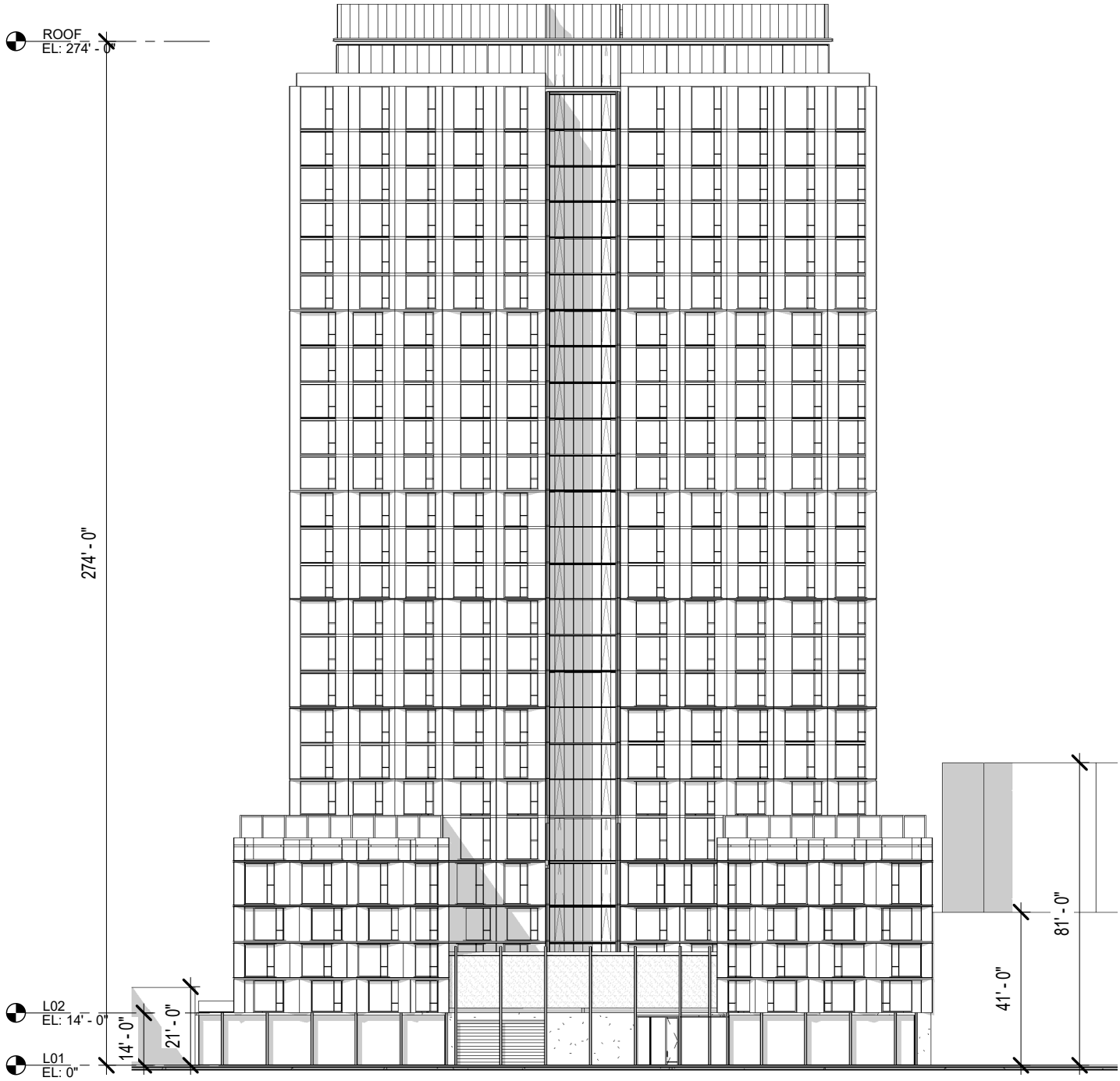


FIGURE 6: Stevenson Street (North) Elevation

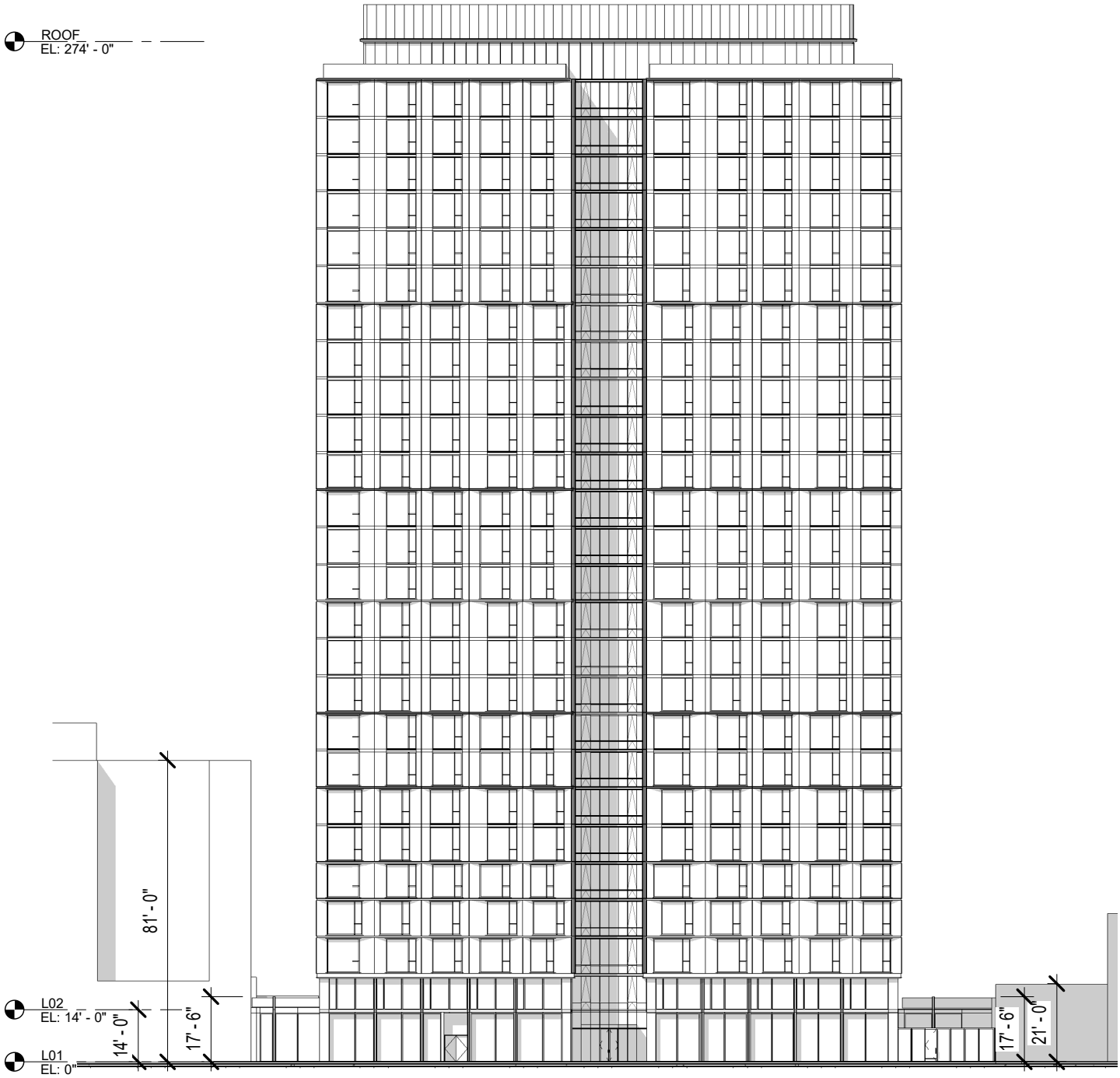


FIGURE 7: Jesse Street (South) Elevation

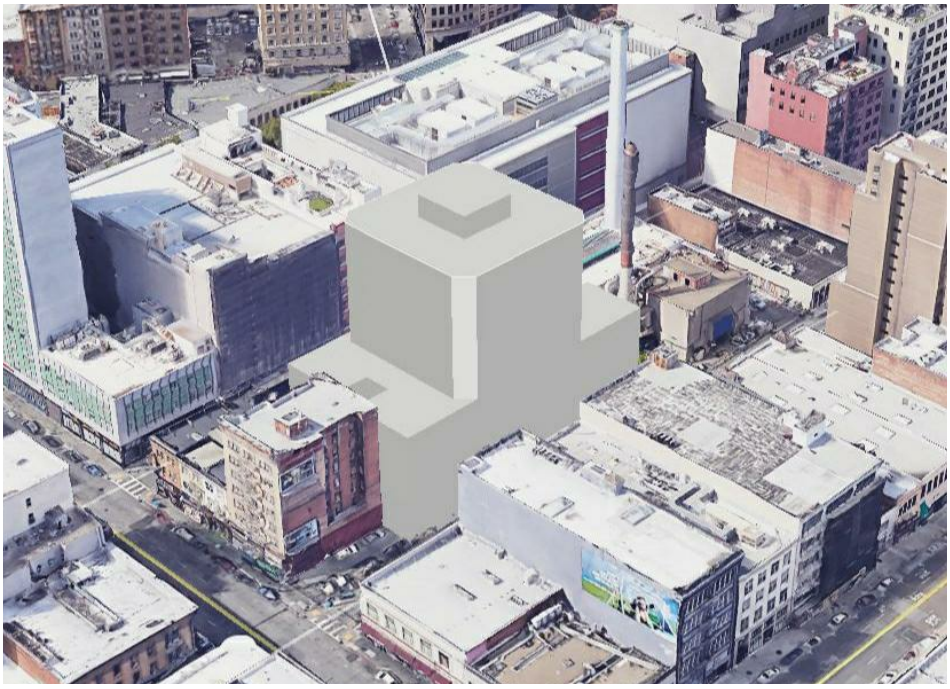


FIGURE 8: Reduced Density Project Alternative Massing

Reduced Density Project Alternative (Alternative B)

Prevision Design evaluated the shadow effects of a contemplated 160-foot tall (+10-foot mechanical parapet) project alternative. As shown by Figures 8 and 9, in addition to the 114-foot reduction in height relative to the proposed project, the massing of the project alternative also includes larger upper setbacks on the eastern and western sides as compared to the proposed project.

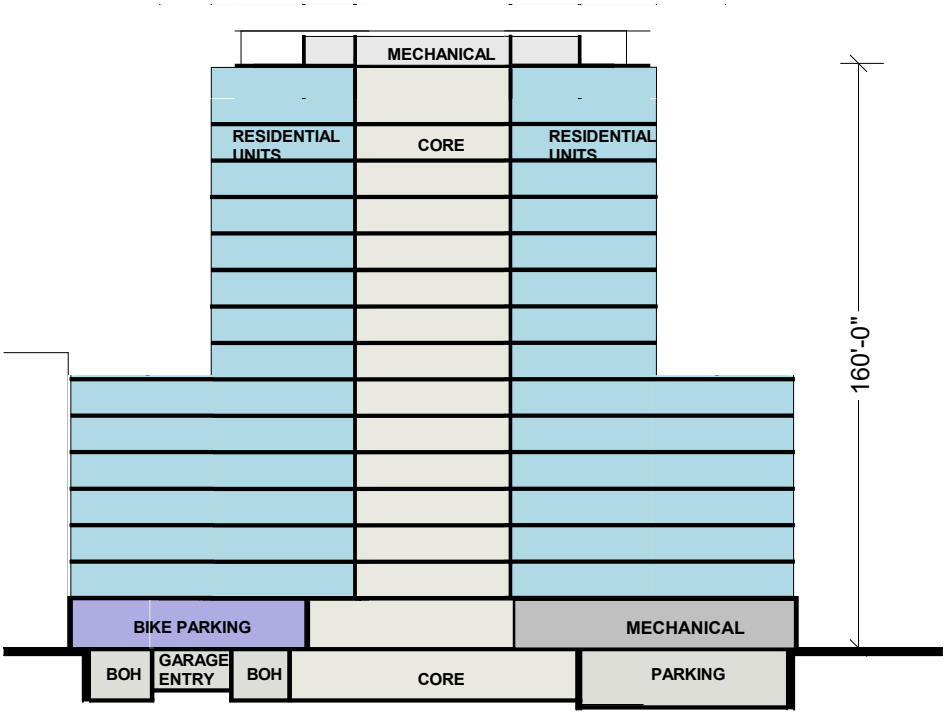


FIGURE 9: Reduced Density Project Alternative Section

FIGURE 10: No Residential Parking - Tower Only Project Alternative Massing

No Residential Parking, Tower Only Project Alternative (Alternative C)

Prevision Design also evaluated the shadow effects of a second contemplated 284-foot tall (+10-foot mechanical parapet) project alternative. As shown by Figures 10 and 11, this alternative provides a 10-foot addition in height relative to the proposed project but a similar overall building form. ■

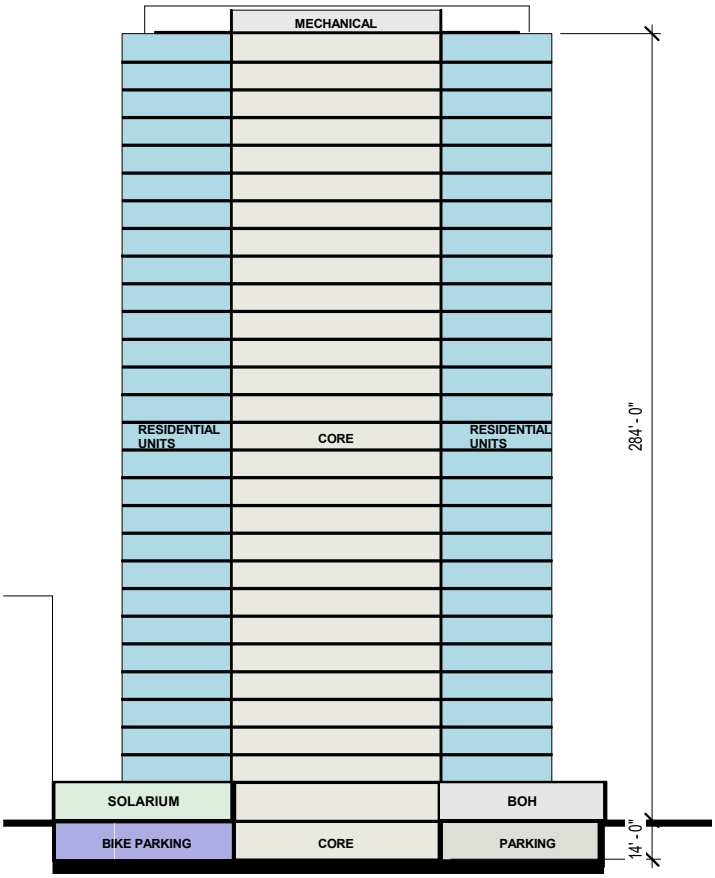


FIGURE 11: No Residential Parking - Tower Only Project Alternative Section

VI. AFFECTED PARKS AND OPEN SPACES

FIGURE 12: Pedestrian view from United Nations Plaza

United Nations Plaza

United Nations Plaza is a 2.35-acre (102,227-sf) urban plaza under the jurisdiction of San Francisco Public Works; the plaza is in the Downtown/Civic Center neighborhood of San Francisco. The plaza is bounded by McAllister Street to the north, Market Street to the south, Charles J. Brenham Place to the east, and Hyde Street to the west and the plaza fills the space between three groups of buildings on the northwest, southwest and northeast corners of the block (Assessor's Block 0351 / Lots 022, 033, 035, 037, 041, 043, 046, 049, 050, 051, and 052-113). The plaza is not fenced.

The plaza is irregularly shaped but has two principal axes: the east-west axis visually connects San Francisco City Hall (Figure 12) with Market Street while a shorter north-south axis connects Leavenworth Street to Market Street. The plaza consists of a

FIGURE 13: United Nations Plaza Plan

1. Public Entries
2. Landscape/Planter Areas
3. Water Feature
4. Hardscape Plaza
5. BART/MUNI entry
6. Equestrian Sculpture

wide brick-paved area which is punctuated by raised planting areas with mature trees the edges of which also serve as seating walls. On the western edge of the plaza near Hyde Street, there is a large bronze equestrian statue. Near the center of the plaza, there is a terraced area with a sculptural fountain. On the western corner of the plaza as well on the southern side are entrances to the underground Civic Center BART and Muni stations. There are 80 mature trees throughout the plaza. Figure 13 shows a plan diagram of United Nations Plaza.

FIGURE 14: Mint Plaza view from 5th Street

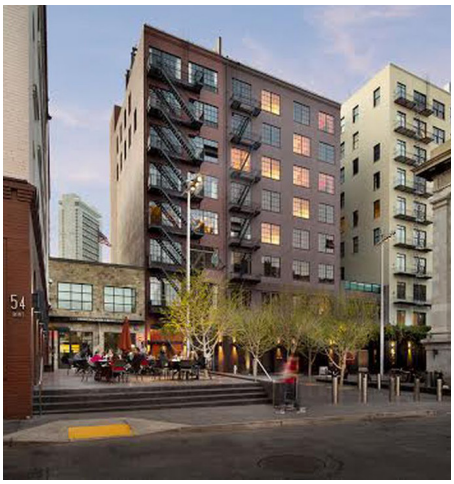


FIGURE 15: Jesse St. View

Mint Plaza

Mint Plaza is a 0.36-acre (15,496-sf) urban plaza owned by the City and County of San Francisco but is maintained and programmed by the Friends of Mint Plaza, a non-profit organization. The plaza is in the South of Market neighborhood of San Francisco. The L-shaped plaza is bounded by existing development (the former U.S. Mint, 2 Mint Plaza, 6 Mint Plaza, 10 Mint Plaza, and 14-54 Mint Plaza) to the north, south and west, with public entries on 5th Street along the eastern edge of the plaza and on Jesse Street at the south west portion of the plaza.

Completed in 2009, the plaza is comprised primarily of stone paving hardscape, along with fixed bench seating areas and landscape plantings, a vine trellis canopy running along the northern edge, and several areas for movable cafe seating serving several cafes and restaurants as well as mobile food vendors. The plaza also serves as a storm water collection area, with a large sub-grade water infiltration zone in the center of the plaza.

Figures 14 and 15 show images of Mint Plaza from the two street frontages, and Figure 16 (next page) shows a plan diagram of Mint Plaza.

FIGURE 16: Mint Plaza Plan

1. Public Entries
2. Landscape Planters/Seating Wall
3. Tree Wells (6 trees)
4. Vine Trellis Structure
5. Hardscape / Non-fixed Seating Areas
6. Cafe Seating

Other Open Spaces Not Affected by Project Shadow

The proposed project does not have the potential to affect any other public parks or privately-owned, publicly accessible open spaces, including several in the vicinity of the project site: Boedekker Park, Hallidie Plaza, the Westfield public roof terrace, the public Intercontinental roof terrace, or Yerba Buena Gardens. Net new project shadow would not affect these properties due to the distance and location of these spaces relative to the project site, the design of the proposed project, and/or due to shadow cast by existing intervening buildings. ■

VII. UN PLAZA ANALYSIS FINDINGS

Table 2 (next page) summarizes the existing condition data and quantitative shadow effects of the proposed project on UN Plaza, as detailed below. The full quantitative calculations for shadow conditions on UN Plaza on all 27 analysis dates referenced below are included as Exhibit H.

Existing Conditions Quantitative Analysis

UN Plaza's area is 2.35 acres (102,227 sf) and experiences 140,940,789 annual square-foot-hours (sfh) of shadow under current conditions. Based on a theoretical annual available sunlight (TAAS) of 380,427,255 sfh, UN Plaza's annual shadow load is 37.048%. The highest amount of shadow cast under current conditions occur in the early morning and late afternoon hours, with the midday hours being the least shaded. This pattern occurs year-round, however overall shading is greater over the winter months as compared to the summer.

Increase in Quantitative Shadow on UN Plaza from the Project

The proposed project would result in net new shadow falling on UN Plaza, adding approximately 9,693 net new annual sfh of shadow and increasing sfh of shadow by 0.003% above current levels, resulting in a new annual total shadow load of 37.051%.

Timing and Location of Net New Shadow from the Project

Net new shadow on UN Plaza that would be cast by the proposed project would occur between approximately May 4th though August 8th and would be present for up to 22 minutes in the early morning (no net new shadow would be present later than 7:30 a.m. on any date). The largest area of net new shadow cast would be 1,649-sf which would occur on June 21st at 6:46 a.m. Overall, the areas affected by net new shadow during the full year would include small portions of the plaza hardscape area, the McAllister point of public entry, and portions of the water feature.

The day of maximum quantitative net new shadow on UN Plaza due to the proposed project would occur on June 21st when the proposed project would shadow small portions of the plaza hardscape areas as well as portions of the water feature starting at

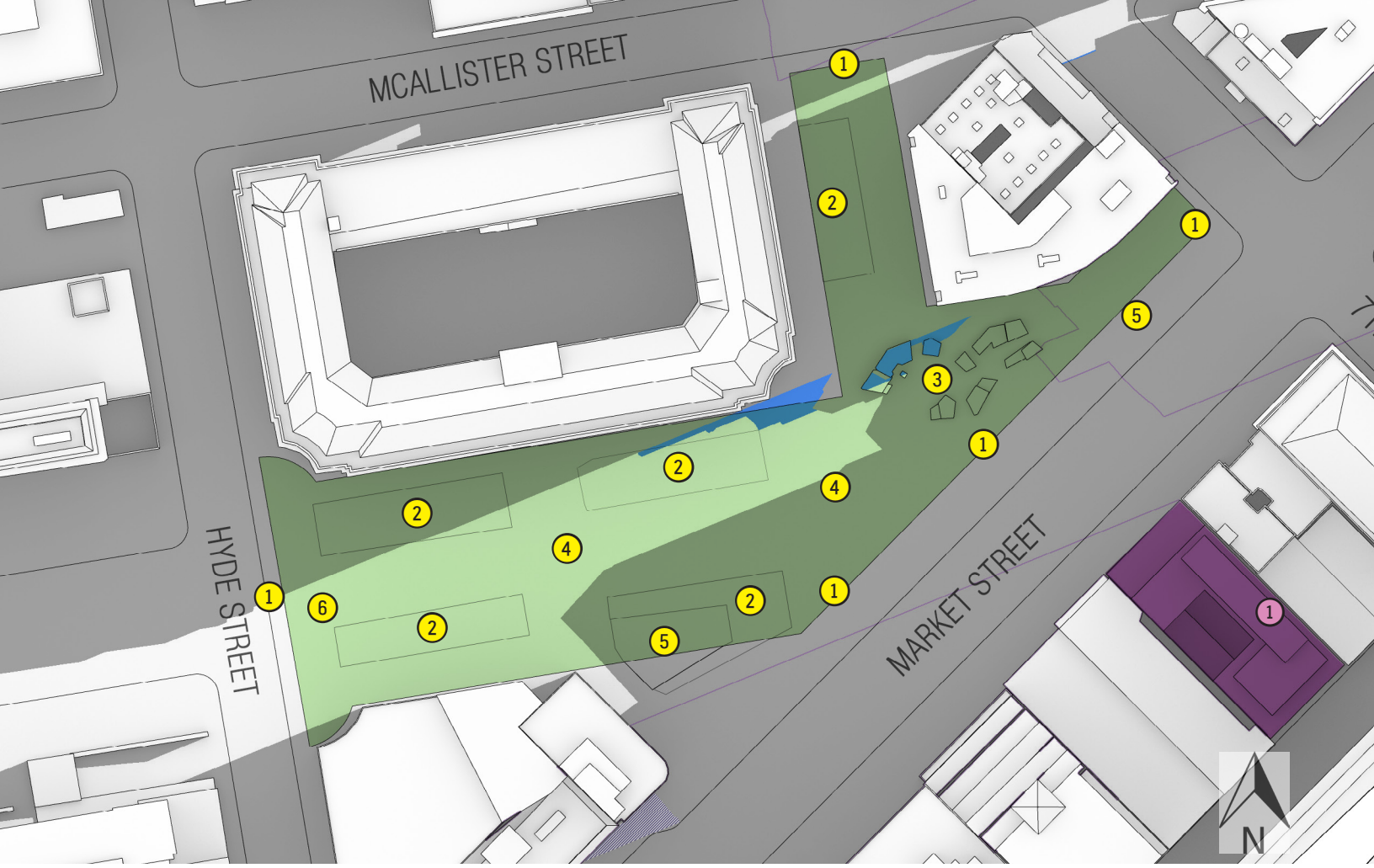
THEORETICAL ANNUAL AVAILABLE SUNLIGHT (TAAS)	UNITED NATIONS PLAZA
Area of United Nations Plaza	2.35 acres (102,227 sf)
Hours of annual available sunlight	3721.4 hrs
TAAS for United Nations Plaza	380,427,255 sfh

EXISTING (CURRENT) LEVELS OF SHADOW	UNITED NATIONS PLAZA
Existing annual total shading on park (sfh)	140,940,789 sfh
Existing shading as percentage of TAAS	37.048%

NEW SHADOW CAST BY THE PROPOSED 469 STEVENSON PROJECT	UNITED NATIONS PLAZA
Additional annual shading on United Nations Plaza from Project	9,693 sfh
Additional annual shading from Project as percentage of TAAS	0.003%
Combined total annual shading existing + Project (sfh)	140,950,482 sfh
Combined total annual shading from existing + Project as percentage of TAAS	37.051%
Number of days when new shading from Project would occur	85-97 days annually
Dates when new shadow from Project would be cast on United Nations Plaza	Between May 4 - Aug 8
Annual range in duration of new Project shadow (duration variance +/- 6 min.)	Zero to approx. 22 min
Range in area of new Project shadow (sf)	Zero to 1,649 sf
Average daily duration of new Project shadow (when present)	Approx. 10 min.
MAXIMUM NEW SHADING BY THE PROPOSED PROJECT	UNITED NATIONS PLAZA
Dates of maximum new shading from proposed Project (max sfh)	June 21
Total new shading on date(s) of maximum shading (sfh)	183.84 sfh
Percentage new shadow on date(s) of maximum shading	0.014%
Date and duration of longest duration of new shading (duration variance +/- 6 min.)	Approx. 22 min on June 21
Date and time of largest area of new Project shadow	1,649 sf on June 21 at 6:46 AM
Percentage of United Nations Plaza covered by largest new shadow	1.613%

NEW SHADOW CAST BY THE PROPOSED PROJECT + CUMULATIVE	UNITED NATIONS PLAZA
Additional annual shading from Project + Cumulative only (sfh)	838,530 sfh
Additional annual shading from Project + Cumulative only as percentage of TAAS	0.220%
Combined total annual shading Existing + Project + Cumulative (sfh)	141,779,319 sfh
Combined shading from Existing + Project + Cumulative as percentage of TAAS	37.268%
Number of days when new shading from Project + Cumulative would occur	365 days annually
Dates when new shading from Project + Cumulative would occur	Year-round
Annual range in duration of new Project +Cumulative shadow (duration variance +/- 7 min.)	Approx. 46 min to approx. 156 min
Range in area of Project + Cumulative new shadows (sf)	Zero to 15,080 sf
Average daily duration of new Project + Cumulative shadow (when present)	Approx. 89 min.
PROPOSED PROJECT + CUMULATIVE MAX SHADING DAY(S)	UNITED NATIONS PLAZA
Dates of maximum Project + Cumulative new shading (max sfh)	Apr 26 & Aug 16
Total new shading on date(s) of maximum shading (sfh)	11,150.90 sfh
Percentage new shading on date(s) of maximum shading	0.939%
Date and duration of longest duration of new shading (duration variance +/- 7 min.)	Approx. 148 min on Aug 16 & Apr 26
Date and time of largest area of new Cumulative shadow	15,080 sf on Aug 23/Apr 19 at 7:31 AM
Percentage of United Nations Plaza covered by largest new shadow	14.751%

TABLE 2: Quantitative Shadow Summary for UN Plaza



Existing (current) Shadows
New Shading by Proposed Project
New Shading from Cumulative Projects

Cumulative Projects
1 1125 Market Street

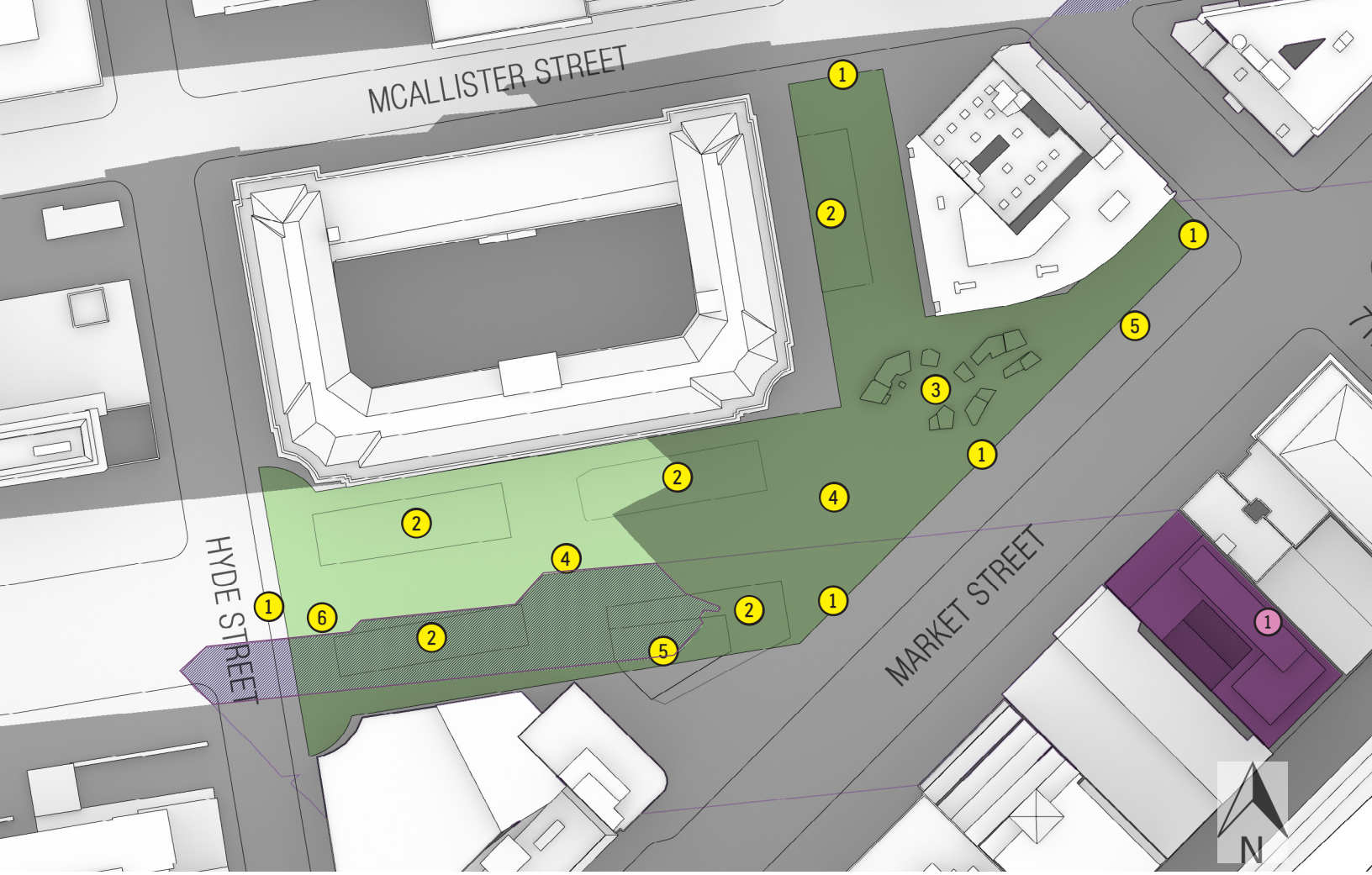
1 Public Entries
2 Landscape/Planter Areas
3 Water Feature
4 Hardscape Plaza
5 BART/MUNI entry
6 Equestrian Sculpture

FIGURE 17: Max net new shadow on UN Plaza (6/21 at 6:46 AM)

6:46 a.m. (beginning of the daily analysis period) and be present for approximately 10 minutes. The size and duration of proposed project-generated net new shadow would vary on other dates within the affected period, with net new shadow lasting between zero and 22 minutes. Net new shadow on UN Plaza generated by the proposed project would have an average duration of approximately 10 minutes.

Exhibits B, C, and D graphically illustrate shadow conditions at hourly intervals throughout the day between the Section 295 cutoff times at the Summer Solstice (June 21), approximate Vernal and Autumnal Equinoxes (March 22 / September 20), the Winter Solstice (December 20), and Exhibit E shows detail diagrams of UN Plaza on the day of maximum net new shadow (June 21).

Figure 17 depicts the size and location of the largest shadow cast on UN Plaza by the project.



Existing (current) Shadows
New Shading by Proposed Project
New Shading from Cumulative Projects
Cumulative Projects
1 1125 Market Street

1 Public Entries
2 Landscape/Planter Areas
3 Water Feature
4 Hardscape Plaza
5 BART/MUNI entry
6 Equestrian Sculpture

FIGURE 18: Max net new cumulative shadow area on UN Plaza (8/23 at 7:31 AM)

Increase in Quantitative Shadow on UN Plaza under Cumulative Conditions

Cumulative net new shadow (from the proposed project combined with the other proposed projects in the vicinity) would result in an increase of 838,530 sfh of net new shadow falling on UN Plaza, compared to an increase of 9,693 sfh in net new shadow from the project alone. This increase in sfh would result in an annual cumulative condition shadow load increase of 0.220%, representing an increase of 0.217% over the annual shadow load of the project alone (0.003%).

Timing and Location of Net New Shadow under Cumulative Conditions

Cumulative condition shadow would affect UN Plaza year-round and be cast in both the early mornings as well as midday hours from fall through spring. The daily duration of net new shadow would be between approximately 46 and 156 minutes, with areas of shadow ranging from zero to 15,080 sf.

The days of maximum quantitative net new shadow on UN Plaza under the cumulative condition would occur on April 26th and August 16th, when the cumulative projects would shadow two of the southern planting/seat wall areas, the BART/MUNI entry, and portions of the plaza hardscape areas starting at 7:25 a.m. (beginning of the daily analysis period) and be present for approximately two and a half hours, and have the largest area of coverage at 7:31 a.m. (15,080 sf).[3]

Exhibit F shows detail diagrams of UN Plaza on the day of maximum net new shadow under cumulative conditions (April 26th and August 16th).

Current Observed Plaza Uses

Within the six 30-minute observation periods conducted by Prevision Design on September 29th and October 3rd, 4th and 5th 2019, the number of observed users in UN Plaza ranged from approximately 900 to 1400, with uses that varied at different times of day and days of the week. See Table 3 for a summary of observation visits.

OBSERVATION	TIME	DATE OF VISIT	TEMP - WEATHER	TOTAL USERS*	PASS-THRU USE %*
Weekday Morning	7:30 AM - 8:00 AM	10/03/2019	52° F - Sunny	1400	95%
Weekday Midday	11:30 AM - 12:00 PM	10/04/2019	63° F - Sunny	900	25%
Weekday Afternoon	2:45 PM - 3:15 PM	10/03/2019	61° F - Sunny	900	90%
Weekend Morning	7:30 AM - 8:00 AM	09/29/2019	54° F - Clear	950	25%
Weekend Midday	11:30 AM - 12:00 PM	10/05/2019	62° F - Sunny	950	90%
Weekend Afternoon	2:45 PM - 3:15 PM	09/29/2019	62° F - Sunny	1250	25%

* due to large number of total users, counts are approximated

TABLE 3: UN Plaza Observation Summary

Use of UN Plaza was greatly affected by special events which were observed to be occurring during many observation visits, including an arts and crafts fair (morning and afternoon on October 3rd), farmer's markets (morning and afternoon on September 29th and midday on October 4th), and a rally (midday on October 5th). The total number of users was high across all visits, likely due to the location of the plaza between Market Street and Civic Center as well as two entries/exits for the Civic Center Bart and Muni Stations. The transitory nature of the use at these times was reflected by 90-95% of users passing through the plaza without stopping.

3 14,282 sf is the largest shadow size on April 26th and August 16th (the date that has the most sfh of cumulative shadow occurring throughout the entire day). The largest single shadow (15,080 sf) occurs on August 23rd and April 19th, however the total sfh of cumulative shadow on that date is less than on April 26th and August 16th.

At times when scheduled activities were occurring in the plaza, the percentage of total users passing through the plaza dropped substantially, with about 75% of observed users engaging in the event, buying food at the farmer's market, etc.

The Value of Sunlight Relative to Uses Observed

The portions of UN Plaza that would likely be more sensitive to the addition of net new shadow would be those elements that are fixed in location, conducive to more stationary activities (where users remain rather than pass through) or are observed to be currently well used by the public. Based on the use observations performed, the seat wall areas in UN Plaza would likely qualify as the most sensitive areas per the criteria established above. The sensitivity of these areas would likely be increased if net new shadow were to occur at times of day when the plaza is typically more unshaded and such features would receive higher levels of use, such as around the midday hours.

PROJECT SCENARIO: Throughout the year, net new shadow due to the proposed project would occur only in the early morning hours prior to 7:30 a.m., with net new shadow (when occurring) being present for about 10 minutes on average, up to a maximum duration of approximately 22 minutes. The largest net new project shadow profile would be 1,649 sf in size, representing 1.6% of the total plaza area, and would occur in portions of the plaza near the periphery which were not observed to be the most highly used by visitors. The date which has the maximum amount of net new shadow throughout the day is June 21st, however the maximum shading would occur at a time early in the day when the shadows would be retreating such that all net new shadow would leave the plaza prior to 7 a.m., prior to the start of the regularly-scheduled farmer's market which was observed to generate an increase user activity in UN Plaza.

CUMULATIVE SCENARIO: Throughout the year, cumulative condition net new shadow would occur only in the morning hours through midday, with no shadow cast later than 12:30 p.m.. Net new cumulative shadow (when occurring) would be present for about 89 minutes on average, up to a maximum duration of approximately 156 minutes. The largest net new cumulative shadow profile would be 15,080 sf in size, representing 14.751% of the total plaza area, and would occur in portions of the southern edge of the plaza which contain seating walls observed to be well used by visitors. The dates which have the maximum amount of net new cumulative shadow throughout the day are April 26th and August 16th. The time of maximum shading would occur at around 7:30 a.m. but a small amount of shadow would remain in the plaza until just prior to 10 a.m., after the start of the regularly scheduled farmer's market. ■

VIII. MINT PLAZA ANALYSIS FINDINGS

Table 4 summarizes the existing condition data and quantitative shadow effects of the proposed project on Mint Plaza, as detailed below. The full quantitative calculations for shadow conditions on Mint Plaza on all 27 analysis dates referenced below are included as Exhibit J.

Existing Shadow Conditions

Mint Plaza's area is 0.36 acres (15,496 sf) and experiences 38,441,767 annual square-foot-hours (sfh) of shadow under current conditions. Based on a theoretical annual available sunlight (TAAS) of 57,665,807 sfh, Mint Plaza's annual shadow load is 66.66%. Mint Plaza is surrounded on most sides by multi-story development which generates substantial shading on the plaza during the morning and mid- to late afternoon hours, and throughout the day over the winter months. Midday and early afternoon hours are the least shaded under current conditions, with the greatest sunlight availability occurring over the summer months.

Increase in Quantitative Shadow on Mint Plaza from the Project

The proposed project would result in net new shadow falling on Mint Plaza, adding approximately 325,407 net new annual sfh of shadow and increasing sfh of shadow by 0.56% above current levels, resulting in a new annual total shadow load of 67.22%.

Timing and Location of Net New Shadow from the Project

Net new shadow on Mint Plaza that would be cast by the proposed project would occur between approximately September 21st though March 21st and would be present for up to 90 minutes in the mid- to late afternoon (no net new shadow would be present until just before 2 p.m. or after 4:30 p.m. on any date). The largest area of net new shadow cast would be 5,811-sf which would occur on November 1st and February 8th at 2:30 p.m. Overall, the areas affected by net new shadow would be confined to the northeastern half of the plaza, including the 5th Street public entry, one of the two planter/bench areas, and hardscape and non-fixed seating areas.

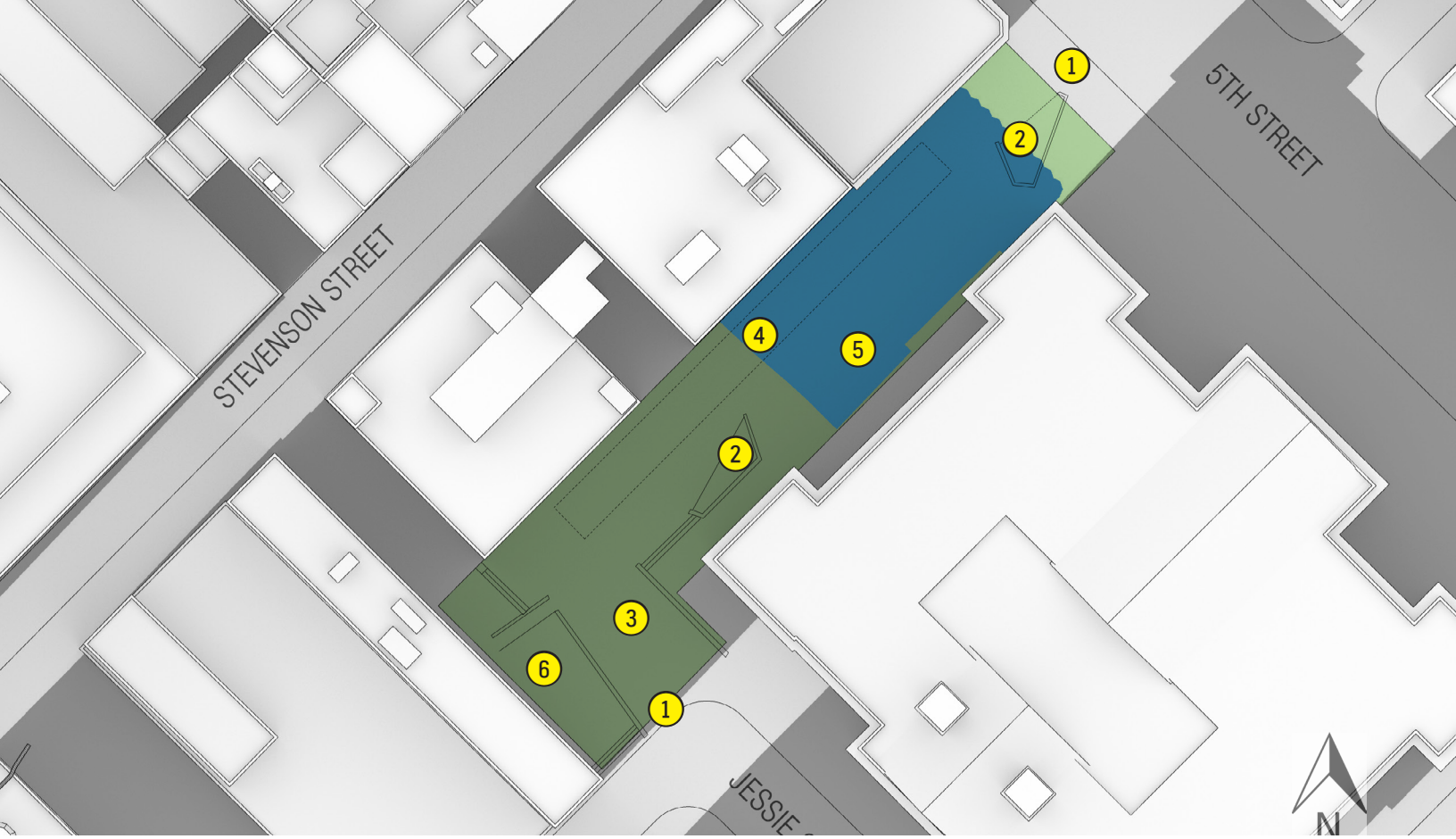
THEORETICAL ANNUAL AVAILABLE SUNLIGHT (TAAS)	MINT PLAZA
Area of Mint Plaza	0.36 acres (15,496 sf)
Hours of annual available sunlight	3721.4 hrs
TAAS for Mint Plaza	57,665,807 sfh

EXISTING (CURRENT) LEVELS OF SHADOW	MINT PLAZA
Existing annual total shading on park (sfh)	38,441,767 sfh
Existing shading as percentage of TAAS	66.66%

NEW SHADOW CAST BY THE PROPOSED 469 STEVENSON PROJECT	MINT PLAZA
Additional annual shading on Mint Plaza from Project	325,407 sfh
Additional annual shading from Project as percentage of TAAS	0.56%
Combined total annual shading existing + Project (sfh)	38,767,175 sfh
Combined total annual shading from existing + Project as percentage of TAAS	67.22%
Number of days when new shading from Project would occur	170-182 days annually
Dates when new shadow from Project would be cast on Mint Plaza	Between Sep 21 - Mar 21
Annual range in duration of new Project shadow (duration variance +/- 13 min.)	Zero to approx. 90 min
Range in area of new Project shadow (sf)	Zero to 5,811 sf
Average daily duration of new Project shadow (when present)	Approx. 60 min.
MAXIMUM NEW SHADING BY THE PROPOSED PROJECT	MINT PLAZA
Dates of maximum new shading from proposed Project (max sfh)	Feb 15 & Oct 25
Total new shading on date(s) of maximum shading (sfh)	4,530.15 sfh
Percentage new shadow on date(s) of maximum shading	3.32%
Date and duration of longest duration of new shading (duration variance +/- 13 min.)	Approx. 90 min on Oct 18 & Feb 22
Date and time of largest area of new Project shadow	5,811 sf on Nov 1/Feb 8 at 2:30 PM
Percentage of Mint Plaza covered by largest new shadow	37.50%

NEW SHADOW CAST BY THE PROPOSED PROJECT + CUMULATIVE	MINT PLAZA
Additional annual shading from Project + Cumulative only (sfh)	349,191 sfh
Additional annual shading from Project + Cumulative only as percentage of TAAS	0.61%
Combined total annual shading Existing + Project + Cumulative (sfh)	38,790,959 sfh
Combined shading from Existing + Project + Cumulative as percentage of TAAS	67.27%
Number of days when new shading from Project + Cumulative would occur	170-182 days annually
Dates when new shading from Project + Cumulative would occur	Between Sep 21 - Mar 21
Annual range in duration of new Project +Cumulative shadow (duration variance +/- 13 min.)	Zero to approx. 104 min
Range in area of Project + Cumulative new shadows (sf)	Zero to 5,811 sf
Average daily duration of new Project + Cumulative shadow (when present)	Approx. 65 min.
PROPOSED PROJECT + CUMULATIVE MAX SHADING DAY(S)	MINT PLAZA
Dates of maximum Project + Cumulative new shading (max sfh)	Feb 15 & Oct 25
Total new shading on date(s) of maximum shading (sfh)	4,530.15 sfh
Percentage new shading on date(s) of maximum shading	3.32%
Date and duration of longest duration of new shading (duration variance +/- 13 min.)	Approx. 90 min on Oct 18 & Feb 22
Date and time of largest area of new Cumulative shadow	5,811 sf on Nov 1/Feb 8 at 2:30 PM
Percentage of Mint Plaza covered by largest new shadow	37.50%

TABLE 4: Quantitative Shadow Summary for Mint Plaza



Existing (current) Shadows
New Shading by Proposed Project
New Shading from Cumulative Projects

1. Public Entries
2. Landscape Planters/Seating Wall
3. Tree Wells (6 trees)
4. Vine Trellis Structure
5. Hardscape / Non-fixed Seating Areas
6. Cafe Seating

FIGURE 19: Largest Project Shadow on Mint Plaza (11/1 at 2:30 p.m.)

The date of maximum quantitative net new shadow on Mint Plaza due to the proposed project would occur on February 15th and October 25th when the proposed project would generate new shadow over the northwestern half of the plaza starting just prior to 2 p.m. and be present for approximately 90 minutes. The size and duration of proposed project-generated net new shadow would vary on other dates within the affected period, with net new shadow lasting between zero and 90 minutes. Net new shadow generated by the proposed project would have an average duration of approximately 60 minutes.

Exhibits B, C, and D graphically illustrate shadow conditions at hourly intervals throughout the day between the Section 295 cutoff times at the Summer Solstice (June 21), approximate Vernal and Autumnal Equinoxes (March 22 / September 20), the Winter Solstice (December 20), and Exhibit G shows detail diagrams of Mint Plaza on the day of maximum net new shadow (February 15th and October 25th).

Figure 19 depicts the size and location of the largest shadow cast on Mint Plaza by the project.

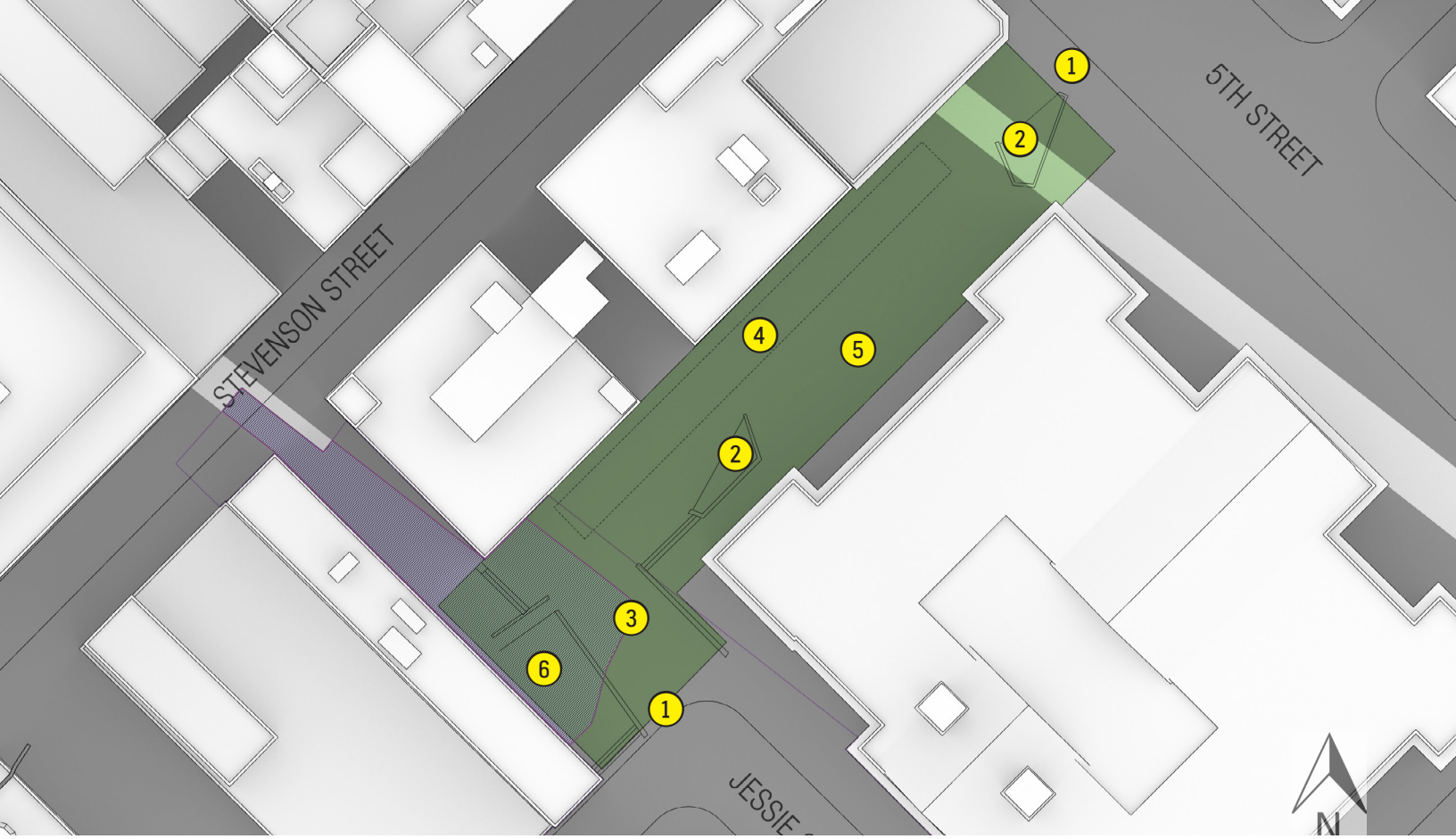


FIGURE 20: Largest (non-Project) Cumulative shadow on Mint Plaza (12/6 at 8:10 a.m.)

Existing (current) Shadows
New Shading from Cumulative Projects

1. Public Entries
2. Landscape Planters/Seating Wall
3. Tree Wells (6 trees)
4. Vine Trellis Structure
5. Hardscape / Non-fixed Seating Areas
6. Cafe Seating

Increase in Shadow under Cumulative Conditions

Cumulative net new shadow (from the proposed project combined with the other proposed projects in the vicinity) would likely be only modestly greater than the project alone. The proposed cumulative project at 921 Howard Street would generate a small amount of early morning shadow (prior to 8:30 a.m.) lasting less than 15 minutes over a section of the western edge of the plaza between November 16th and January 24th (Figure 20).

Timing and Location of Net New Shadow under Cumulative Conditions

Net new shadow on Mint Plaza that would be cast under cumulative conditions would occur between approximately September 21st though March 21st and would be present for up to 90 minutes in the mid- to late afternoon as well as for up to approximately 14 minutes in the early mornings between November 16th and January 24th (due to shadow cast by 921 Howard Street). The largest area of net new shadow cast would be 5,811-sf which would occur on November 1st and February 8th at 2:30 p.m.

During the afternoon affected periods, the areas affected by net new shadow would be confined to the northeastern half of the plaza, including the 5th Street public entry, one of the two planter/bench areas, and hardscape and non-fixed seating areas, the same

areas affected by the proposed project as shown by Figure 19. During the morning affected periods, the cumulative condition shadow would fall on the western portion of the plaza, affecting a portion of the cafe seating area and tree well areas as shown by Figure 20.

The days of maximum quantitative net new shadow on Mint Plaza under the cumulative condition would occur on February 15th and October 25th (the same days as the maximum net new shadow on the plaza under existing plus project conditions). This is because, as described above, the only cumulative project that would shade Mint Plaza is 921 Howard Street, which would not shade the plaza on the same dates as the proposed project.

Current Observed Plaza Uses

Within the six 30-minute observation periods conducted by Prevision Design on September 29th and October 3rd, 4th and 5th 2019, the number of observed users in Mint Plaza ranged from approximately 200 to 575, with uses that varied at different times of day and days of the week. See Table 5 for a summary of observation visits.

OBSERVATION	TIME	DATE OF VISIT	TEMP - WEATHER	TOTAL USERS*	PASS-THRU USE %*
Weekday Morning	9:00 AM - 9:30 AM	10/03/2019	53° F - Sunny	375	85%
Weekday Midday	12:30 PM - 1:00 PM	10/04/2019	61° F - Sunny	450	75%
Weekday Afternoon	2:45 PM - 3:15 PM	10/03/2019	65° F - Sunny	575	90%
Weekend Morning	9:00 AM - 9:30 AM	09/29/2019	54° F - Clear	200	90%
Weekend Midday	12:15 PM - 12:45 PM	10/05/2019	65° F - Sunny	300	80%
Weekend Afternoon	3:30 PM - 4:00 PM	09/29/2019	62° F - Sunny	275	80%

* due to large number of total users, counts are approximated

TABLE 5: Mint Plaza Observation Summary

It was observed that most Mint Plaza users (75-90%) used the plaza as a cut-through to other destinations, or as a destination for a cup of coffee or food truck item that was taken to go. A smaller percentage of users (10-25%) remained in the plaza for longer than a few minutes, with those users utilizing the fixed seating wall areas or the movable chairs. During times when the plaza would be affected by net new project shadow (afternoon) approximately 50-60 users were observed to spend more than a few minutes in the plaza overall, and of those users approximately 15-30 were observed to be occupying areas that would be affected by net new project shadow. During the early morning hours where cumulative shadow from 921 Howard Street would affect the plaza, approximately 15-20 users were observed spending more than a few minutes in areas which would be affected by cumulative condition shadow.

The observed intensity of use varied but could be characterized as moderate to high, but largely observed to be used as a pass-though, or a destination to buy café goods then leave.

The Value of Sunlight Relative to Uses Observed

While the observed uses of Mint plaza were largely transitory in nature, portions of Mint Plaza that would likely be more sensitive to the addition of net new shadow would be those elements that are fixed in location, conducive to more stationary activities (where users remain rather than pass through) or are observed to be currently well used by the public. Based on the use observations performed, the seating wall areas in Mint Plaza would likely qualify as the most sensitive areas per the criteria established above, as would the areas where freestanding seating is typically placed. The sensitivity of these areas would likely be increased if net new shadow were to occur at times of day when the plaza is typically more unshaded and such features would receive higher levels of use, such as around the midday and afternoon hours.

PROJECT SCENARIO: Throughout the year, net new shadow due to the proposed project would occur in the mid- to late afternoon. The largest net new shadow profile would cover about 1/3 of plaza area and would occur on the northeastern side fronting 5th Street. Users occupying the seating wall areas in the late afternoon would experience shadow falling on that area approximately one hour earlier in the afternoon than under current conditions, which may affect use of this feature which was observed to be occupied by 10-15 people over the course of both afternoon site observation visits. The net new shadow would additionally shade an area adjacent to the Mint building an hour earlier than under current conditions, where between 5-15 other users were observed using movable chairs. Other areas of the plaza would either be unaffected due to the presence of existing shadow or were observed to be areas of predominantly transitory uses.

CUMULATIVE SCENARIO: The cumulative scenario would add additional short periods of shadow early in the morning over winter months. Shadow at these times would fall on the cafe seating and tree wells area. While short in duration (less than 15 minutes), this additional cumulative shadow would cast shadow on one of the few currently unshaded portions of the plaza at his time (plaza is 75-85% shaded). During morning visits this area was observed to be occupied by approximately 15-20 people. ■

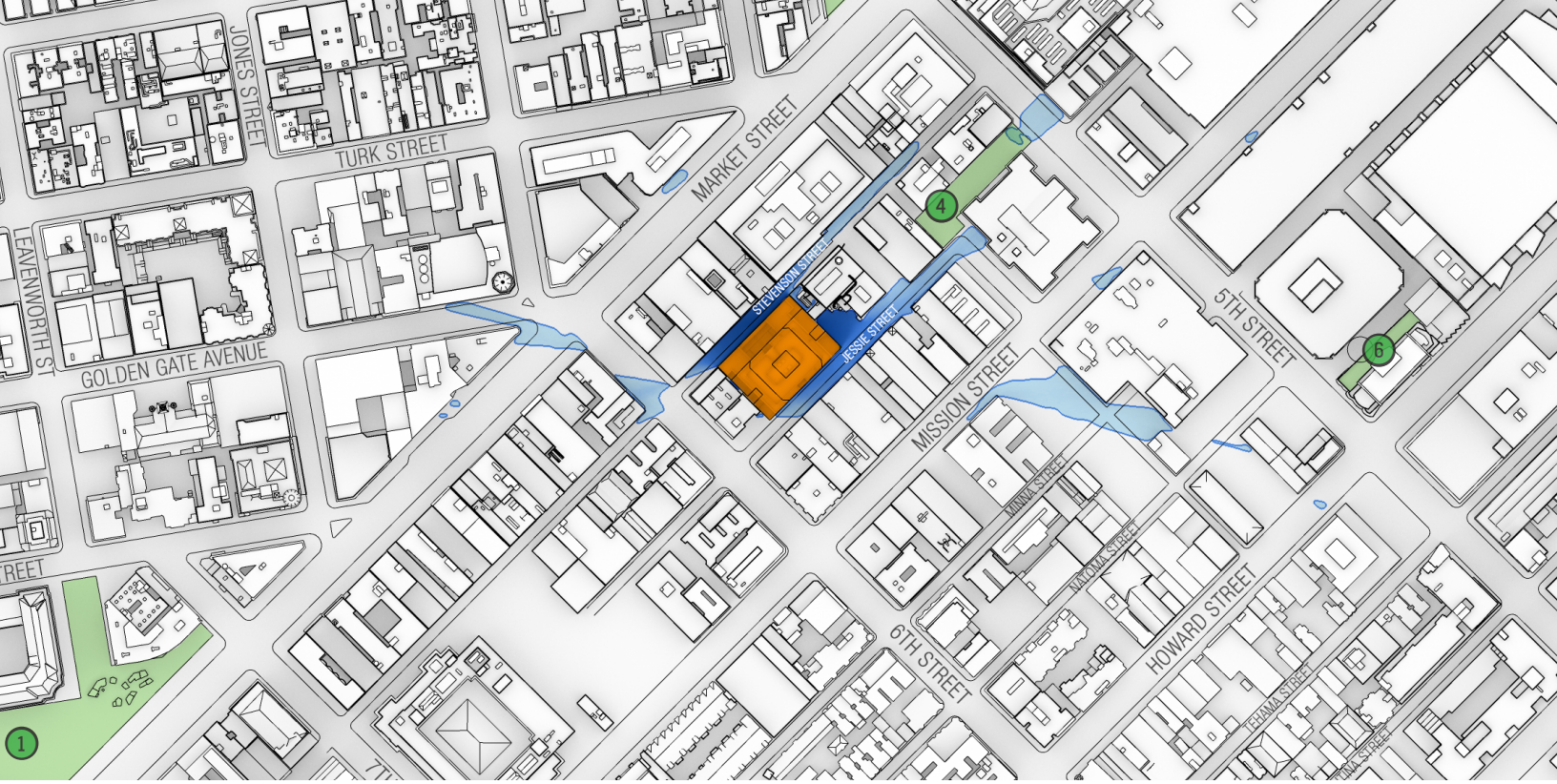


FIGURE 21: Shadow Fan Diagram for Reduced Density Alternative B

469 Stevenson Street

Parks and Open Spaces (Jurisdiction)

1 UN Plaza (DPW)

4 Mint Plaza (POPOS)

6 Intercontinental Roof Terrace (POPOS)

IX. PROJECT ALTERNATIVE ANALYSIS FINDINGS

Net New Shadow Effects from Alternative B: Reduced Density Alternative

As shown by Figure 21, the Reduced Density Alternative would eliminate all net new shadow on UN Plaza, however this alternative would still generate 4,610 sfh of net new shadow on Mint Plaza (0.01% of TAAS). Net new shadow cast by this project alternative would be cast for approximately 90 days a year between November 2nd and February 7th. Net new shadow would be present for up to approximately 16 minutes in the mid- to late afternoon. The largest area of net new shadow cast would be 400 sf and occur on January 4th and December 6th and affect 2.58% of the plaza area. See Table 6 (next page) for a full quantitative summary.

Overall, the areas affected by net new shadow would be confined to the northeastern tip of the plaza near the 5th Street public entry and reach one of the two landscape planter/ seating wall areas.

Mint Plaza users occupying the affected seating wall area in the late afternoon would experience additional new shadow falling on that area lasting 5 minutes or less as compared to current conditions. Other areas of the plaza would either be unaffected due to the presence of existing shadow or were observed to be areas of predominantly transitory uses.

NEW SHADOW CAST BY 469 STEVENSON ALTERNATIVE B: REDUCED DENSITY ALTERNATIVE	MINT PLAZA
Additional annual shading on Mint Plaza from Reduced Density Alternative	4,610 sfh
Additional annual shading from Reduced Density Alternative as percentage of TAAS	0.01%
Combined total annual shading existing + Reduced Density Alternative (sfh)	38,446,391 sfh
Combined total annual shading from existing + Reduced Density Alternative of TAAS	66.67%
Number of days when new shading from Reduced Density Alternative would occur	84-96 days annually
Dates when new shadow from Reduced Density Alternative would be cast on Mint Plaza	Between 11/2 - 12/19 & 12/22 - 2/7
Annual range in duration of new Reduced Density Alternative shadow (variance +/- 14 min.)	Zero to approx. 16 min
Range in area of new Reduced Density Alternative shadow (sf)	Zero to 400 sf
Average daily duration of new Reduced Density Alternative shadow (when present)	Approx. 15 min.
MAXIMUM NEW SHADING BY ALTERNATIVE B: REDUCED DENSITY ALTERNATIVE	MINT PLAZA
Dates of maximum new shading from proposed Reduced Density Alternative (max sfh)	Jan 4 & Dec 6
Total new shading on date(s) of maximum shading (sfh)	99.91 sfh
Percentage new shadow on date(s) of maximum shading	0.08%
Date and duration of longest duration of new shading (duration variance +/- 14 min.)	Approx. 16 min on Nov 8 & Feb 1
Date and time of largest area of new Reduced Density Alternative shadow	400 sf on Dec 6/Jan 4 at 3:00 PM
Percentage of Mint Plaza covered by largest new shadow	2.58%

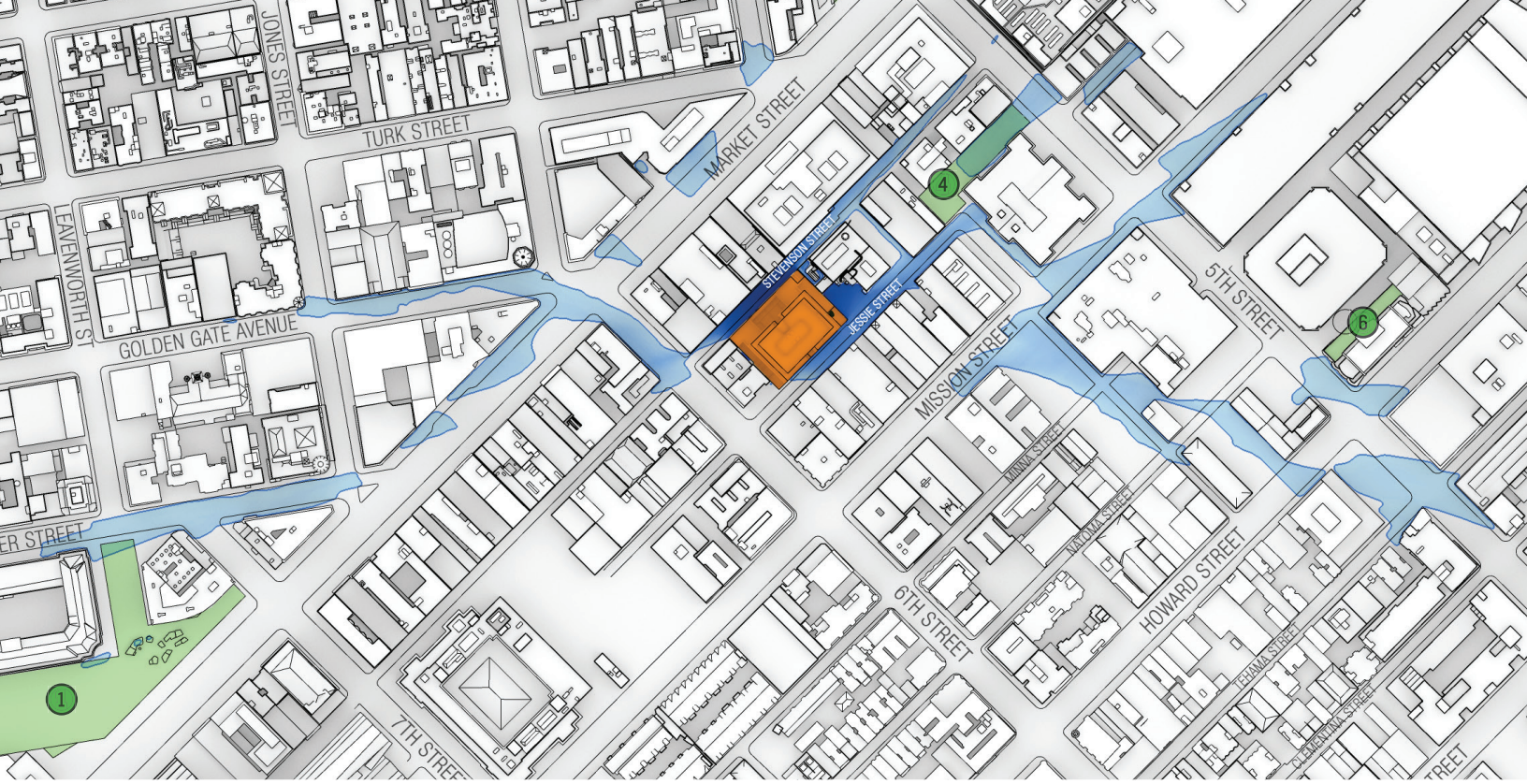
TABLE 6: Quantitative Shadow Summary for Mint Plaza (Reduced Density Alternative B)

Net New Shadow Effects from Alternative C: No Residential Parking, Tower Only Alternative

As shown by Figure 22 (next page), the No Residential Parking, Tower Only Alternative would result in net new shadow being cast on UN Plaza and Mint Plaza, but would not affect any additional parks or open spaces not affected by the proposed project.

This alternative would generate 10,603 sfh of net new shadow on UN Plaza (0.003% of TAAS). Net new shadow cast by this project alternative would be cast for between approximately 85-97 days a year between May 4th and August 8th. Net new shadow would be present for an average of up to approximately 10 minutes in the early morning. The largest area of net new shadow cast would be 1,823 sf and occur on June 21st, affecting 1.783% of the plaza area. See Table 7 for a full quantitative summary.

Overall, the areas affected by Alternative C net new shadow during the full year would include small portions of the plaza hardscape area, the McAllister point of public entry, and small portions of the water feature, all areas of transitory observed uses.



469 Stevenson Street

Parks and Open Spaces (Jurisdiction)

1 UN Plaza (DPW)

4 Mint Plaza (POPOS)

6 Intercontinental Roof Terrace (POPOS)

FIGURE 22: Shadow Fan Diagram for No Residential Parking, Tower Only Alternative C

NEW SHADOW CAST BY 469 STEVENSON ALTERNATIVE C: TOWER ONLY ALTERNATIVE	UNITED NATIONS PLAZA
Additional annual shading on United Nations Plaza from Tower Only Alternative	10,603 sfh
Additional annual shading from Tower Only Alternative as percentage of TAAS	0.003%
Combined total annual shading existing + Tower Only Alternative (sfh)	140,951,312 sfh
Combined total annual shading from existing + Tower Only Alternative as percentage of TAAS	37.051%
Number of days when new shading from Tower Only Alternative would occur	85-97 days annually
Dates when new shadow from Tower Only Alternative would be cast on United Nations Plaza	Between May 4 - Aug 8
Annual range in duration of new Tower Only Alternative shadow (duration variance +/- 6 min.)	Zero to approx. 22 min
Range in area of new Tower Only Alternative shadow (sf)	Zero to 1,823 sf
Average daily duration of new Tower Only Alternative shadow (when present)	Approx. 10 min.
MAXIMUM NEW SHADING BY ALTERNATIVE C: TOWER ONLY ALTERNATIVE	UNITED NATIONS PLAZA
Dates of maximum new shading from proposed Tower Only Alternative (max sfh)	June 21
Total new shading on date(s) of maximum shading (sfh)	202.98 sfh
Percentage new shadow on date(s) of maximum shading	0.015%
Date and duration of longest duration of new shading (duration variance +/- 6 min.)	Approx. 22 min on June 21
Date and time of largest area of new Tower Only Alternative shadow	1,823 sf on June 21 at 6:46 AM
Percentage of United Nations Plaza covered by largest new shadow	1.783%

TABLE 7: Quantitative Shadow Summary for UN Plaza (No Residential Parking, Tower Only Alternative C)

This alternative would generate 342,763 sfh of net new shadow on Mint Plaza (0.59% of TAAS). Net new shadow cast by this project alternative would be cast for between approximately 170-182 days a year between September 21st and March 21st. Net new shadow would be present for up to approximately 90 minutes in the mid- to late afternoon. The largest area of net new shadow cast would be 6,049 sf and occur on October 25th and February 22nd, affecting 39.04% of the plaza area. See Table 8 for a full quantitative summary.

Overall, the areas affected by Alternative C net new shadow would be the northeastern third of Mint Plaza near the 5th Street public entry and reach one of the two landscape planter/seating wall areas. Mint Plaza users occupying the affected seating wall area in the late afternoon on affected dates would experience additional new shadow falling on that area lasting approximately 15-30 minutes longer than current conditions. Other areas of the plaza would either be unaffected (due to the presence of existing shadow) or were observed to be in areas of predominantly transitory uses. ■

NEW SHADOW CAST BY 469 STEVENSON ALTERNATIVE C: TOWER ONLY ALTERNATIVE	MINT PLAZA
Additional annual shading on Mint Plaza from Tower Only Alternative	342,763 sfh
Additional annual shading from Tower Only Alternative as percentage of TAAS	0.59%
Combined total annual shading existing + Tower Only Alternative (sfh)	38,784,492 sfh
Combined total annual shading from existing + Tower Only Alternative of TAAS	67.25%
Number of days when new shading from Tower Only Alternative would occur	170-182 days annually
Dates when new shadow from Tower Only Alternative would be cast on Mint Plaza	Between Sep 21 - Mar 21
Annual range in duration of new Tower Only Alternative shadow (variance +/- 14 min.)	Zero to approx. 90 min
Range in area of new Tower Only Alternative shadow (sf)	Zero to 6,049 sf
Average daily duration of new Tower Only Alternative shadow (when present)	Approx. 60 min.
MAXIMUM NEW SHADING BY ALTERNATIVE C: TOWER ONLY ALTERNATIVE	MINT PLAZA
Dates of maximum new shading from proposed Tower Only Alternative (max sfh)	Feb 15 & Oct 25
Total new shading on date(s) of maximum shading (sfh)	4,757.09 sfh
Percentage new shadow on date(s) of maximum shading	3.49%
Date and duration of longest duration of new shading (duration variance +/- 14 min.)	Approx. 90 min on Oct 18 & Feb 22
Date and time of largest area of new Tower Only Alternative shadow	6,049 sf on Oct 25/Feb 15 at 2:30 PM
Percentage of Mint Plaza covered by largest new shadow	39.04%

TABLE 8: Quantitative Shadow Summary for Mint Plaza (No Residential Parking, Tower Only Alternative C)

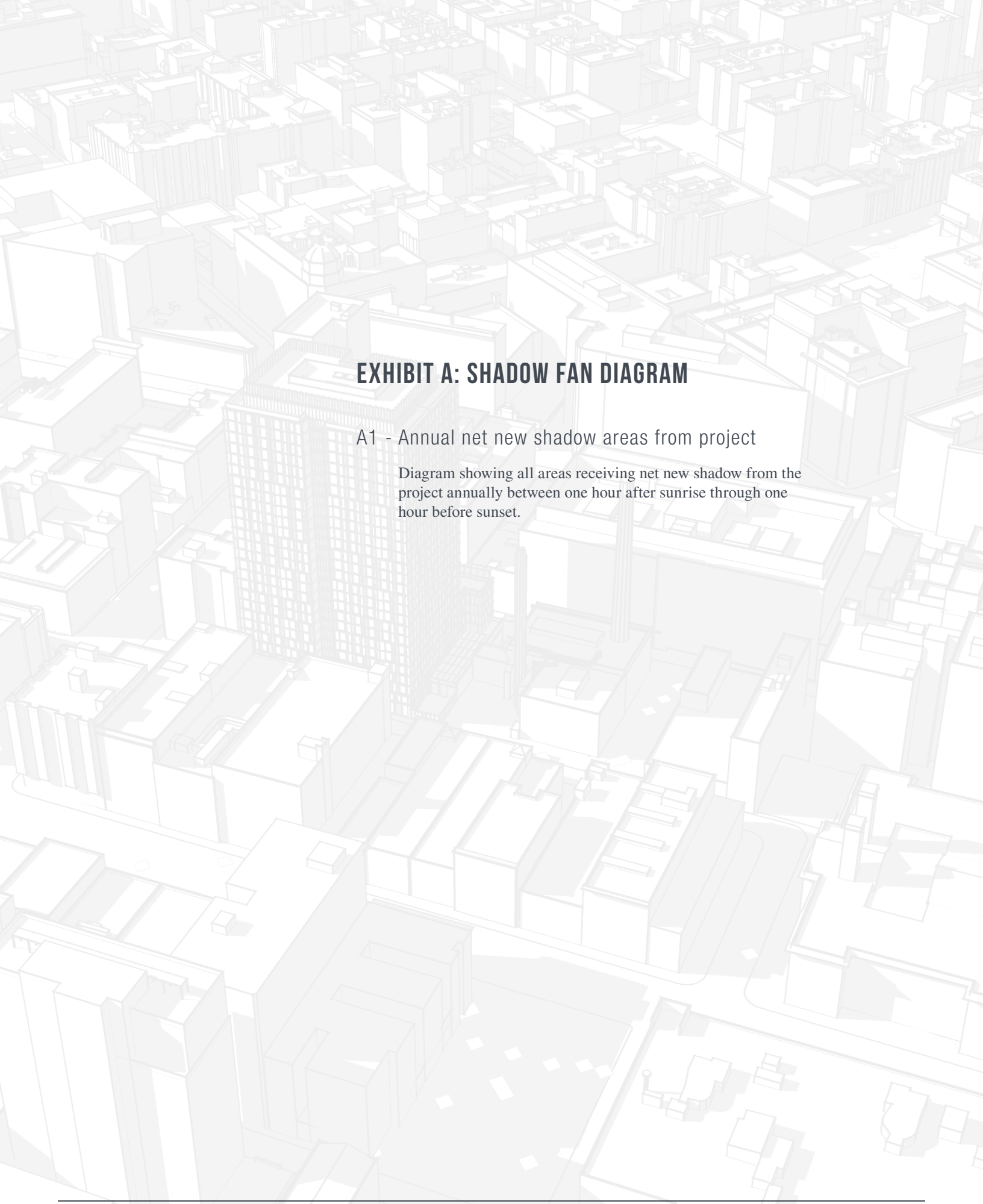


EXHIBIT A: SHADOW FAN DIAGRAM

A1 - Annual net new shadow areas from project

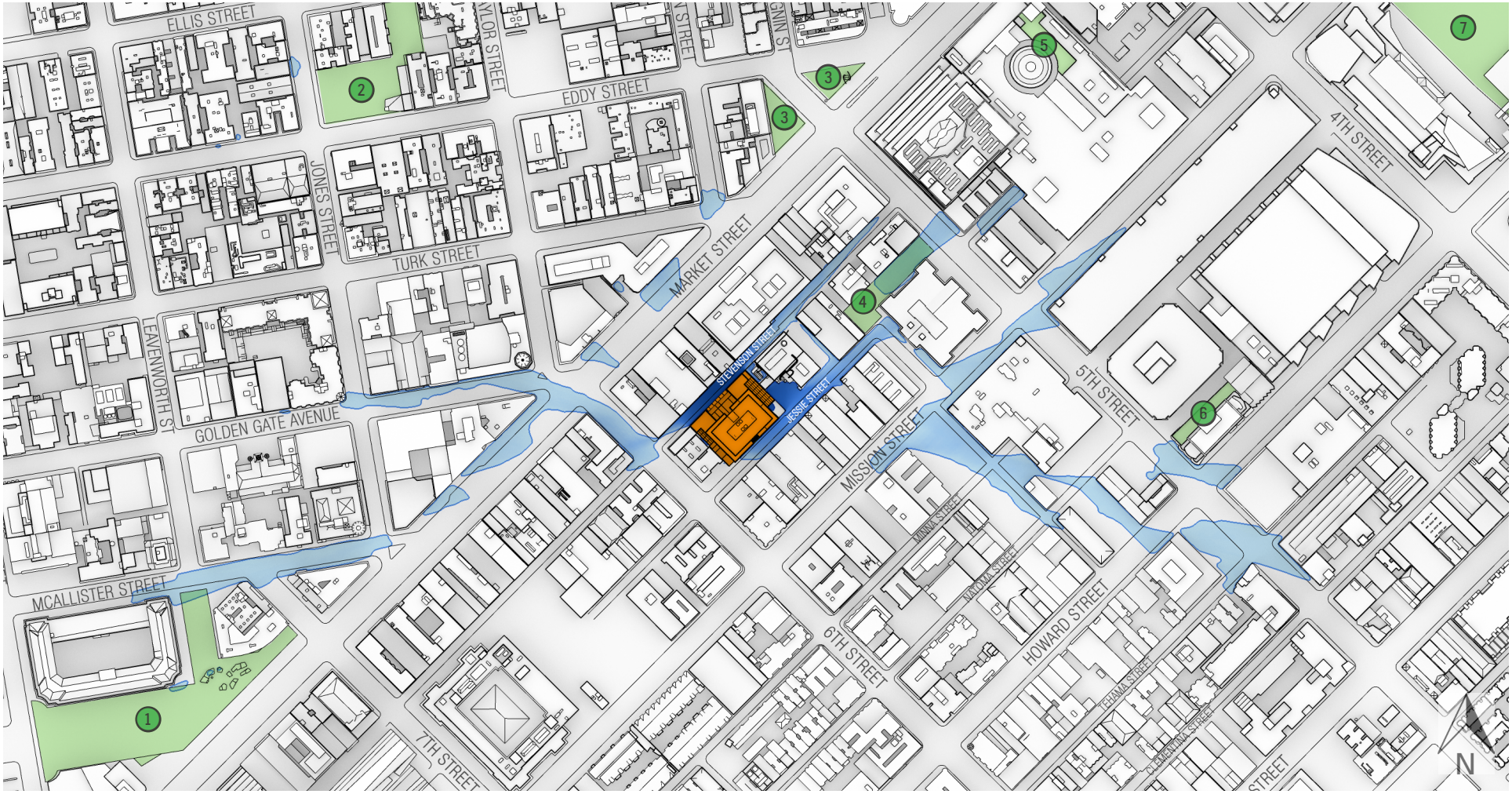
Diagram showing all areas receiving net new shadow from the project annually between one hour after sunrise through one hour before sunset.

A1

469 STEVENSON STREET

Full year net new shadow fan diagram factoring in the presence of existing shadows

PREVISION DESIGN



Proposed Project

Net New Shadow Fan of Proposed Project

occasional shadow — frequent shadow

SHADOW FAN DIAGRAM
AFFECTED AREAS DURING SECTION 295 TIMES

FULL YEAR

Parks and Open Spaces (Jurisdiction)

1. UN Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)
7. Yerba Buena Gardens (OCII)

EXHIBIT B: SWEEP SHADOW DIAGRAMS ON SUMMER SOLSTICE

B1 - June 21

Diagrams at one hour intervals starting one hour after sunrise to one hour prior to sunset.

B1.1

469 STEVENSON STREET

Shading diagrams on the Summer Solstice

SUMMER SOLSTICE
JUNE 21

6:46 AM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

B1.2

469 STEVENSON STREET

Shading diagrams on the Summer Solstice

SUMMER SOLSTICE
JUNE 21

7:00 AM

Proposed Project
Existing (current) Shadows
New Shading by Proposed Project
New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)
1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects
1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

B1.3

469 STEVENSON STREET

Shading diagrams on the Summer Solstice

SUMMER SOLSTICE
JUNE 21

8:00 AM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

B1.4

469 STEVENSON STREET

Shading diagrams on the Summer Solstice

SUMMER SOLSTICE
JUNE 21

9:00 AM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

B1.5

469 STEVENSON STREET

Shading diagrams on the Summer Solstice

SUMMER SOLSTICE
JUNE 21

10:00 AM

Proposed Project
Existing (current) Shadows
New Shading by Proposed Project
New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)
1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects
1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

B1.6

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Shading diagrams on the Summer Solstice

SUMMER SOLSTICE
JUNE 21

11:00 AM

Proposed Project
Existing (current) Shadows
New Shading by Proposed Project
New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)
1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects
1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

B1.7

469 STEVENSON STREET

Shading diagrams on the Summer Solstice

SUMMER SOLSTICE
JUNE 21

12:00 PM

Proposed Project
Existing (current) Shadows
New Shading by Proposed Project
New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)
1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects
1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

B1.8

469 STEVENSON STREET

Shading diagrams on the Summer Solstice

SUMMER SOLSTICE
JUNE 21

1:00 PM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

B1.9

469 STEVENSON STREET

Shading diagrams on the Summer Solstice

SUMMER SOLSTICE
JUNE 21

2:00 PM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

B1.10

469 STEVENSON STREET

Shading diagrams on the Summer Solstice

SUMMER SOLSTICE
JUNE 21

3:00 PM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

B1.11

469 STEVENSON STREET

Shading diagrams on the Summer Solstice

SUMMER SOLSTICE
JUNE 21

4:00 PM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

B1.12

469 STEVENSON STREET

Shading diagrams on the Summer Solstice

SUMMER SOLSTICE
JUNE 21

5:00 PM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

B1.13

469 STEVENSON STREET

Shading diagrams on the Summer Solstice

SUMMER SOLSTICE
JUNE 21

6:00 PM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

B1.14 469 STEVENSON STREET

Shading diagrams on the Summer Solstice

SUMMER SOLSTICE
JUNE 21

7:00 PM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

B1.15

469 STEVENSON STREET

Shading diagrams on the Summer Solstice

SUMMER SOLSTICE
JUNE 21

7:36 PM

Proposed Project
Existing (current) Shadows
New Shading by Proposed Project
New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)
1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects
1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

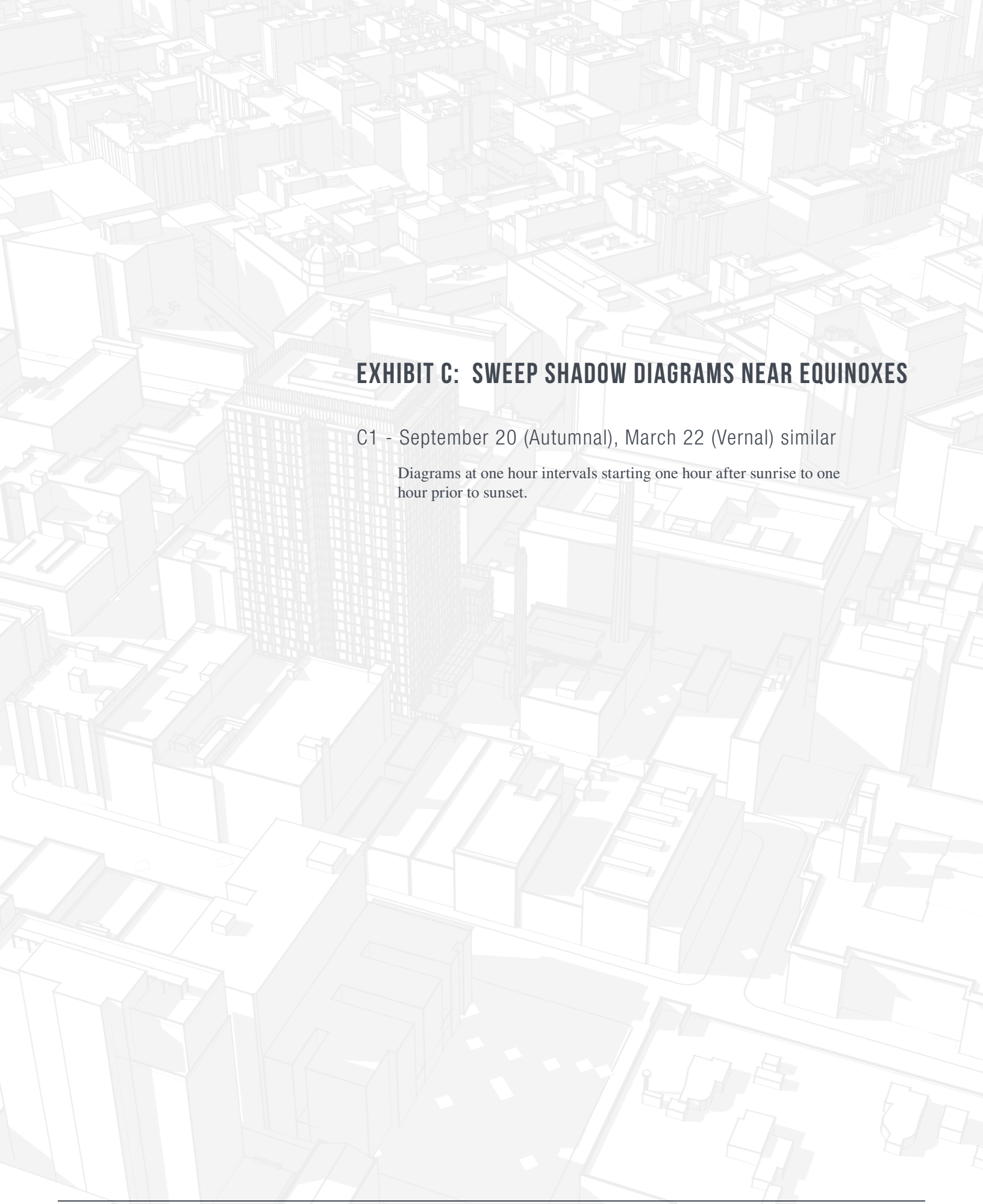


EXHIBIT C: SWEEP SHADOW DIAGRAMS NEAR EQUINOXES

C1 - September 20 (Autumnal), March 22 (Vernal) similar

Diagrams at one hour intervals starting one hour after sunrise to one hour prior to sunset.

PREVISION DESIGN

C1.1

469 STEVENSON STREET

Shading diagrams near the Fall/Spring Equinoxes

APPROX. FALL EQUINOX (SPRING SIMILAR)
SEPTEMBER 20

7:57 AM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

C1.2

469 STEVENSON STREET

Shading diagrams near the Fall/Spring Equinoxes

APPROX. FALL EQUINOX (SPRING SIMILAR)
SEPTEMBER 20

8:00 AM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

C1.3

469 STEVENSON STREET

Shading diagrams near the Fall/Spring Equinoxes

APPROX. FALL EQUINOX (SPRING SIMILAR)
SEPTEMBER 20

9:00 AM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

C1.4

469 STEVENSON STREET

Shading diagrams near the Fall/Spring Equinoxes

APPROX. FALL EQUINOX (SPRING SIMILAR)
SEPTEMBER 20

10:00 AM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

C1.5

469 STEVENSON STREET

Shading diagrams near the Fall/Spring Equinoxes

APPROX. FALL EQUINOX (SPRING SIMILAR)
SEPTEMBER 20

11:00 AM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

C1.6

469 STEVENSON STREET

Shading diagrams near the Fall/Spring Equinoxes

APPROX. FALL EQUINOX (SPRING SIMILAR)
SEPTEMBER 20

12:00 PM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

C1.7

469 STEVENSON STREET

Shading diagrams near the Fall/Spring Equinoxes

APPROX. FALL EQUINOX (SPRING SIMILAR)
SEPTEMBER 20

1:00 PM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

C1.8

469 STEVENSON STREET

Shading diagrams near the Fall/Spring Equinoxes

APPROX. FALL EQUINOX (SPRING SIMILAR)
SEPTEMBER 20

2:00 PM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

C1.9

469 STEVENSON STREET

Shading diagrams near the Fall/Spring Equinoxes

APPROX. FALL EQUINOX (SPRING SIMILAR)
SEPTEMBER 20

3:00 PM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

C1.10

469 STEVENSON STREET

Shading diagrams near the Fall/Spring Equinoxes

APPROX. FALL EQUINOX (SPRING SIMILAR)
SEPTEMBER 20

4:00 PM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

C1.11

469 STEVENSON STREET

Shading diagrams near the Fall/Spring Equinoxes

APPROX. FALL EQUINOX (SPRING SIMILAR)
SEPTEMBER 20

5:00 PM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

C1.12

469 STEVENSON STREET

Shading diagrams near the Fall/Spring Equinoxes

APPROX. FALL EQUINOX (SPRING SIMILAR)
SEPTEMBER 20

6:00 PM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

C1.13 469 STEVENSON STREET

Shading diagrams near the Fall/Spring Equinoxes

APPROX. FALL EQUINOX (SPRING SIMILAR)
SEPTEMBER 20

6:09 PM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

EXHIBIT D: SWEEP SHADOW DIAGRAMS ON WINTER SOLSTICE

D1 - December 20

Diagrams at one hour intervals starting one hour after sunrise to one hour prior to sunset.

PREVISION DESIGN

D1.1

469 STEVENSON STREET

Shading diagrams on the Winter Solstice

WINTER SOLSTICE
DECEMBER 20

8:19 AM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

D1.2

469 STEVENSON STREET

Shading diagrams on the Winter Solstice

WINTER SOLSTICE
DECEMBER 20

9:00 AM

Proposed Project
Existing (current) Shadows
New Shading by Proposed Project
New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)
1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects
1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

D1.3

469 STEVENSON STREET

Shading diagrams on the Winter Solstice

WINTER SOLSTICE
DECEMBER 20

10:00 AM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

D1.4

469 STEVENSON STREET

Shading diagrams on the Winter Solstice

WINTER SOLSTICE
DECEMBER 20

11:00 AM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

D1.5

469 STEVENSON STREET

Shading diagrams on the Winter Solstice

WINTER SOLSTICE
DECEMBER 20

12:00 PM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

D1.6

469 STEVENSON STREET

Shading diagrams on the Winter Solstice

WINTER SOLSTICE
DECEMBER 20

1:00 PM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

D1.7

469 STEVENSON STREET

Shading diagrams on the Winter Solstice

WINTER SOLSTICE
DECEMBER 20

2:00 PM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

D1.8

469 STEVENSON STREET

Shading diagrams on the Winter Solstice

WINTER SOLSTICE
DECEMBER 20

3:00 PM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

PREVISION DESIGN

D1.9

469 STEVENSON STREET

Shading diagrams on the Winter Solstice

WINTER SOLSTICE
DECEMBER 20

3:54 PM

- Proposed Project
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

Parks and Open Spaces (Jurisdiction)

1. United Nations Plaza (DPW)
2. Boedekker Park (RPD)
3. Hallidie Plaza (DPW)
4. Mint Plaza (POPOS)
5. Westfield Roof Terrace (POPOS)
6. Intercontinental Roof Terrace (POPOS)

Cumulative Projects

1. 1125 Market Street
2. 1055 Market Street
3. 1028 Market Street
4. 57 Taylor Street
5. 25 Mason Street
6. 996 Mission Street
7. 457-475 Minna Street
8. 921 Howard Street

EXHIBIT E: DAY(S) OF MAXIMUM NET NEW SHADOW FOR UNITED NATIONS PLAZA

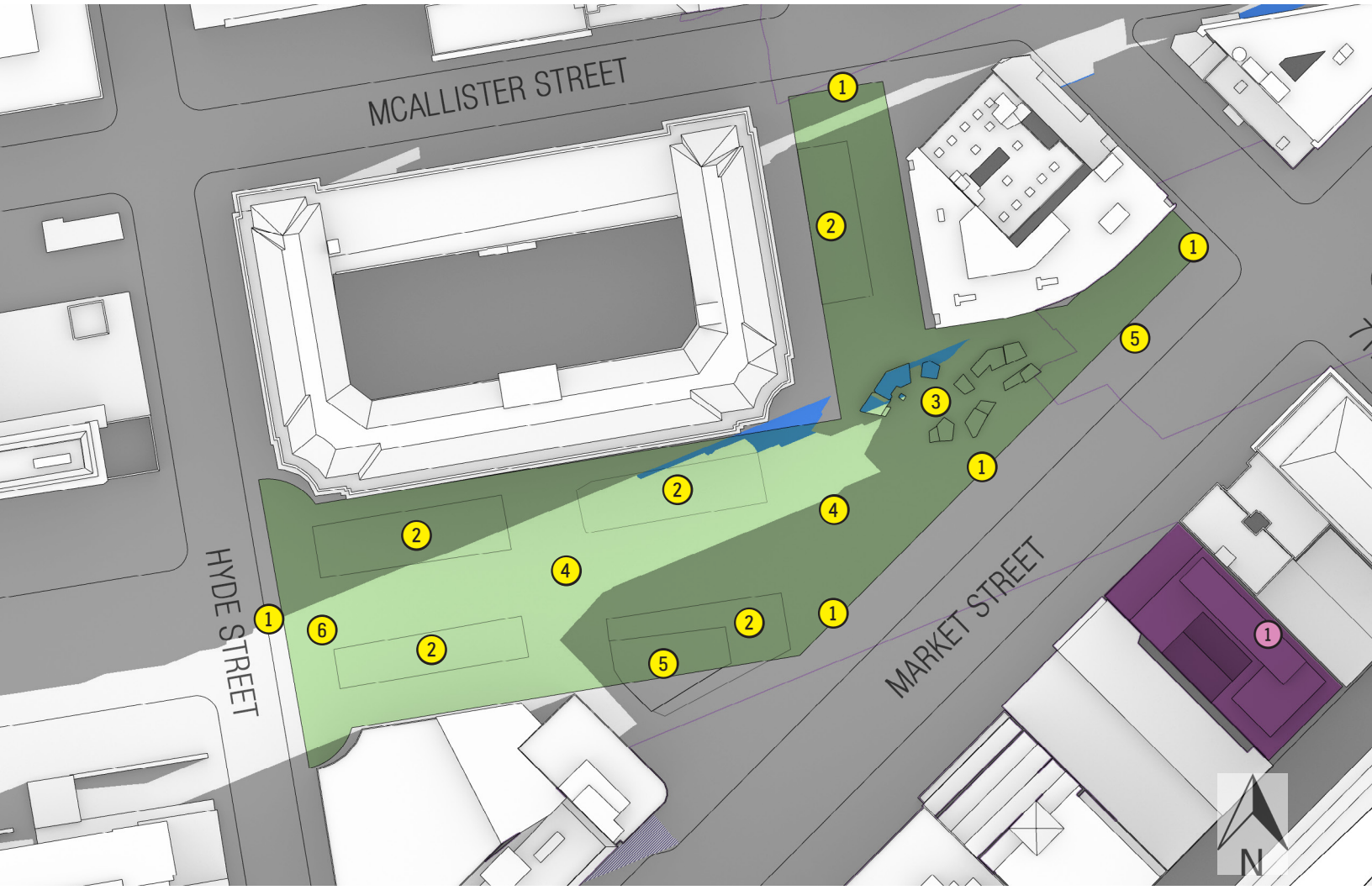
E1 - June 21

Diagrams at one hour intervals starting one hour after sunrise to one hour prior to sunset, and at 15-minute intervals when net new shadow is present.

E1.1

469 STEVENSON STREET

UN Plaza: Maximum Project Shadow Date



DATE WITH MOST SFH NET NEW PROJECT SHADOW
JUNE 21

6:46 AM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

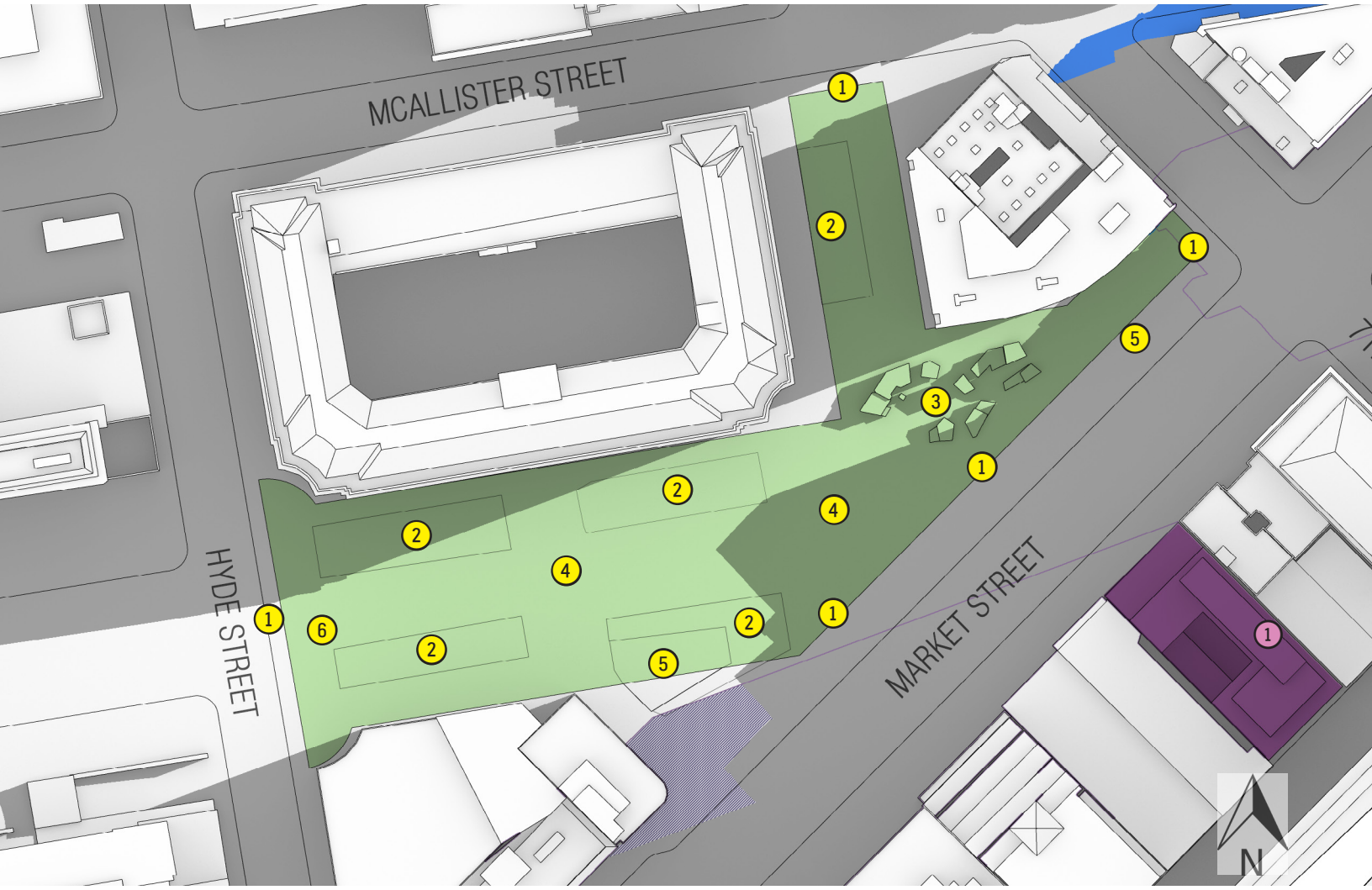
- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

PREVISION DESIGN

E1.2

469 STEVENSON STREET

UN Plaza: Maximum Project Shadow Date



DATE WITH MOST SFH NET NEW PROJECT SHADOW
JUNE 21

7:00 AM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

PREVISION DESIGN

E1.3

469 STEVENSON STREET

UN Plaza: Maximum Project Shadow Date

DATE WITH MOST SFH NET NEW PROJECT SHADOW
JUNE 21

8:00 AM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

(1) Public Entries
(2) Landscape/Planter Areas
(3) Water Feature
(4) Hardscape Plaza
(5) BART/MUNI entry
(6) Equestrian Sculpture

PREVISION DESIGN

E1.4

469 STEVENSON STREET

UN Plaza: Maximum Project Shadow Date

DATE WITH MOST SFH NET NEW PROJECT SHADOW
JUNE 21

9:00 AM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

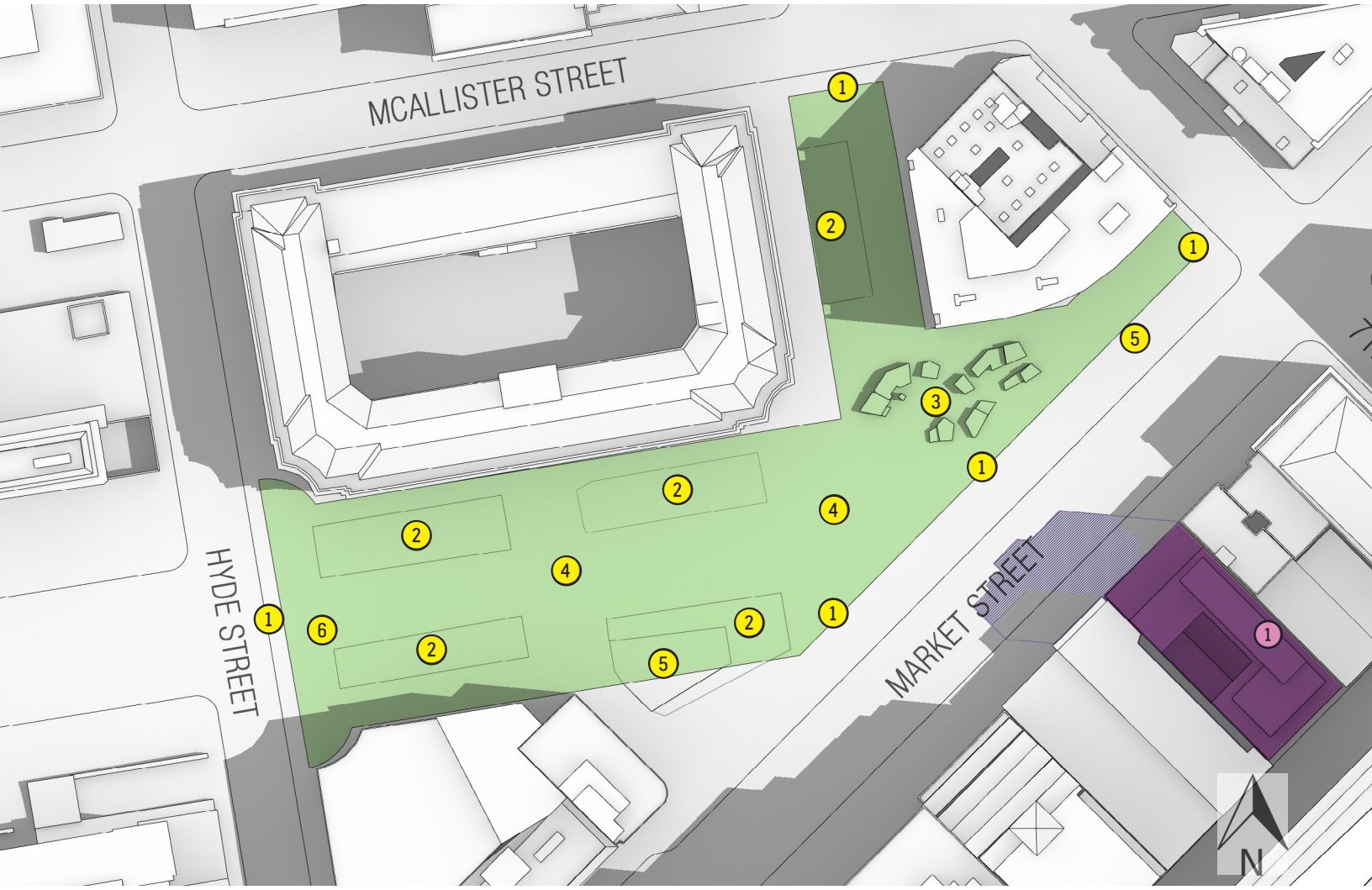
(1) Public Entries
(2) Landscape/Planter Areas
(3) Water Feature
(4) Hardscape Plaza
(5) BART/MUNI entry
(6) Equestrian Sculpture

PREVISION DESIGN

E1.5

469 STEVENSON STREET

UN Plaza: Maximum Project Shadow Date



DATE WITH MOST SFH NET NEW PROJECT SHADOW
JUNE 21

10:00 AM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

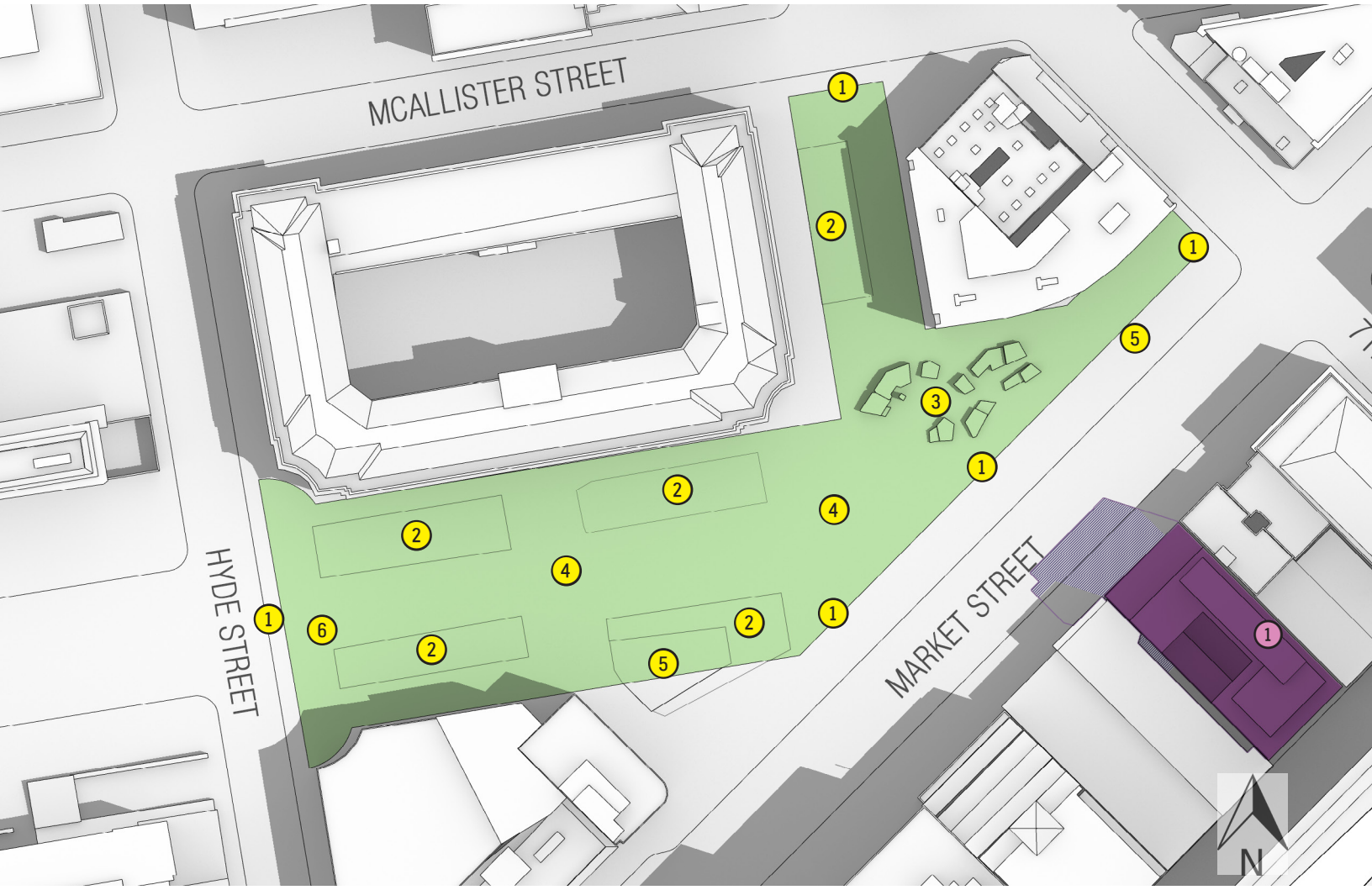
- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

PREVISION DESIGN

E1.6

469 STEVENSON STREET

UN Plaza: Maximum Project Shadow Date



DATE WITH MOST SFH NET NEW PROJECT SHADOW
JUNE 21

11:00 AM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

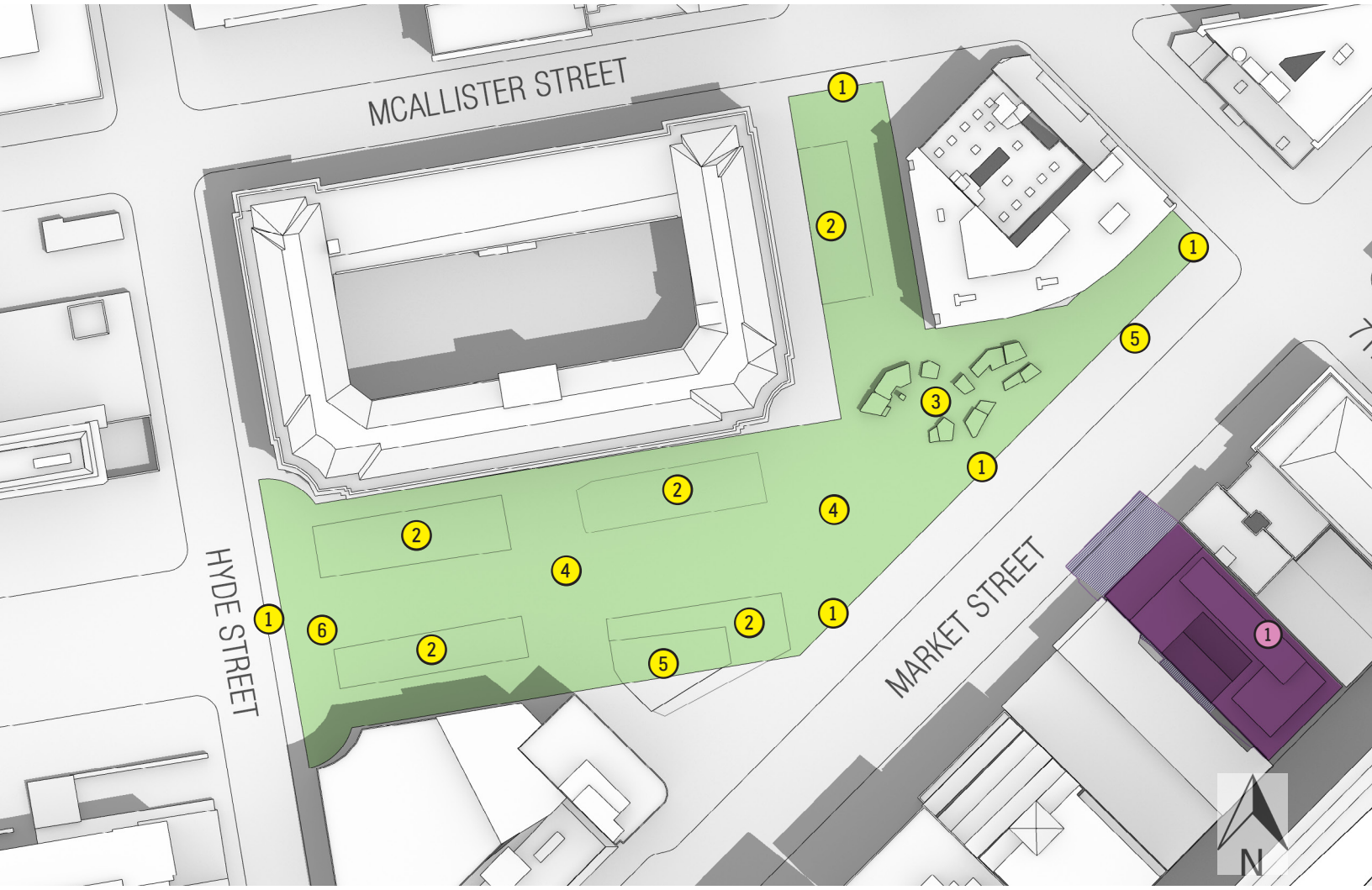
- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

PREVISION DESIGN

E1.7

469 STEVENSON STREET

UN Plaza: Maximum Project Shadow Date



DATE WITH MOST SFH NET NEW PROJECT SHADOW
JUNE 21

12:00 PM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

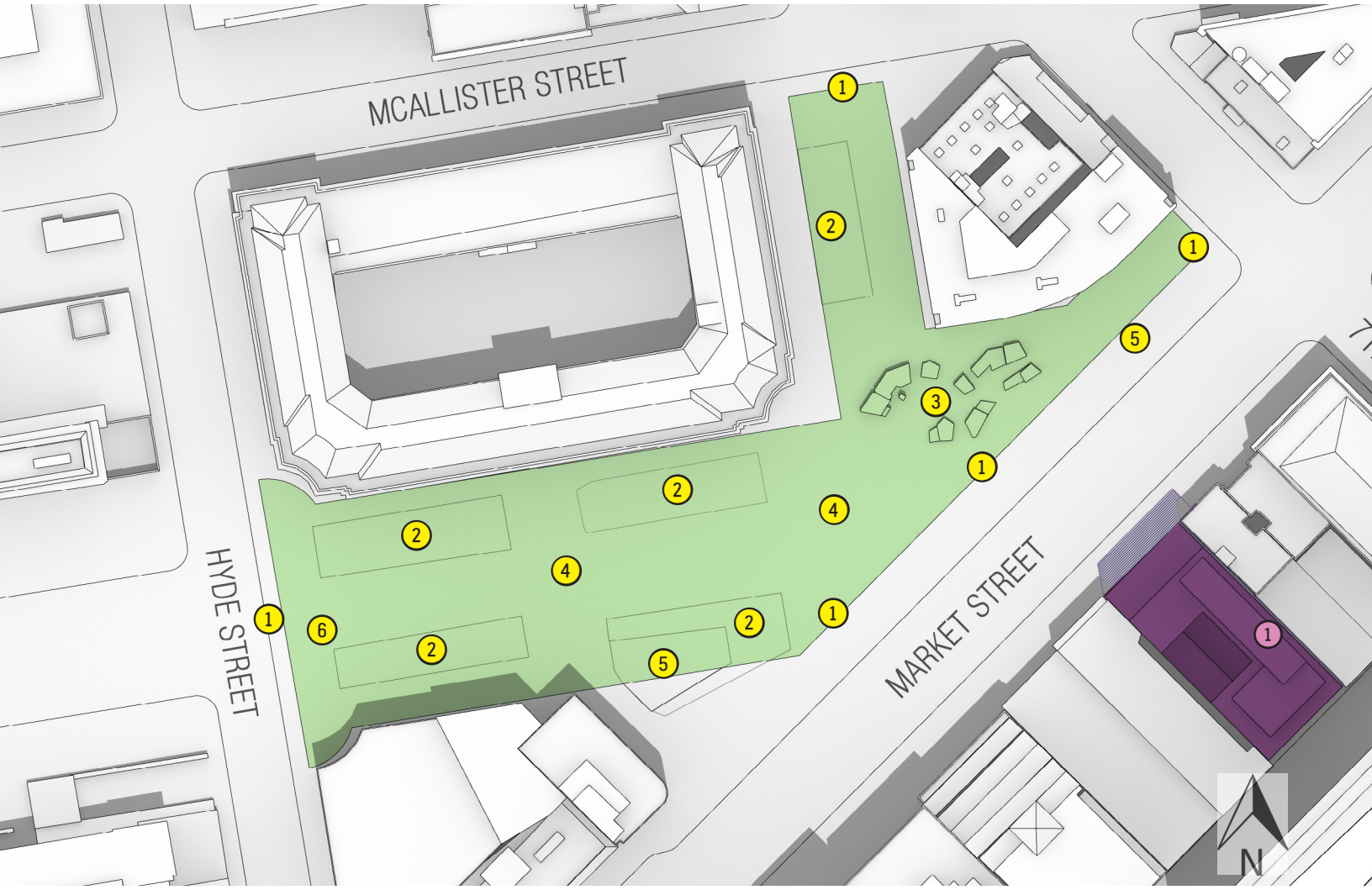
- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

PREVISION DESIGN

E1.8

469 STEVENSON STREET

UN Plaza: Maximum Project Shadow Date



DATE WITH MOST SFH NET NEW PROJECT SHADOW
JUNE 21

1:00 PM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

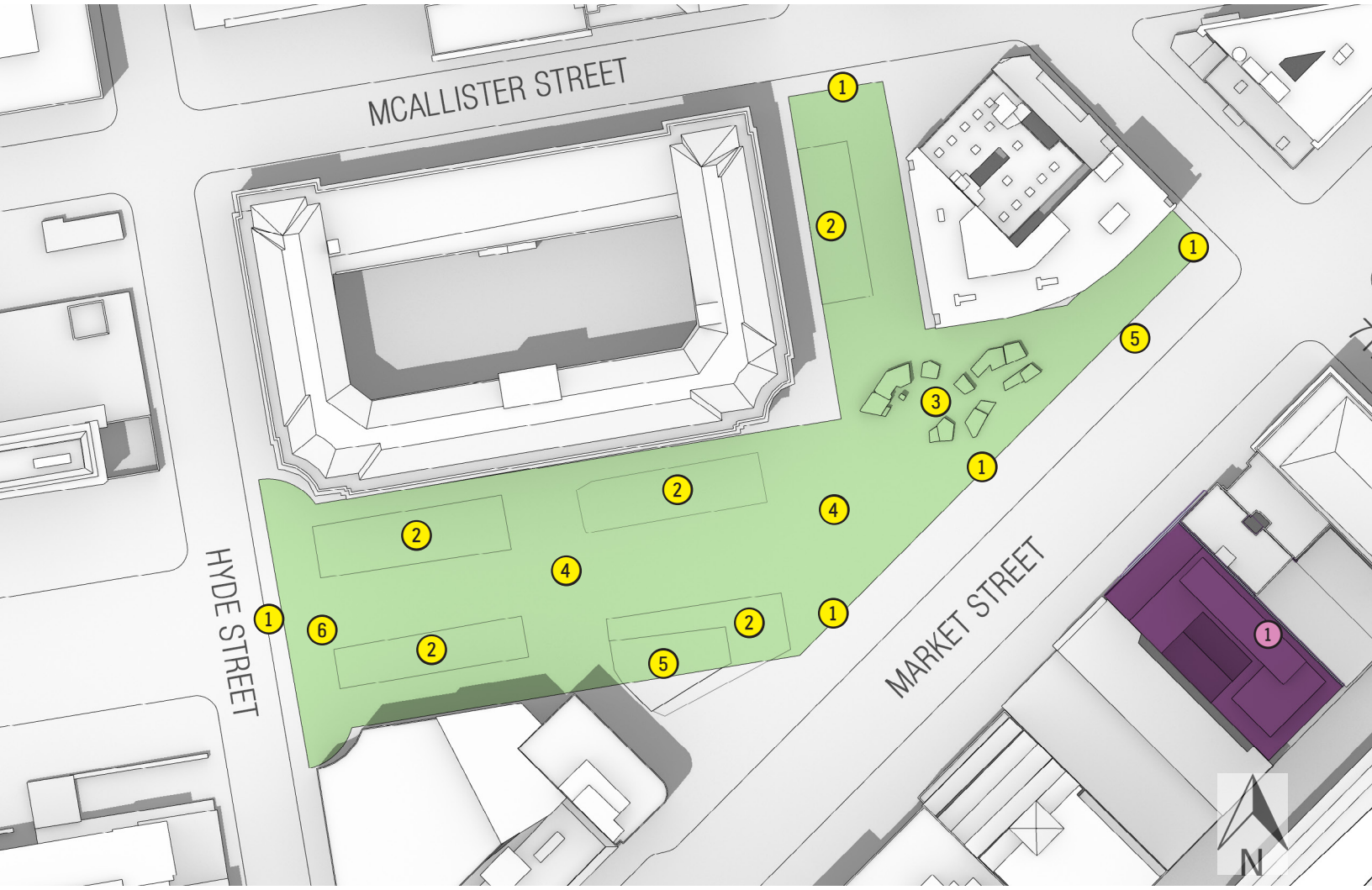
- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

PREVISION DESIGN

E1.9

469 STEVENSON STREET

UN Plaza: Maximum Project Shadow Date



DATE WITH MOST SFH NET NEW PROJECT SHADOW
JUNE 21

2:00 PM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

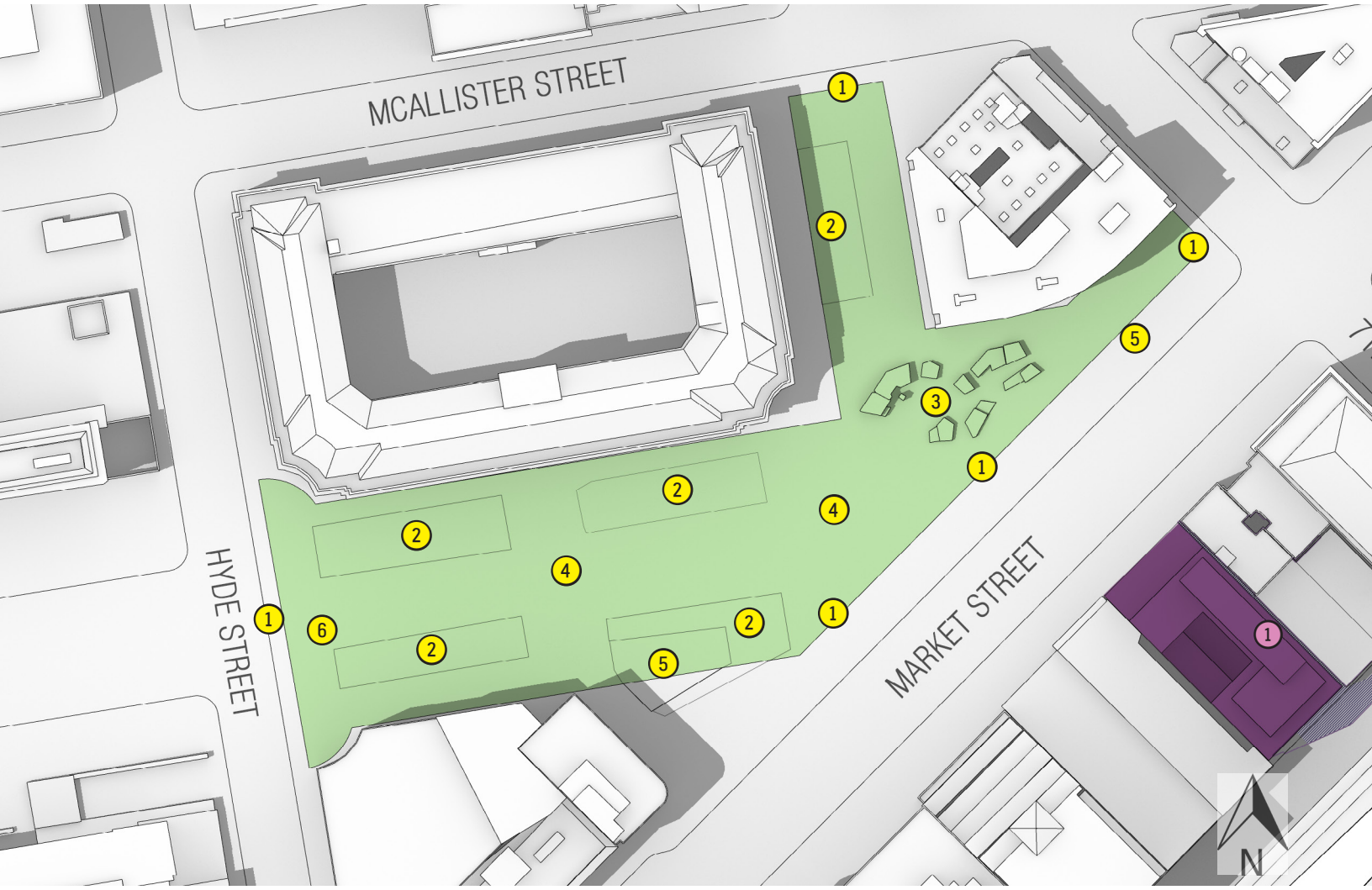
(1) Public Entries
(2) Landscape/Planter Areas
(3) Water Feature
(4) Hardscape Plaza
(5) BART/MUNI entry
(6) Equestrian Sculpture

PREVISION DESIGN

E1.10

469 STEVENSON STREET

UN Plaza: Maximum Project Shadow Date



DATE WITH MOST SFH NET NEW PROJECT SHADOW
JUNE 21

3:00 PM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

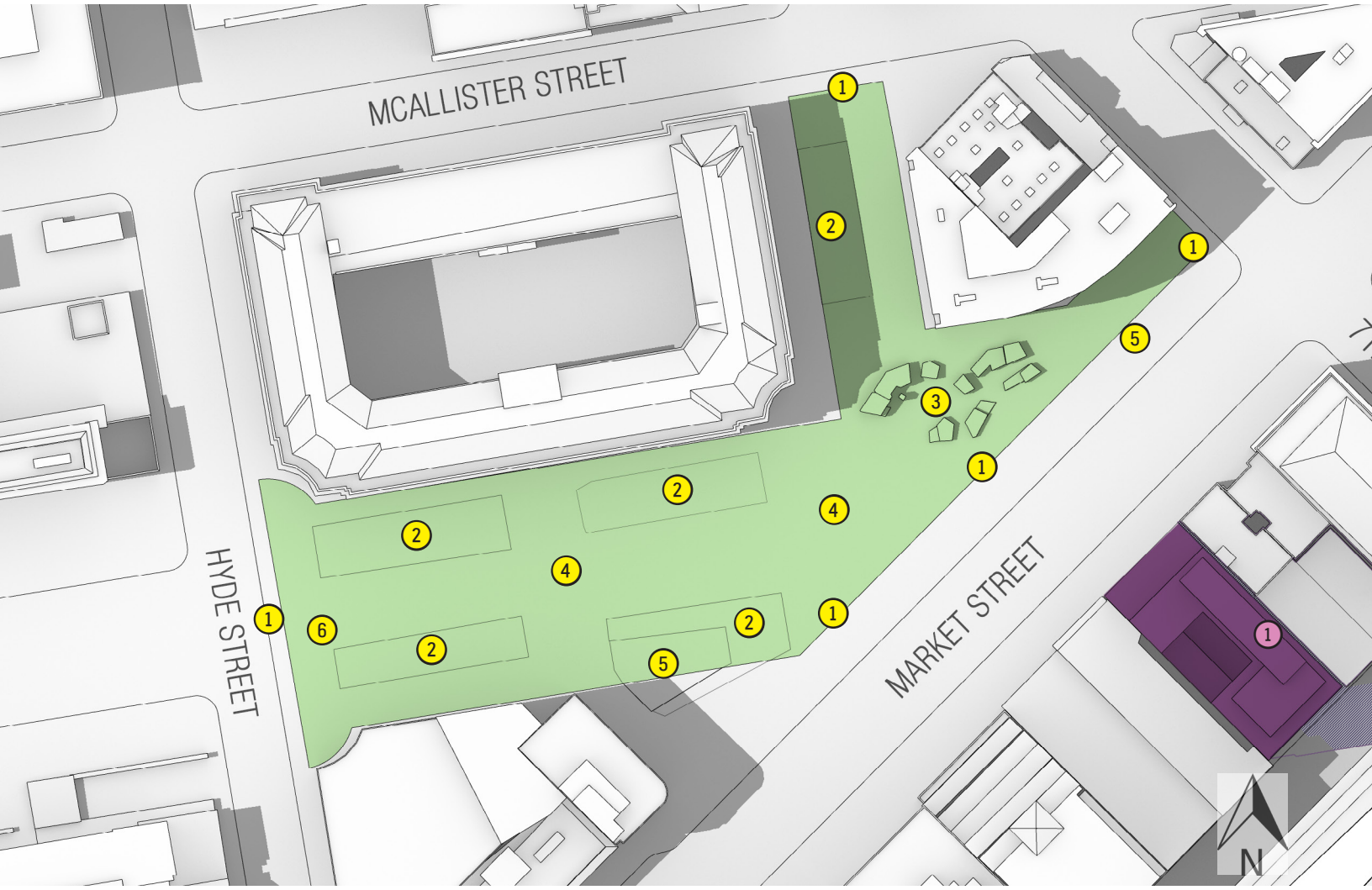
(1) Public Entries
(2) Landscape/Planter Areas
(3) Water Feature
(4) Hardscape Plaza
(5) BART/MUNI entry
(6) Equestrian Sculpture

PREVISION DESIGN

E1.11

469 STEVENSON STREET

UN Plaza: Maximum Project Shadow Date



DATE WITH MOST SFH NET NEW PROJECT SHADOW
JUNE 21

4:00 PM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

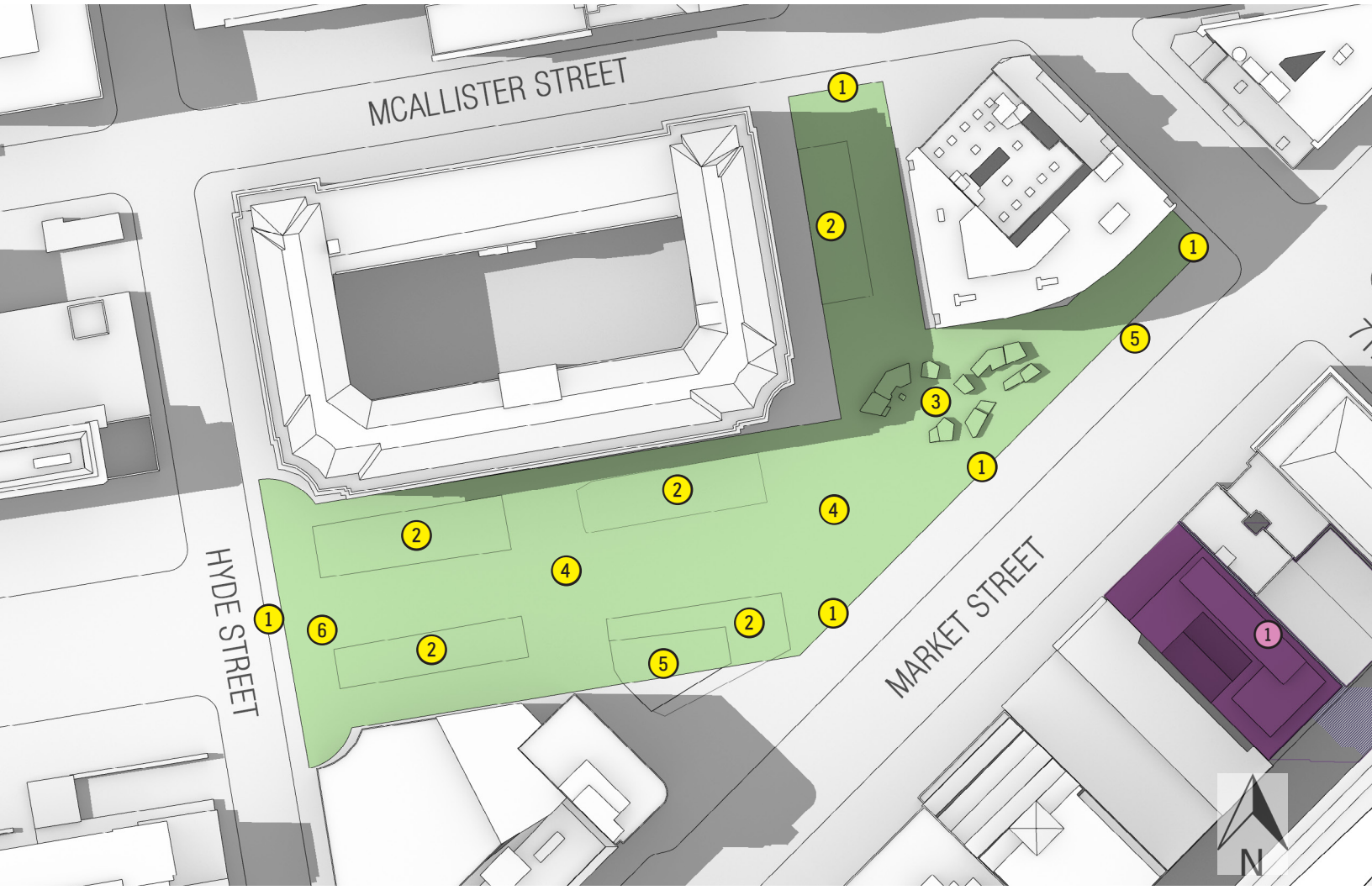
- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

PREVISION DESIGN

E1.12

469 STEVENSON STREET

UN Plaza: Maximum Project Shadow Date



DATE WITH MOST SFH NET NEW PROJECT SHADOW
JUNE 21

5:00 PM

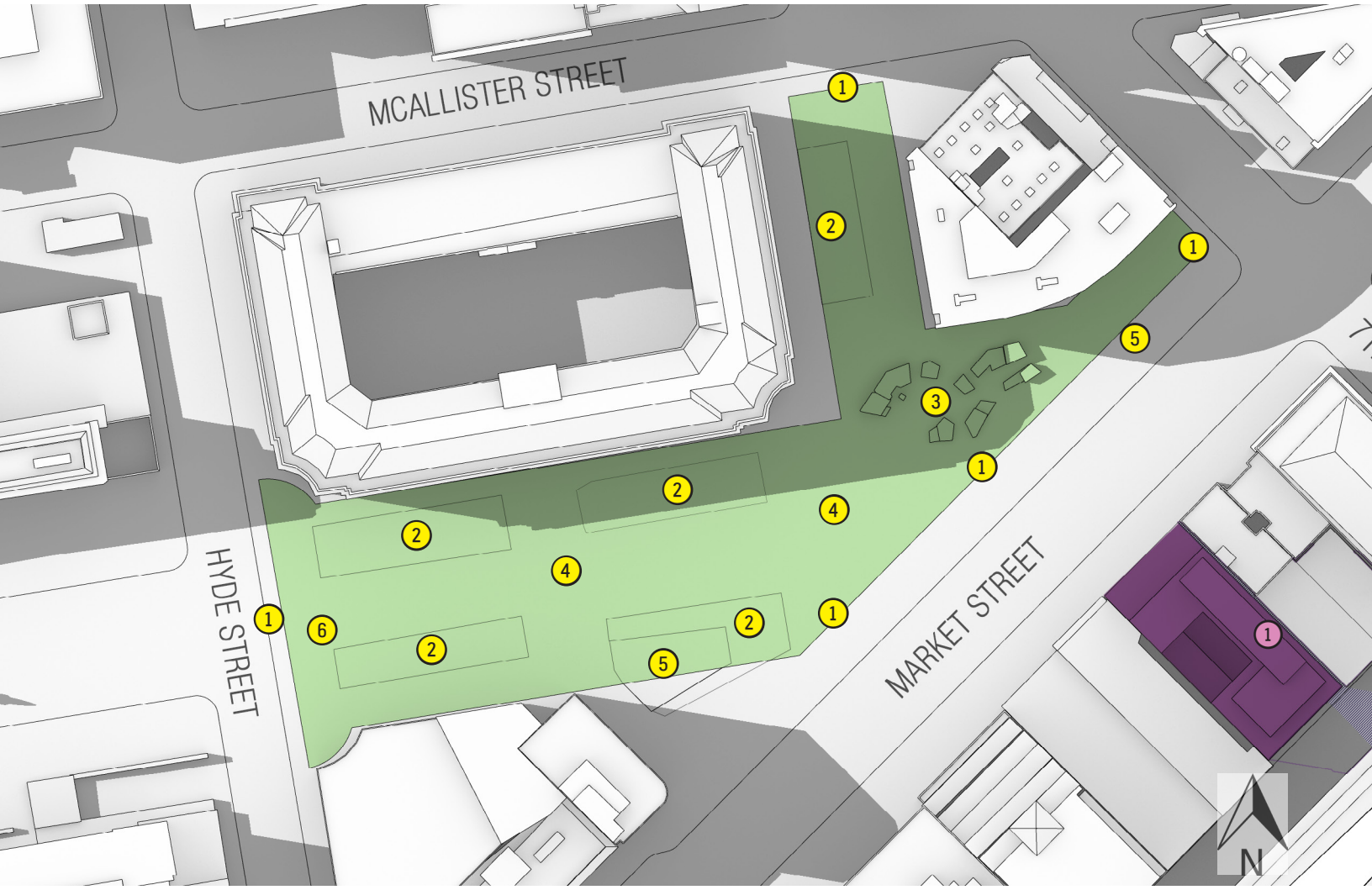
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

E1.13

469 STEVENSON STREET

UN Plaza: Maximum Project Shadow Date



DATE WITH MOST SFH NET NEW PROJECT SHADOW
JUNE 21

6:00 PM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

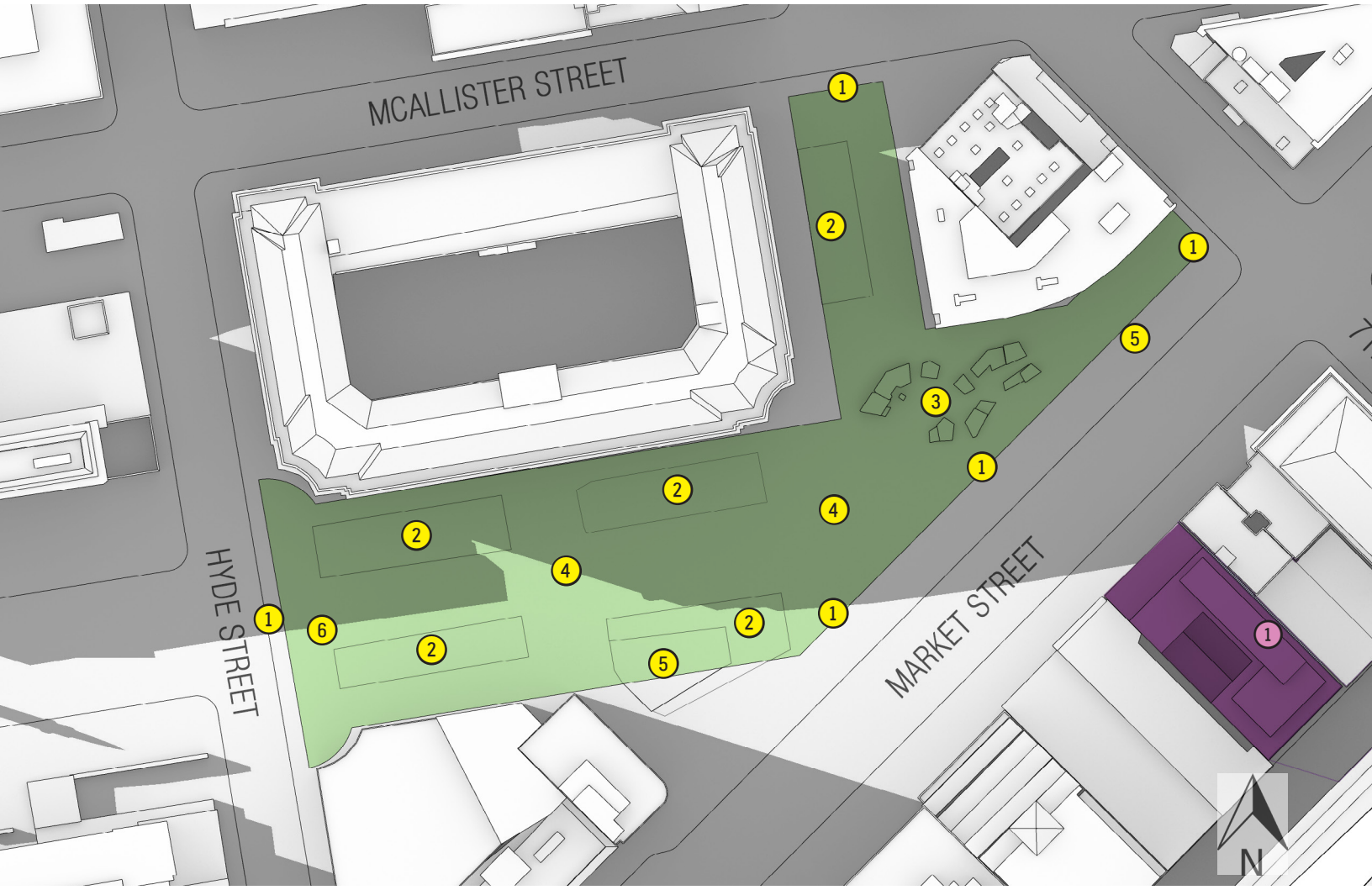
- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

PREVISION DESIGN

E1.14

469 STEVENSON STREET

UN Plaza: Maximum Project Shadow Date



DATE WITH MOST SFH NET NEW PROJECT SHADOW
JUNE 21

7:00 PM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

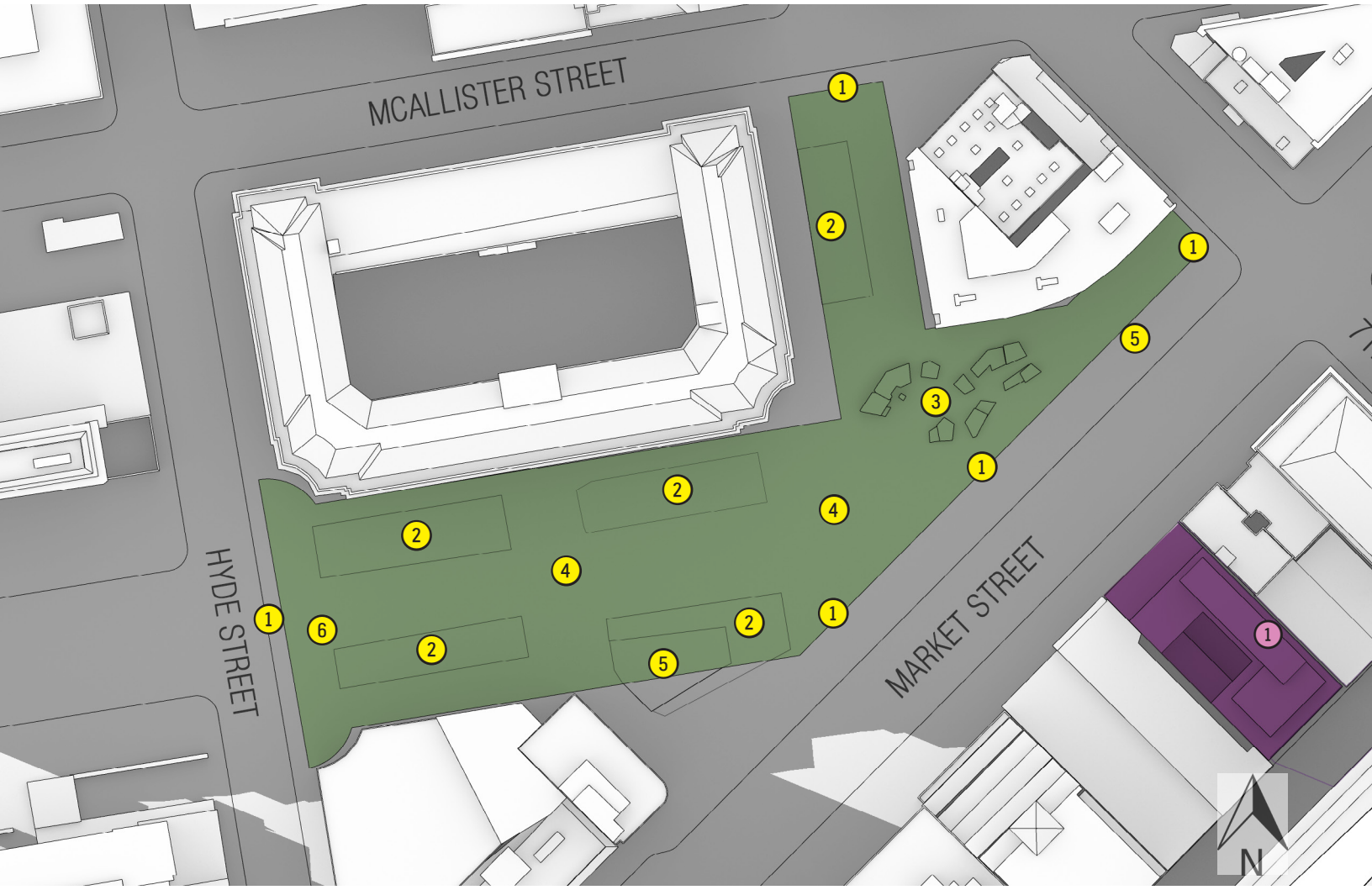
- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

PREVISION DESIGN

E1.15

469 STEVENSON STREET

UN Plaza: Maximum Project Shadow Date



DATE WITH MOST SFH NET NEW PROJECT SHADOW
JUNE 21

7:36 PM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

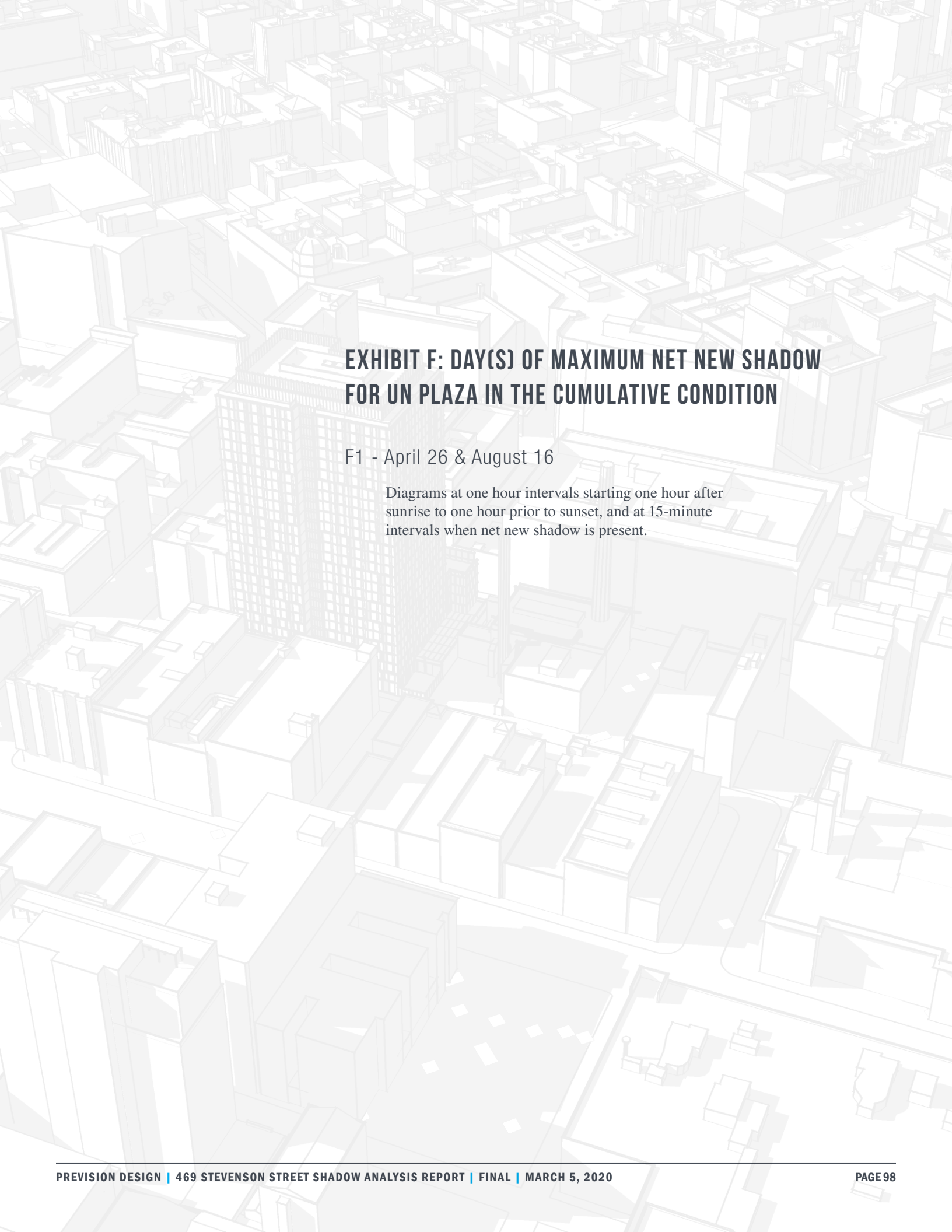


EXHIBIT F: DAY(S) OF MAXIMUM NET NEW SHADOW FOR UN PLAZA IN THE CUMULATIVE CONDITION

F1 - April 26 & August 16

Diagrams at one hour intervals starting one hour after sunrise to one hour prior to sunset, and at 15-minute intervals when net new shadow is present.

F1.1

469 STEVENSON

UN Plaza: Maximum Cumulative Shadow Date

DATE WITH MOST SFH NET NEW CUMULATIVE SHADOW
APRIL 26 & AUGUST 16

7:25 AM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

PREVISION DESIGN

F1.2

469 STEVENSON

UN Plaza: Maximum Cumulative Shadow Date

DATE WITH MOST SFH NET NEW CUMULATIVE SHADOW
APRIL 26 & AUGUST 16

7:30 AM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

PREVISION DESIGN

F1.3

469 STEVENSON

UN Plaza: Maximum Cumulative Shadow Date

DATE WITH MOST SFH NET NEW CUMULATIVE SHADOW
APRIL 26 & AUGUST 16

7:45 AM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

F1.4

469 STEVENSON

UN Plaza: Maximum Cumulative Shadow Date

DATE WITH MOST SFH NET NEW CUMULATIVE SHADOW
APRIL 26 & AUGUST 16

8:00 AM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

PREVISION DESIGN

F1.5

469 STEVENSON

UN Plaza: Maximum Cumulative Shadow Date

DATE WITH MOST SFH NET NEW CUMULATIVE SHADOW
APRIL 26 & AUGUST 16

8:15 AM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

PREVISION DESIGN

F1.6

469 STEVENSON

UN Plaza: Maximum Cumulative Shadow Date

DATE WITH MOST SFH NET NEW CUMULATIVE SHADOW
APRIL 26 & AUGUST 16

8:30 AM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

F1.7

469 STEVENSON

UN Plaza: Maximum Cumulative Shadow Date

DATE WITH MOST SFH NET NEW CUMULATIVE SHADOW
APRIL 26 & AUGUST 16

8:45 AM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

PREVISION DESIGN

F1.8

469 STEVENSON

UN Plaza: Maximum Cumulative Shadow Date

DATE WITH MOST SFH NET NEW CUMULATIVE SHADOW
APRIL 26 & AUGUST 16

9:00 AM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

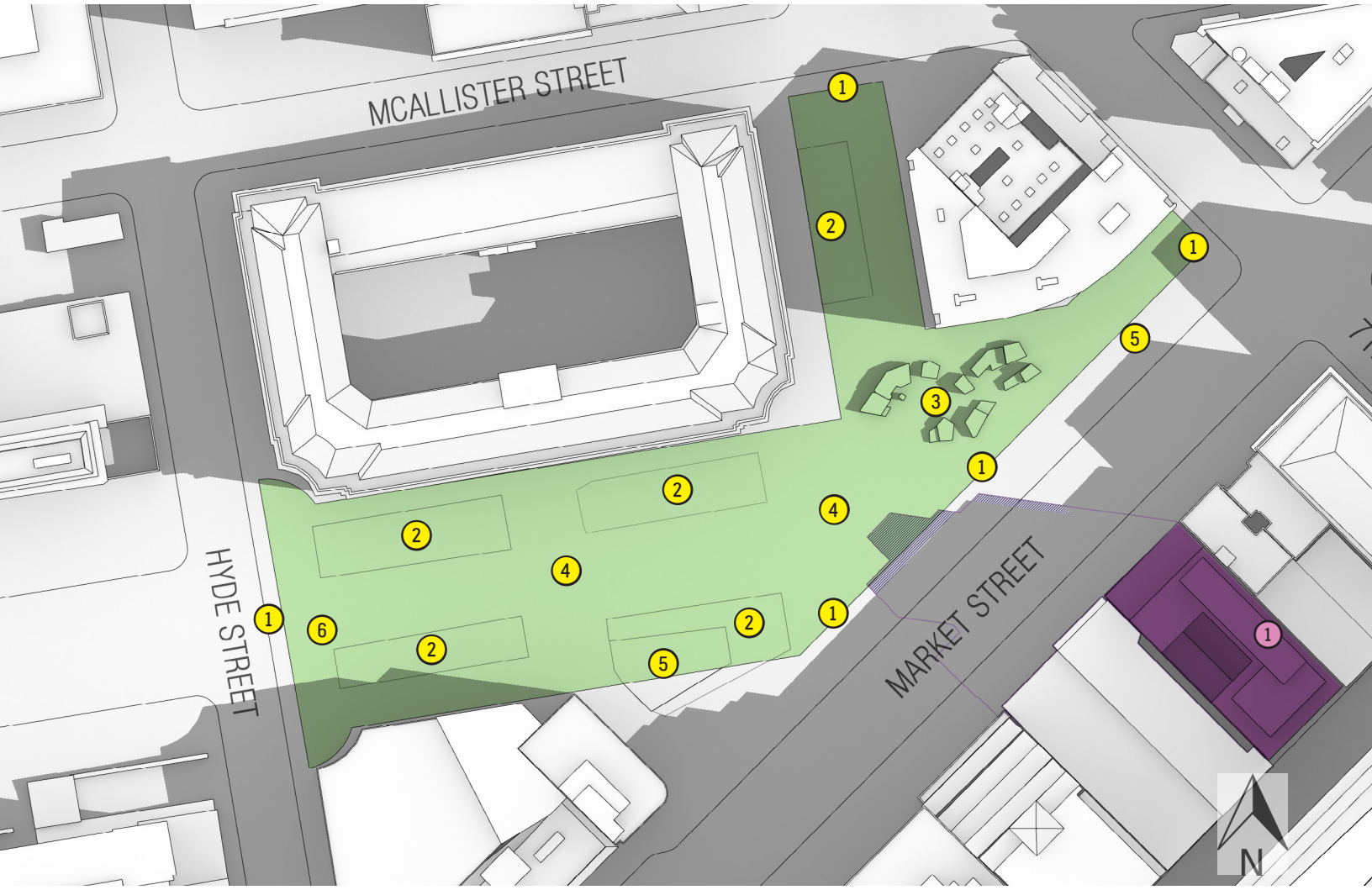
- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

PREVISION DESIGN

F1.9

469 STEVENSON

UN Plaza: Maximum Cumulative Shadow Date



DATE WITH MOST SFH NET NEW CUMULATIVE SHADOW
APRIL 26 & AUGUST 16

9:15 AM

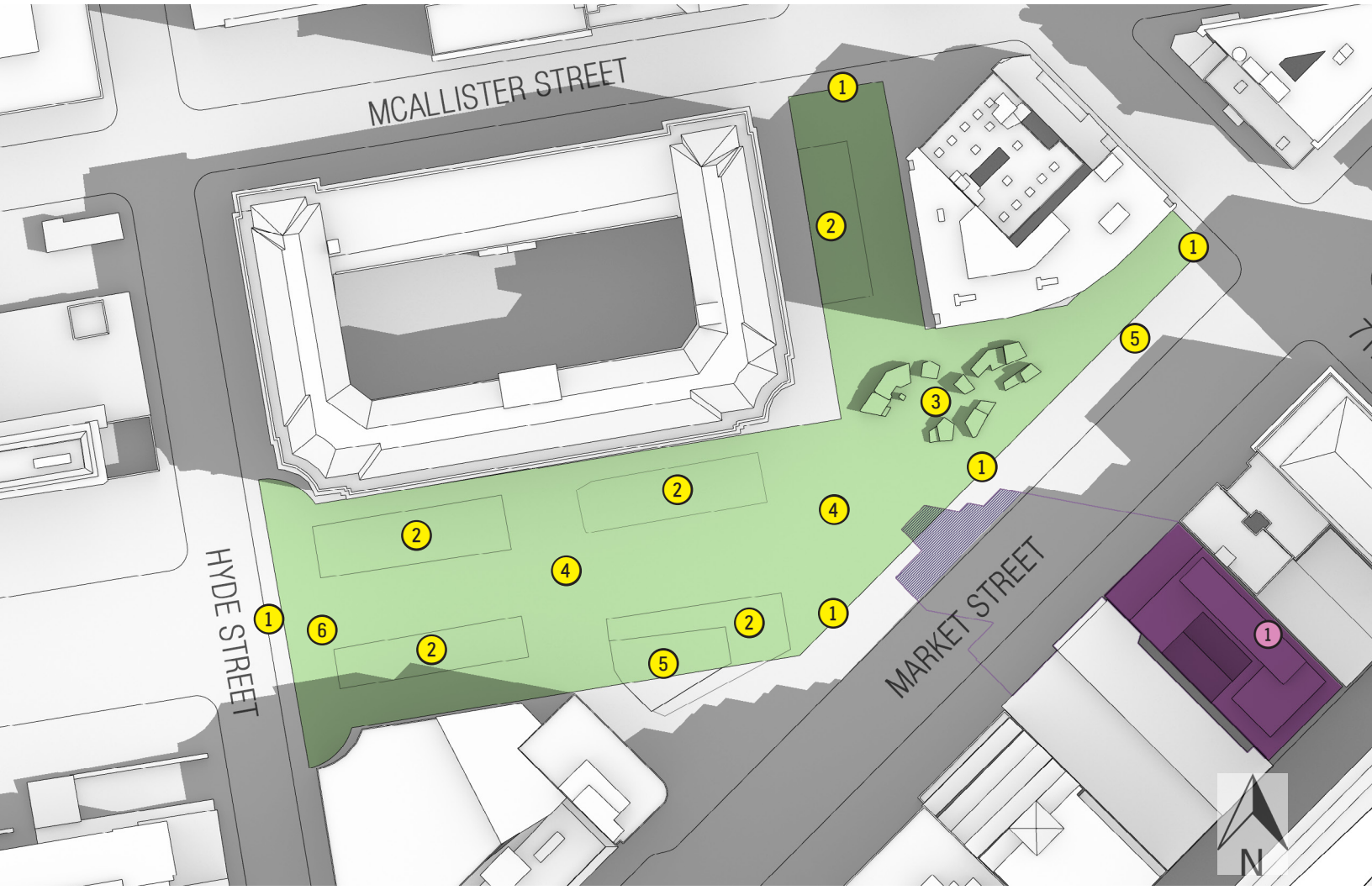
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

F1.10

469 STEVENSON

UN Plaza: Maximum Cumulative Shadow Date



DATE WITH MOST SFH NET NEW CUMULATIVE SHADOW
APRIL 26 & AUGUST 16

9:30 AM

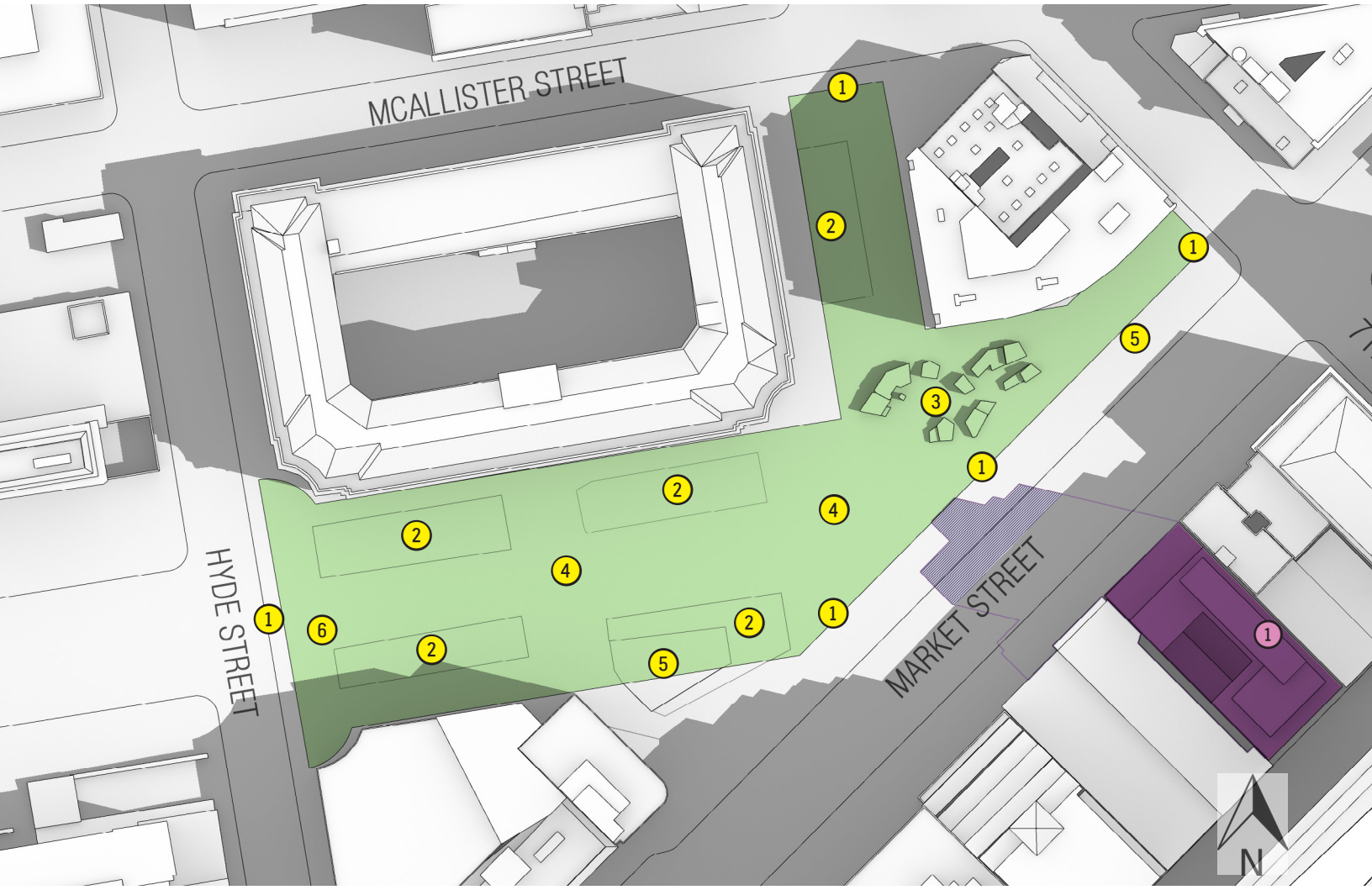
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

F1.11

469 STEVENSON

UN Plaza: Maximum Cumulative Shadow Date



DATE WITH MOST SFH NET NEW CUMULATIVE SHADOW
APRIL 26 & AUGUST 16

9:45 AM

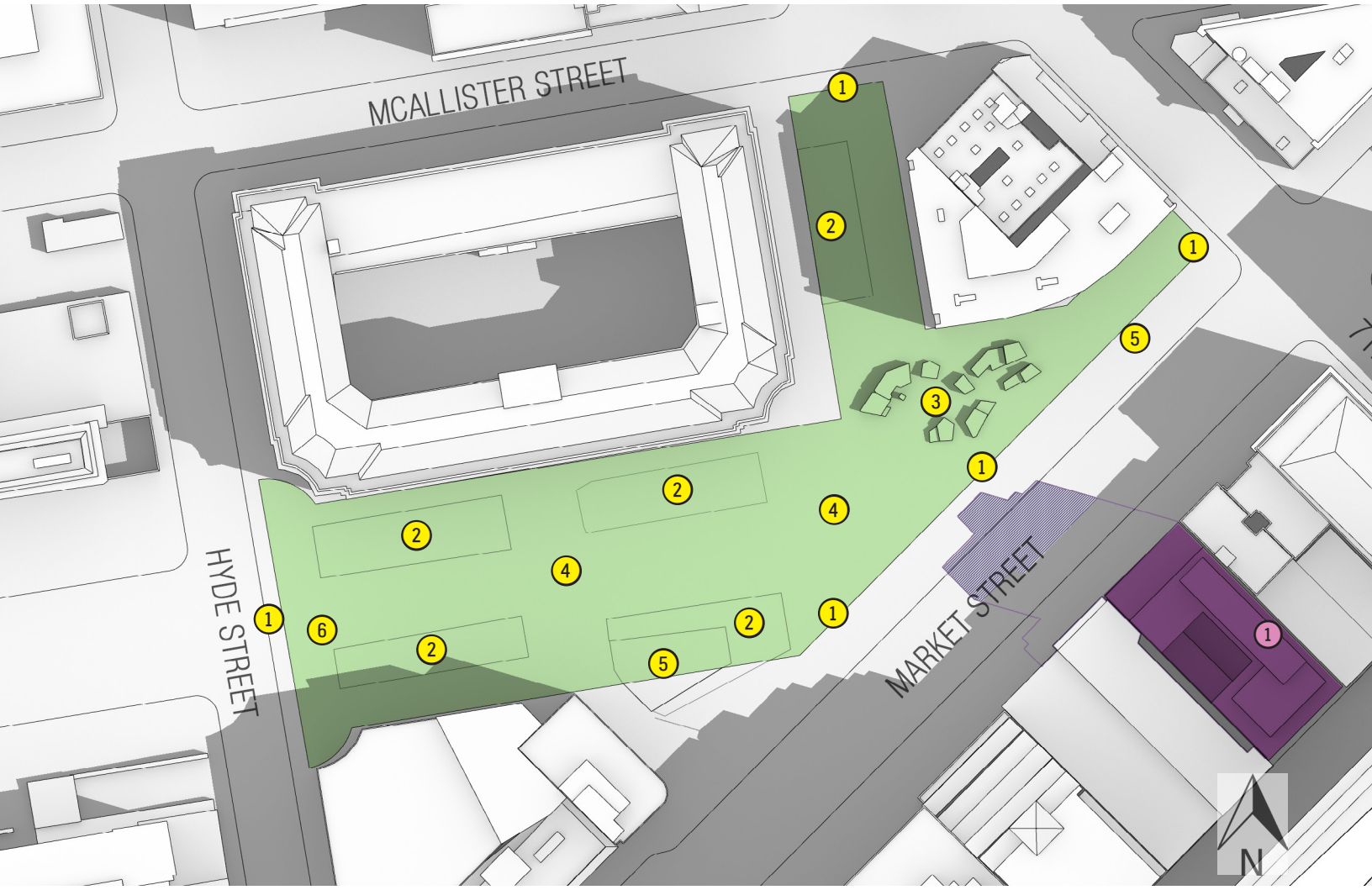
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

F1.12

469 STEVENSON

UN Plaza: Maximum Cumulative Shadow Date



DATE WITH MOST SFH NET NEW CUMULATIVE SHADOW
APRIL 26 & AUGUST 16

10:00 AM

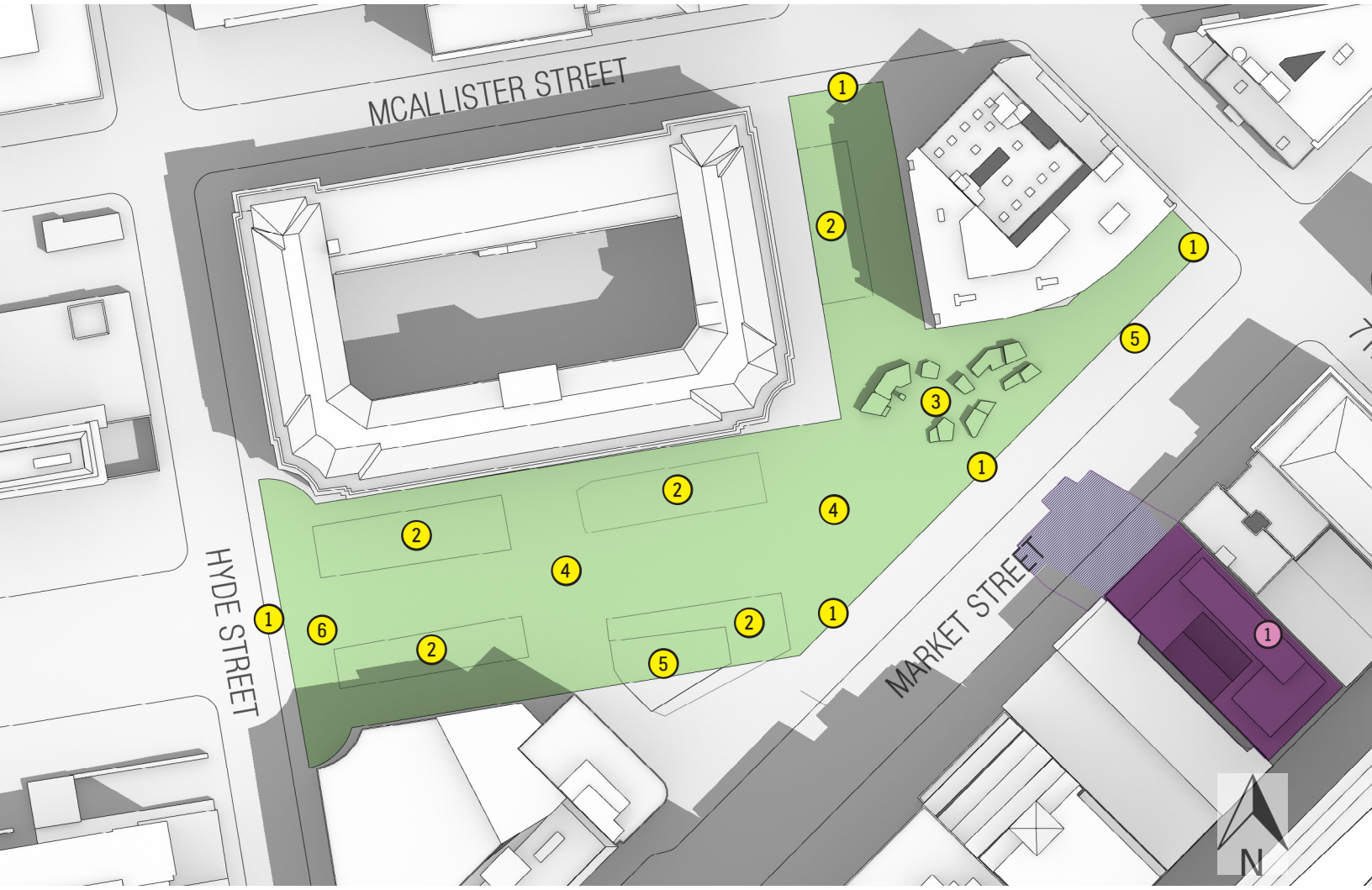
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

F1.13

469 STEVENSON

UN Plaza: Maximum Cumulative Shadow Date



DATE WITH MOST SFH NET NEW CUMULATIVE SHADOW
APRIL 26 & AUGUST 16

11:00 AM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

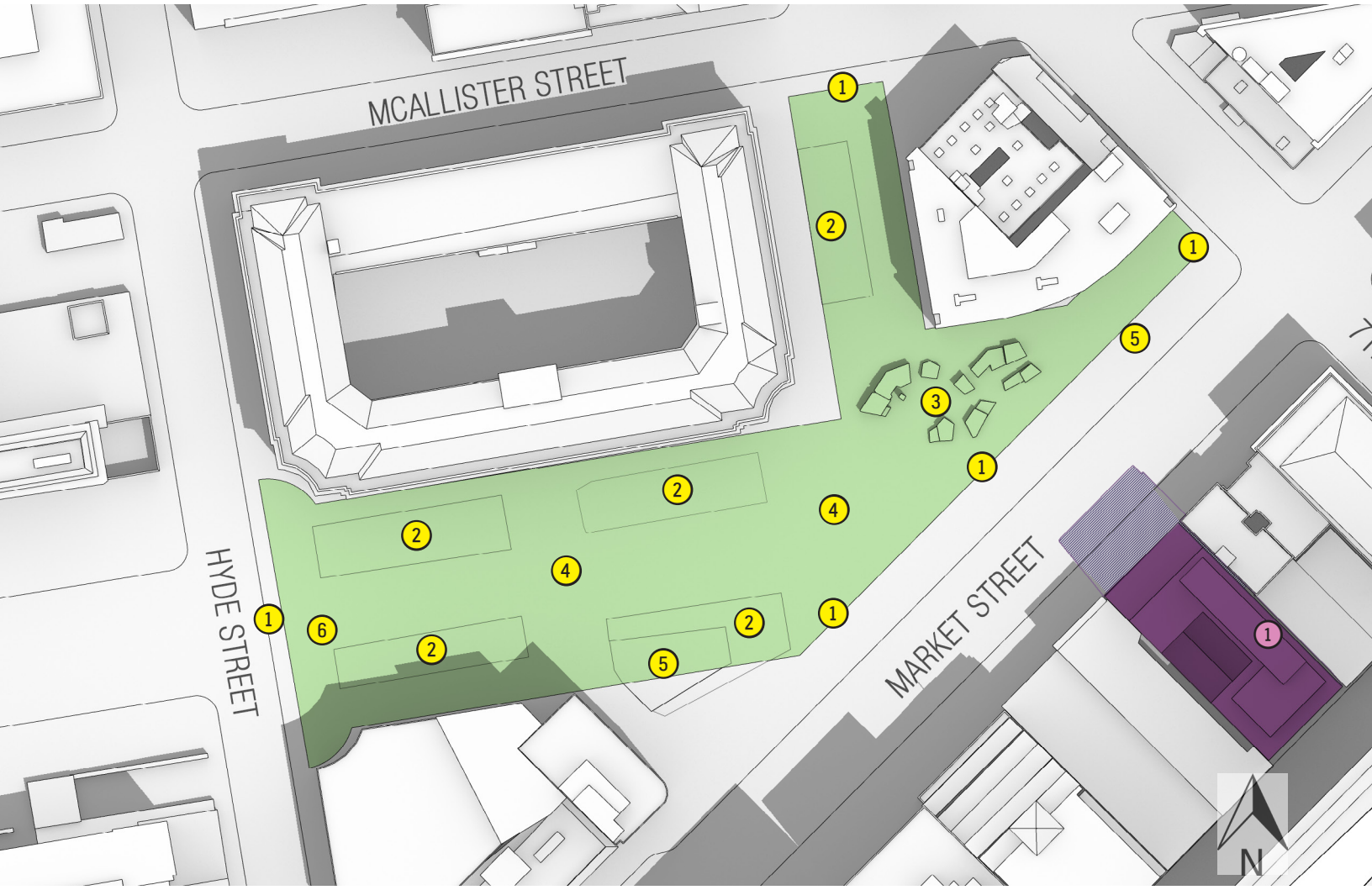
- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

PREVISION DESIGN

F1.14

469 STEVENSON

UN Plaza: Maximum Cumulative Shadow Date



DATE WITH MOST SFH NET NEW CUMULATIVE SHADOW
APRIL 26 & AUGUST 16

12:00 PM

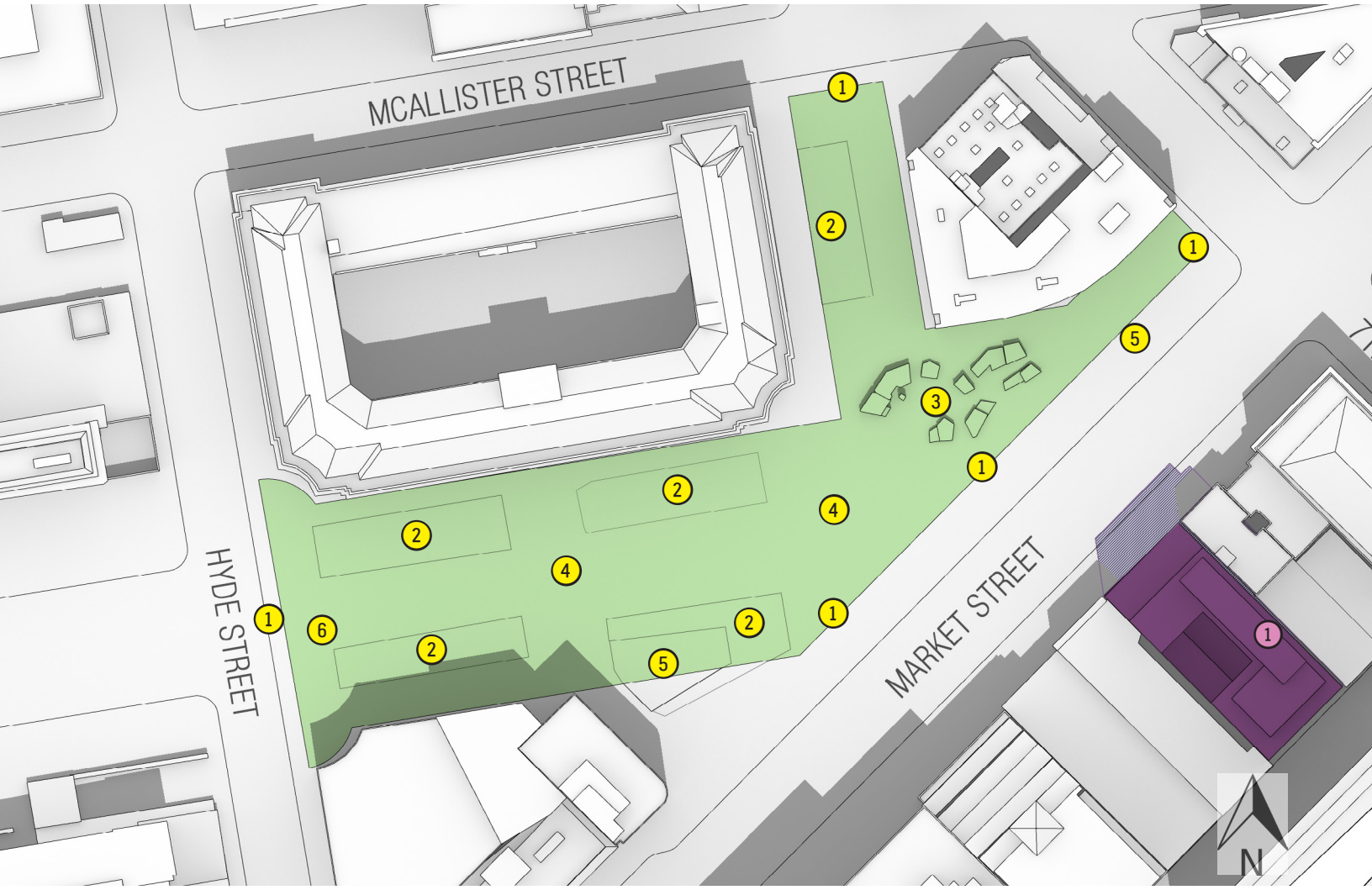
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

F1.15

469 STEVENSON

UN Plaza: Maximum Cumulative Shadow Date



DATE WITH MOST SFH NET NEW CUMULATIVE SHADOW
APRIL 26 & AUGUST 16

1:00 PM

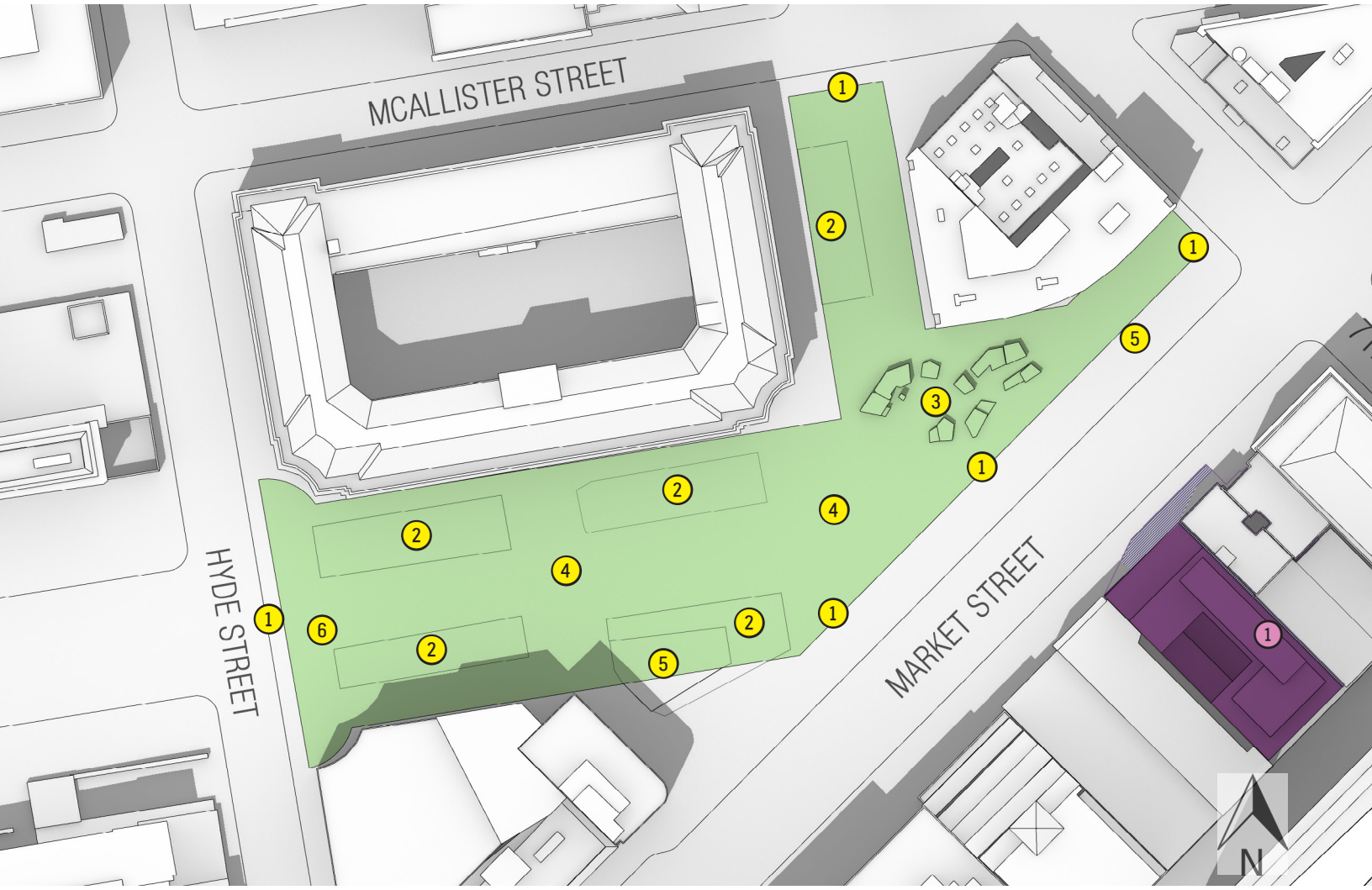
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

F1.16

469 STEVENSON

UN Plaza: Maximum Cumulative Shadow Date



DATE WITH MOST SFH NET NEW CUMULATIVE SHADOW
APRIL 26 & AUGUST 16

2:00 PM

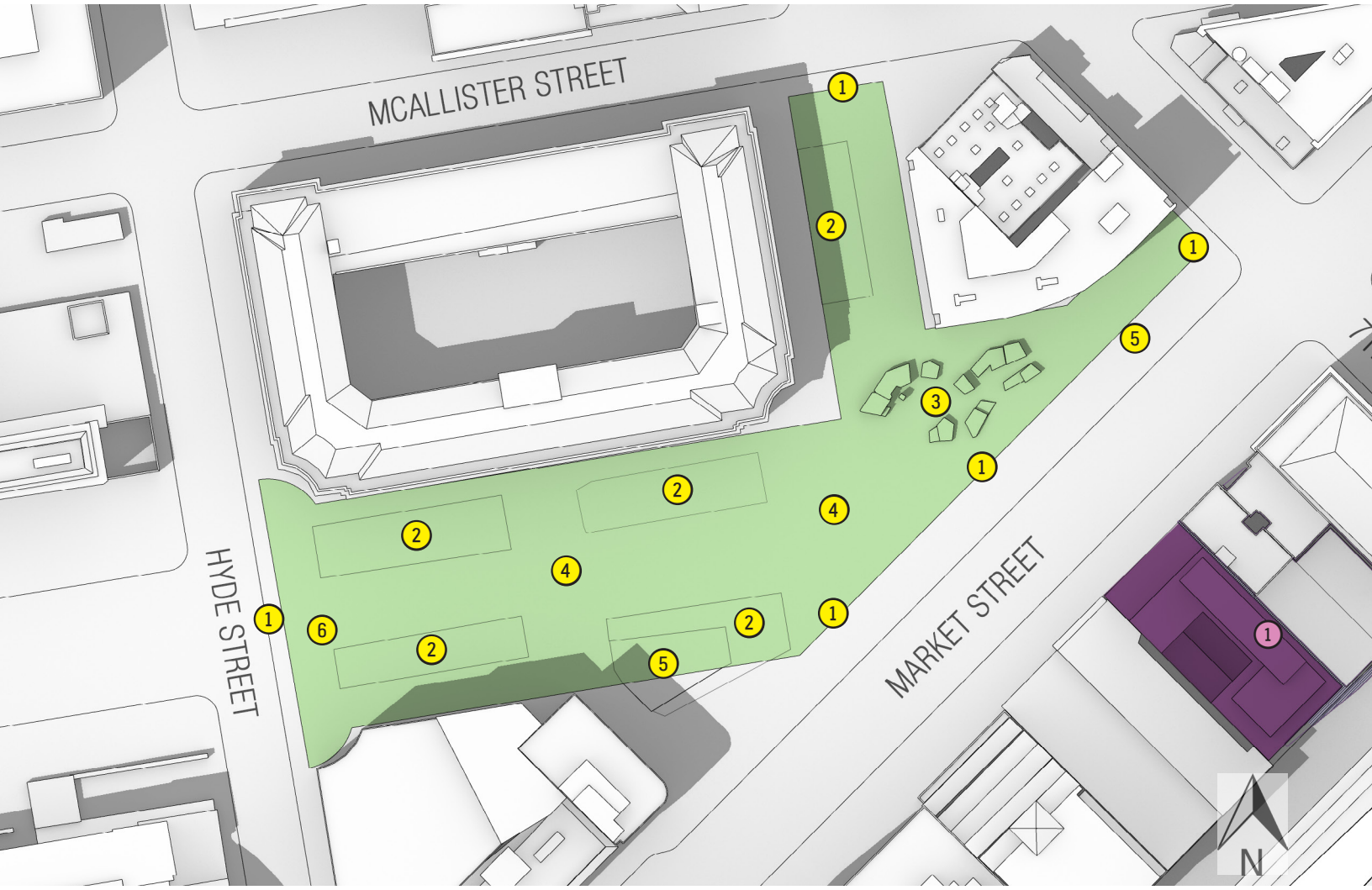
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

F1.17

469 STEVENSON

UN Plaza: Maximum Cumulative Shadow Date



DATE WITH MOST SFH NET NEW CUMULATIVE SHADOW
APRIL 26 & AUGUST 16

3:00 PM

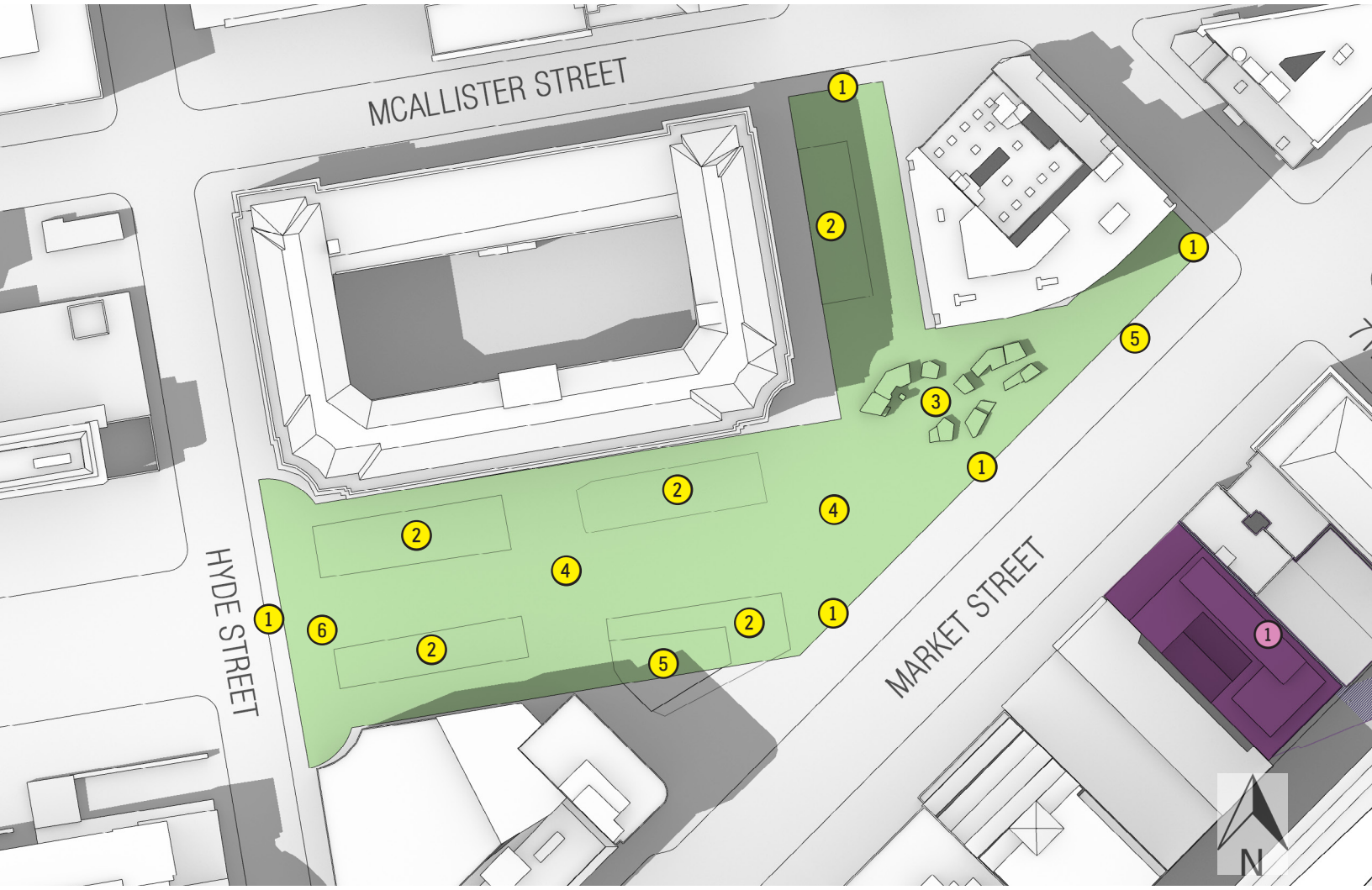
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

F1.18

469 STEVENSON

UN Plaza: Maximum Cumulative Shadow Date



DATE WITH MOST SFH NET NEW CUMULATIVE SHADOW
APRIL 26 & AUGUST 16

4:00 PM

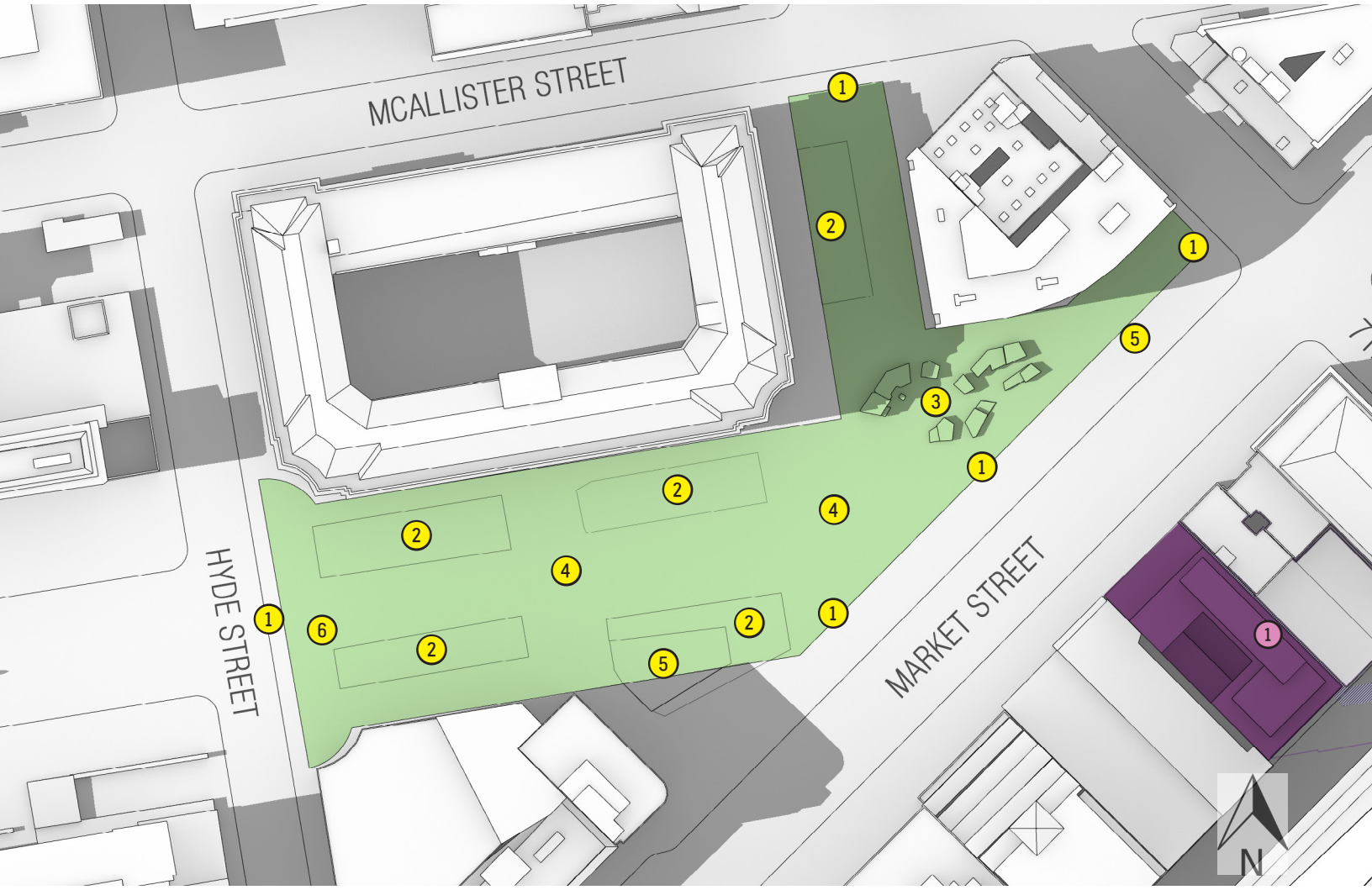
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

F1.19

469 STEVENSON

UN Plaza: Maximum Cumulative Shadow Date



DATE WITH MOST SFH NET NEW CUMULATIVE SHADOW
APRIL 26 & AUGUST 16

5:00 PM

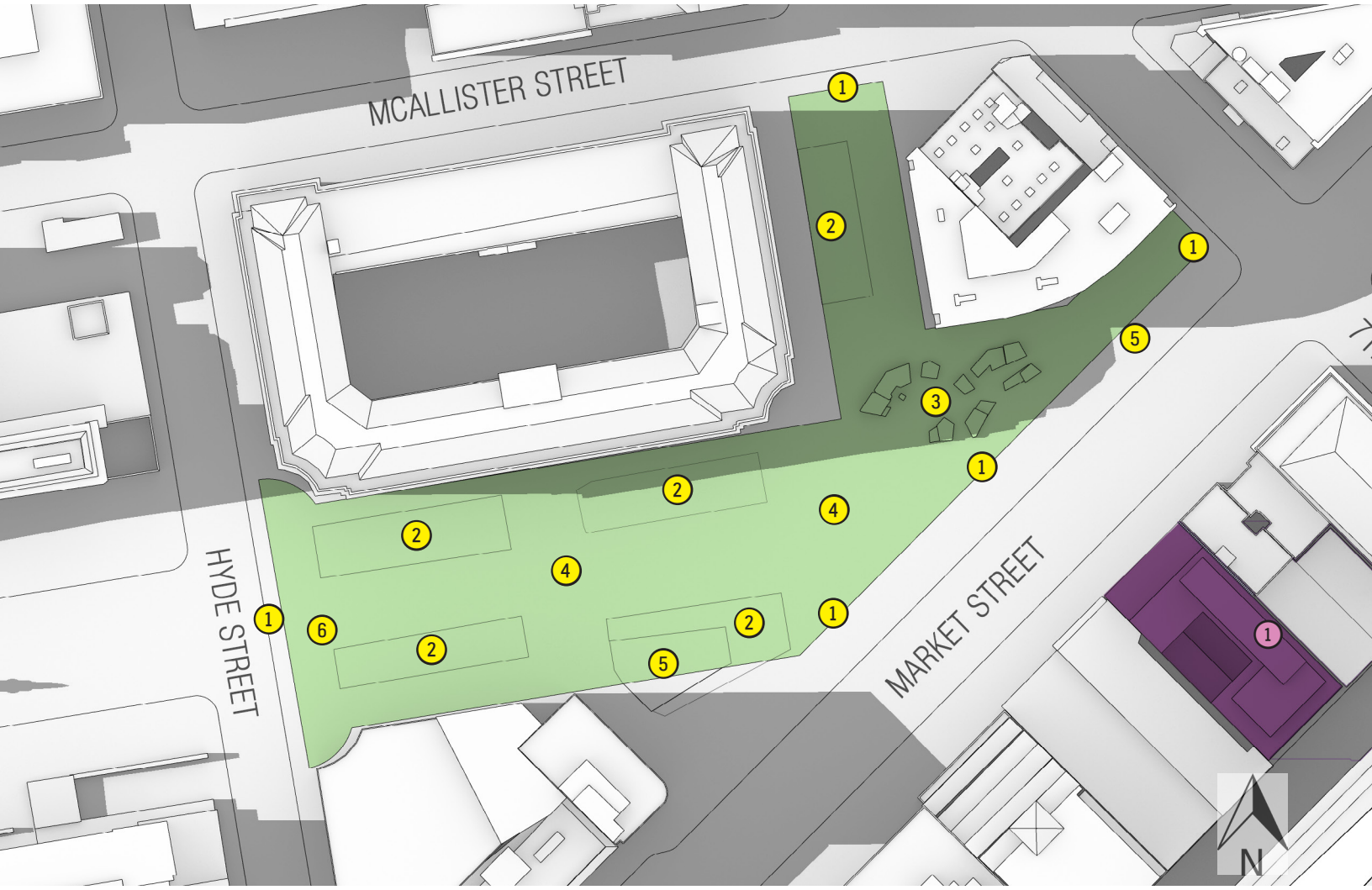
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

F1.20

469 STEVENSON

UN Plaza: Maximum Cumulative Shadow Date



DATE WITH MOST SFH NET NEW CUMULATIVE SHADOW
APRIL 26 & AUGUST 16

6:00 PM

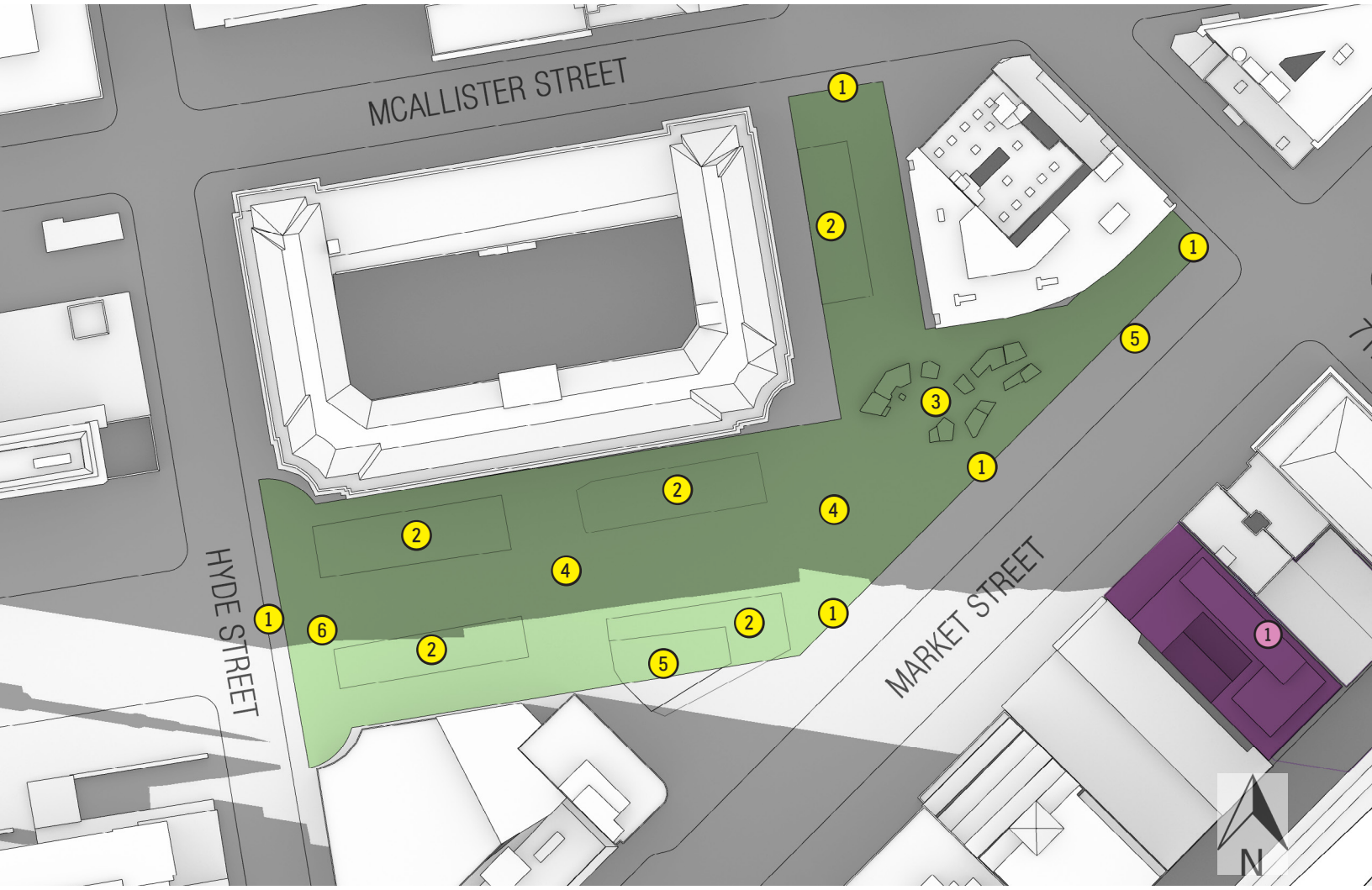
- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

F1.21

469 STEVENSON

UN Plaza: Maximum Cumulative Shadow Date



DATE WITH MOST SFH NET NEW CUMULATIVE SHADOW
APRIL 26 & AUGUST 16

7:02 PM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects
- Cumulative Projects
  - (1) 1125 Market Street

- (1) Public Entries
- (2) Landscape/Planter Areas
- (3) Water Feature
- (4) Hardscape Plaza
- (5) BART/MUNI entry
- (6) Equestrian Sculpture

EXHIBIT G: DAY(S) OF MAXIMUM NET NEW SHADOW FOR MINT PLAZA (ALSO DATE OF MAX CUMULATIVE)

G1 - October 25 & February 15

Diagrams at one hour intervals starting one hour after sunrise to one hour prior to sunset, and at 15-minute intervals when net new shadow is present.

G1.1

469 STEVENSON STREET

Shading diagrams on the date(s) of maximum shading

DATE WITH MOST NET NEW SHADOW
OCTOBER 25 & FEBRUARY 15

7:30 AM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

1. Public Entries
2. Landscape Planters/Seating Wall
3. Tree Wells (6 trees)
4. Vine Trellis Structure
5. Hardscape / Non-fixed Seating Areas
6. Cafe Seating

G1.2

469 STEVENSON STREET

Shading diagrams on the date(s) of maximum shading

DATE WITH MOST NET NEW SHADOW
OCTOBER 25 & FEBRUARY 15

8:00 AM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

1. Public Entries
2. Landscape Planters/Seating Wall
3. Tree Wells (6 trees)
4. Vine Trellis Structure
5. Hardscape / Non-fixed Seating Areas
6. Cafe Seating

G1.3

469 STEVENSON STREET

Shading diagrams on the date(s) of maximum shading

DATE WITH MOST NET NEW SHADOW
OCTOBER 25 & FEBRUARY 15

9:00 AM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

1. Public Entries
2. Landscape Planters/Seating Wall
3. Tree Wells (6 trees)
4. Vine Trellis Structure
5. Hardscape / Non-fixed Seating Areas
6. Cafe Seating

G1.4

469 STEVENSON STREET

Shading diagrams on the date(s) of maximum shading

DATE WITH MOST NET NEW SHADOW
OCTOBER 25 & FEBRUARY 15

10:00 AM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

1. Public Entries
2. Landscape Planters/Seating Wall
3. Tree Wells (6 trees)
4. Vine Trellis Structure
5. Hardscape / Non-fixed Seating Areas
6. Cafe Seating

G1.5

469 STEVENSON STREET

Shading diagrams on the date(s) of maximum shading

DATE WITH MOST NET NEW SHADOW
OCTOBER 25 & FEBRUARY 15

11:00 AM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

1. Public Entries
2. Landscape Planters/Seating Wall
3. Tree Wells (6 trees)
4. Vine Trellis Structure
5. Hardscape / Non-fixed Seating Areas
6. Cafe Seating

PREVISION DESIGN

G1.6

469 STEVENSON STREET

Shading diagrams on the date(s) of maximum shading

DATE WITH MOST NET NEW SHADOW
OCTOBER 25 & FEBRUARY 15

12:00 PM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

1. Public Entries
2. Landscape Planters/Seating Wall
3. Tree Wells (6 trees)
4. Vine Trellis Structure
5. Hardscape / Non-fixed Seating Areas
6. Cafe Seating

G1.7

469 STEVENSON STREET

Shading diagrams on the date(s) of maximum shading

DATE WITH MOST NET NEW SHADOW
OCTOBER 25 & FEBRUARY 15

1:00 PM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

1. Public Entries
2. Landscape Planters/Seating Wall
3. Tree Wells (6 trees)
4. Vine Trellis Structure
5. Hardscape / Non-fixed Seating Areas
6. Cafe Seating

G1.8

469 STEVENSON STREET

Shading diagrams on the date(s) of maximum shading

DATE WITH MOST NET NEW SHADOW
OCTOBER 25 & FEBRUARY 15

2:00 PM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

1. Public Entries
2. Landscape Planters/Seating Wall
3. Tree Wells (6 trees)
4. Vine Trellis Structure
5. Hardscape / Non-fixed Seating Areas
6. Cafe Seating

G1.9

469 STEVENSON STREET

Shading diagrams on the date(s) of maximum shading

DATE WITH MOST NET NEW SHADOW
OCTOBER 25 & FEBRUARY 15

2:15 PM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

1. Public Entries
2. Landscape Planters/Seating Wall
3. Tree Wells (6 trees)
4. Vine Trellis Structure
5. Hardscape / Non-fixed Seating Areas
6. Cafe Seating

G1.10

469 STEVENSON STREET

Shading diagrams on the date(s) of maximum shading

DATE WITH MOST NET NEW SHADOW
OCTOBER 25 & FEBRUARY 15

2:30 PM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

1. Public Entries
2. Landscape Planters/Seating Wall
3. Tree Wells (6 trees)
4. Vine Trellis Structure
5. Hardscape / Non-fixed Seating Areas
6. Cafe Seating

G1.11

469 STEVENSON STREET

Shading diagrams on the date(s) of maximum shading

DATE WITH MOST NET NEW SHADOW
OCTOBER 25 & FEBRUARY 15

2:45 PM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

1. Public Entries
2. Landscape Planters/Seating Wall
3. Tree Wells (6 trees)
4. Vine Trellis Structure
5. Hardscape / Non-fixed Seating Areas
6. Cafe Seating

G1.12

469 STEVENSON STREET

Shading diagrams on the date(s) of maximum shading

DATE WITH MOST NET NEW SHADOW
OCTOBER 25 & FEBRUARY 15

3:00 PM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

1. Public Entries
2. Landscape Planters/Seating Wall
3. Tree Wells (6 trees)
4. Vine Trellis Structure
5. Hardscape / Non-fixed Seating Areas
6. Cafe Seating

G1.13

469 STEVENSON STREET

Shading diagrams on the date(s) of maximum shading

DATE WITH MOST NET NEW SHADOW
OCTOBER 25 & FEBRUARY 15

3:15 PM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

1. Public Entries
2. Landscape Planters/Seating Wall
3. Tree Wells (6 trees)
4. Vine Trellis Structure
5. Hardscape / Non-fixed Seating Areas
6. Cafe Seating

G1.14

469 STEVENSON STREET

Shading diagrams on the date(s) of maximum shading

DATE WITH MOST NET NEW SHADOW
OCTOBER 25 & FEBRUARY 15

4:00 PM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

1. Public Entries
2. Landscape Planters/Seating Wall
3. Tree Wells (6 trees)
4. Vine Trellis Structure
5. Hardscape / Non-fixed Seating Areas
6. Cafe Seating

G1.15

469 STEVENSON STREET

Shading diagrams on the date(s) of maximum shading

DATE WITH MOST NET NEW SHADOW
OCTOBER 25 & FEBRUARY 15

4:18 PM

- Existing (current) Shadows
- New Shading by Proposed Project
- New Shading from Cumulative Projects

1. Public Entries
2. Landscape Planters/Seating Wall
3. Tree Wells (6 trees)
4. Vine Trellis Structure
5. Hardscape / Non-fixed Seating Areas
6. Cafe Seating

EXHIBIT H: QUANTITATIVE SHADOW DATA

Quantitative Shadow Data for United Nations Plaza

Shadow data for existing conditions, net new shadow from project, and cumulative condition shadow

JUNE 21

Analysis Hours: 6:46 AM-7:36 PM (PDT)

SUMMER SOLSTICE

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
6:46 AM	64,919.33	7141.13	63.5%	1,649.15	181.41	1.6%	1,649.15	181.41	1.6%
7:00 AM	49,575.96	11402.47	48.5%	10.60	2.44	0.0%	10.60	2.44	0.0%
7:15 AM	35,664.48	8916.12	34.9%	0.00	0.00	0.0%	93.77	23.44	0.1%
7:30 AM	26,592.75	6648.19	26.0%	0.00	0.00	0.0%	218.98	54.75	0.2%
7:45 AM	21,910.81	5477.70	21.4%	0.00	0.00	0.0%	52.90	13.23	0.1%
8:00 AM	18,924.92	4731.23	18.5%	0.00	0.00	0.0%	213.46	53.36	0.2%
8:15 AM	16,709.02	4177.26	16.3%	0.00	0.00	0.0%	173.56	43.39	0.2%
8:30 AM	15,707.78	3926.94	15.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	15,937.54	3984.39	15.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	15,973.41	3993.35	15.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	15,929.86	3982.47	15.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	15,787.01	3946.75	15.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	15,616.18	3904.04	15.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	15,247.66	3811.91	14.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	14,012.07	3503.02	13.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	12,819.72	3204.93	12.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	11,763.47	2940.87	11.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	10,737.48	2684.37	10.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	9,802.18	2450.55	9.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	8,809.24	2202.31	8.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	7,908.45	1977.11	7.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	6,937.81	1734.45	6.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	6,094.02	1523.50	6.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	5,209.61	1302.40	5.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	4,686.24	1171.56	4.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	4,343.18	1085.79	4.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	4,233.42	1058.36	4.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	3,878.00	969.50	3.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	3,739.77	934.94	3.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	3,422.79	855.70	3.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	3,402.70	850.67	3.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	3,750.53	937.63	3.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	4,892.74	1223.19	4.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	6,051.59	1512.90	5.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	7,373.43	1843.36	7.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	8,776.93	2194.23	8.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	10,386.68	2596.67	10.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	12,245.12	3061.28	12.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	15,062.90	3765.72	14.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	18,287.30	4571.83	17.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	21,971.72	5492.93	21.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	25,784.40	6446.10	25.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	28,896.06	7224.01	28.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	32,379.26	8094.82	31.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	36,792.33	9198.08	36.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	42,503.91	10625.98	41.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	48,737.37	12184.34	47.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	55,735.58	13933.89	54.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	65,070.07	16267.52	63.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	76,469.00	19117.25	74.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	89,177.63	26753.29	87.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:36 PM	102,575.43	18463.58	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

JUNE 28

Analysis Hours: 6:48 AM-7:36 PM (PDT)

JUNE 14 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
6:48 AM	64,782.53	6478.25	63.4%	905.44	90.54	0.9%	905.44	90.54	0.9%
7:00 AM	51,606.32	11353.39	50.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 AM	37,434.10	9358.52	36.6%	0.00	0.00	0.0%	79.99	20.00	0.1%
7:30 AM	27,575.35	6893.84	27.0%	0.00	0.00	0.0%	281.94	70.48	0.3%
7:45 AM	22,373.39	5593.35	21.9%	0.00	0.00	0.0%	54.80	13.70	0.1%
8:00 AM	19,204.79	4801.20	18.8%	0.00	0.00	0.0%	226.95	56.74	0.2%
8:15 AM	16,894.49	4223.62	16.5%	0.00	0.00	0.0%	242.53	60.63	0.2%
8:30 AM	15,825.67	3956.42	15.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	15,983.23	3995.81	15.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	16,032.10	4008.02	15.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	15,996.82	3999.21	15.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	15,864.46	3966.11	15.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	15,691.82	3922.95	15.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	15,415.42	3853.86	15.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	14,205.67	3551.42	13.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	12,998.63	3249.66	12.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	11,928.81	2982.20	11.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	10,893.91	2723.48	10.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	9,955.38	2488.85	9.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	8,957.83	2239.46	8.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	8,052.12	2013.03	7.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	7,078.16	1769.54	6.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	6,225.97	1556.49	6.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	5,339.06	1334.76	5.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	4,757.95	1189.49	4.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	4,417.67	1104.42	4.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	4,304.44	1076.11	4.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	3,951.70	987.92	3.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	3,812.31	953.08	3.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	3,487.32	871.83	3.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	3,432.23	858.06	3.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	3,698.46	924.61	3.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	4,833.24	1208.31	4.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	5,977.51	1494.38	5.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	7,295.66	1823.91	7.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	8,683.12	2170.78	8.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	10,271.33	2567.83	10.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	12,073.86	3018.46	11.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,723.64	3680.91	14.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	17,915.17	4478.79	17.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	21,553.77	5388.44	21.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	25,415.12	6353.78	24.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	28,501.94	7125.48	27.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	31,936.08	7984.02	31.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	36,220.50	9055.12	35.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	41,811.18	10452.80	40.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	48,040.79	12010.20	47.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	54,841.52	13710.38	53.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	64,023.38	16005.85	62.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	75,314.85	18828.71	73.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	87,966.53	26389.96	86.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:36 PM	102,575.43	18463.58	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

JULY 5

Analysis Hours: 6:52 AM-7:36 PM (PDT)

JUNE 7 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
6:52 AM	64,587.52	3875.25	63.2%	24.97	1.50	0.0%	24.97	1.50	0.0%
7:00 AM	54,973.99	10445.06	53.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 AM	40,597.41	10149.35	39.7%	0.00	0.00	0.0%	129.45	32.36	0.1%
7:30 AM	29,244.27	7311.07	28.6%	0.00	0.00	0.0%	450.63	112.66	0.4%
7:45 AM	22,990.93	5747.73	22.5%	0.00	0.00	0.0%	232.55	58.14	0.2%
8:00 AM	19,478.49	4869.62	19.1%	0.00	0.00	0.0%	402.40	100.60	0.4%
8:15 AM	17,088.87	4272.22	16.7%	0.00	0.00	0.0%	404.39	101.10	0.4%
8:30 AM	16,164.98	4041.25	15.8%	0.00	0.00	0.0%	42.43	10.61	0.0%
8:45 AM	16,155.44	4038.86	15.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	16,209.44	4052.36	15.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	16,186.15	4046.54	15.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	16,062.48	4015.62	15.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	15,885.44	3971.36	15.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	15,629.50	3907.37	15.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	14,537.14	3634.28	14.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	13,307.85	3326.96	13.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	12,218.31	3054.58	12.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	11,170.37	2792.59	10.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	10,219.89	2554.97	10.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	9,209.97	2302.49	9.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	8,293.97	2073.49	8.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	7,311.35	1827.84	7.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	6,454.91	1613.73	6.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	5,561.72	1390.43	5.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	4,930.23	1232.56	4.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	4,595.35	1148.84	4.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	4,478.38	1119.60	4.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	4,129.61	1032.40	4.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	3,983.89	995.97	3.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	3,648.78	912.20	3.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	3,579.07	894.77	3.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	3,775.24	943.81	3.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	4,901.75	1225.44	4.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	6,046.50	1511.62	5.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	7,352.60	1838.15	7.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	8,724.85	2181.21	8.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	10,302.83	2575.71	10.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	12,000.30	3000.08	11.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,341.89	3585.47	14.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	17,525.06	4381.26	17.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	21,130.95	5282.74	20.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	24,949.98	6237.49	24.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	28,003.17	7000.79	27.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	31,410.30	7852.58	30.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	35,573.26	8893.32	34.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	41,073.45	10268.36	40.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	47,296.59	11824.15	46.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	53,892.65	13473.16	52.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	63,052.09	15763.02	61.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	74,355.87	18588.97	72.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	87,199.98	26159.99	85.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:36 PM	102,575.43	18463.58	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

JULY 12

Analysis Hours: 6:56 AM-7:33 PM (PDT)

MAY 31 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
6:56 AM	64,918.91	1947.57	63.5%	943.80	28.31	0.9%	943.80	28.31	0.9%
7:00 AM	60,499.22	9074.88	59.2%	662.96	99.44	0.6%	662.96	99.44	0.6%
7:15 AM	44,590.43	11147.61	43.6%	0.00	0.00	0.0%	339.62	84.91	0.3%
7:30 AM	31,751.07	7937.77	31.1%	0.00	0.00	0.0%	826.76	206.69	0.8%
7:45 AM	23,781.02	5945.26	23.3%	0.00	0.00	0.0%	973.82	243.45	1.0%
8:00 AM	19,831.39	4957.85	19.4%	0.00	0.00	0.0%	809.06	202.26	0.8%
8:15 AM	17,403.69	4350.92	17.0%	0.00	0.00	0.0%	709.32	177.33	0.7%
8:30 AM	16,776.60	4194.15	16.4%	0.00	0.00	0.0%	234.73	58.68	0.2%
8:45 AM	16,526.22	4131.56	16.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	16,498.94	4124.73	16.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	16,490.93	4122.73	16.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	16,376.05	4094.01	16.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	16,198.85	4049.71	15.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	15,961.93	3990.48	15.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	15,006.52	3751.63	14.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	13,748.74	3437.18	13.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	12,632.36	3158.09	12.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	11,562.79	2890.70	11.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	10,593.79	2648.45	10.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	9,564.34	2391.09	9.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	8,633.19	2158.30	8.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	7,635.53	1908.88	7.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	6,777.34	1694.34	6.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	5,878.91	1469.73	5.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	5,203.70	1300.93	5.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	4,875.53	1218.88	4.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	4,754.16	1188.54	4.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	4,411.39	1102.85	4.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	4,259.37	1064.84	4.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	3,907.53	976.88	3.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	3,852.35	963.09	3.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	3,998.71	999.68	3.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	5,099.64	1274.91	5.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	6,255.46	1563.86	6.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	7,545.93	1886.48	7.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	8,907.43	2226.86	8.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	10,496.16	2624.04	10.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	12,168.83	3042.21	11.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,175.96	3543.99	13.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	17,135.25	4283.81	16.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	20,725.24	5181.31	20.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	24,380.05	6095.01	23.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	27,402.73	6850.68	26.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	30,793.07	7698.27	30.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	34,869.43	8717.36	34.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	40,276.10	10069.02	39.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	46,515.74	11628.93	45.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	52,927.24	13231.81	51.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	62,137.48	15534.37	60.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	73,588.54	18397.13	72.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	87,118.56	24393.20	85.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:33 PM	102,575.43	15386.31	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

JULY 19

Analysis Hours: 7:01 AM-7:30 PM (PDT)

MAY 24 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:01 AM	66,011.34	8581.47	64.6%	1,281.41	166.58	1.3%	1,281.41	166.58	1.3%
7:16 AM	48,084.30	11540.23	47.0%	0.00	0.00	0.0%	1,028.86	246.93	1.0%
7:30 AM	34,910.47	8378.51	34.1%	0.00	0.00	0.0%	1,744.50	418.68	1.7%
7:45 AM	25,815.56	6453.89	25.3%	0.00	0.00	0.0%	2,208.23	552.06	2.2%
8:00 AM	20,361.32	5090.33	19.9%	0.00	0.00	0.0%	1,798.20	449.55	1.8%
8:15 AM	18,248.44	4562.11	17.9%	0.00	0.00	0.0%	1,315.34	328.84	1.3%
8:30 AM	17,683.46	4420.86	17.3%	0.00	0.00	0.0%	576.80	144.20	0.6%
8:45 AM	17,244.80	4311.20	16.9%	0.00	0.00	0.0%	125.39	31.35	0.1%
9:00 AM	16,888.78	4222.20	16.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	16,901.65	4225.41	16.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	16,797.15	4199.29	16.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	16,622.73	4155.68	16.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	16,405.22	4101.30	16.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	15,589.98	3897.50	15.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	14,302.59	3575.65	14.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	13,159.22	3289.81	12.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	12,058.75	3014.69	11.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	11,062.23	2765.56	10.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	10,008.85	2502.21	9.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	9,054.74	2263.69	8.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	8,039.58	2009.90	7.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	7,185.54	1796.39	7.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	6,276.60	1569.15	6.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	5,581.72	1395.43	5.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	5,256.23	1314.06	5.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	5,129.91	1282.48	5.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	4,793.19	1198.30	4.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	4,637.31	1159.33	4.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	4,269.04	1067.26	4.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	4,240.70	1060.18	4.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	4,372.07	1093.02	4.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	5,449.08	1362.27	5.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	6,623.06	1655.76	6.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	7,908.07	1977.02	7.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	9,267.40	2316.85	9.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	10,863.60	2715.90	10.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	12,539.72	3134.93	12.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,421.66	3605.42	14.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	16,817.44	4204.36	16.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	20,403.91	5100.98	20.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	23,737.67	5934.42	23.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	26,734.12	6683.53	26.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	30,111.54	7527.88	29.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	34,155.18	8538.79	33.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	39,484.25	9871.06	38.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	45,729.24	11432.31	44.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	52,086.71	13021.68	51.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	61,356.32	15339.08	60.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	73,160.74	18290.18	71.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	87,511.74	21877.93	85.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 PM	102,119.31	13275.51	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%

JULY 26

Analysis Hours: 7:07 AM-7:25 PM (PDT)

MAY 17 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:07 AM	67,382.58	4042.95	65.9%	986.06	59.16	1.0%	986.06	59.16	1.0%
7:15 AM	55,973.98	10635.06	54.8%	39.86	7.57	0.0%	1,380.15	262.23	1.4%
7:30 AM	38,424.58	9606.14	37.6%	0.00	0.00	0.0%	3,189.74	797.44	3.1%
7:45 AM	28,877.31	7219.33	28.2%	0.00	0.00	0.0%	3,966.99	991.75	3.9%
8:00 AM	22,256.44	5564.11	21.8%	0.00	0.00	0.0%	3,438.66	859.66	3.4%
8:15 AM	19,781.39	4945.35	19.4%	0.00	0.00	0.0%	2,336.28	584.07	2.3%
8:30 AM	18,845.38	4711.35	18.4%	0.00	0.00	0.0%	1,235.81	308.95	1.2%
8:45 AM	18,188.40	4547.10	17.8%	0.00	0.00	0.0%	458.09	114.52	0.4%
9:00 AM	17,699.76	4424.94	17.3%	0.00	0.00	0.0%	65.67	16.42	0.1%
9:15 AM	17,403.56	4350.89	17.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	17,315.48	4328.87	16.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	17,158.87	4289.72	16.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	16,940.53	4235.13	16.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	16,291.79	4072.95	15.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	14,972.73	3743.18	14.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	13,812.53	3453.13	13.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	12,664.84	3166.21	12.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	11,634.28	2908.57	11.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	10,546.42	2636.60	10.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	9,564.02	2391.00	9.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	8,525.70	2131.43	8.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	7,683.51	1920.88	7.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	6,762.41	1690.60	6.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	6,066.37	1516.59	5.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	5,738.03	1434.51	5.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	5,610.02	1402.50	5.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	5,278.56	1319.64	5.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	5,120.58	1280.15	5.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	4,791.23	1197.81	4.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	4,739.23	1184.81	4.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	4,892.49	1223.12	4.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	5,973.54	1493.38	5.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	7,142.55	1785.64	7.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	8,453.94	2113.49	8.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	9,807.85	2451.96	9.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	11,403.32	2850.83	11.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	13,112.46	3278.12	12.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	15,043.51	3760.88	14.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	16,969.10	4242.27	16.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	20,162.86	5040.72	19.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	22,980.41	5745.10	22.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	25,961.20	6490.30	25.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	29,325.47	7331.37	28.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	33,316.08	8329.02	32.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	38,744.22	9686.05	37.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	44,807.40	11201.85	43.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	51,215.89	12803.97	50.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	60,623.82	15155.96	59.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	72,924.25	18231.06	71.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	88,847.57	18657.99	86.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:25 PM	101,672.87	9150.56	99.5%	0.00	0.00	0.0%	0.00	0.00	0.0%

AUGUST 2

Analysis Hours: 7:12 AM-7:18 PM (PDT)

MAY 10 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:12 AM	67,231.66	1344.63	65.8%	642.47	12.85	0.6%	1,700.28	34.01	1.7%
7:15 AM	62,704.36	9405.65	61.3%	454.18	68.13	0.4%	2,259.34	338.90	2.2%
7:30 AM	42,526.23	10631.56	41.6%	0.00	0.00	0.0%	5,067.12	1266.78	5.0%
7:45 AM	32,317.30	8079.33	31.6%	0.00	0.00	0.0%	6,803.65	1700.91	6.7%
8:00 AM	25,590.27	6397.57	25.0%	0.00	0.00	0.0%	5,761.15	1440.29	5.6%
8:15 AM	22,900.11	5725.03	22.4%	0.00	0.00	0.0%	3,841.64	960.41	3.8%
8:30 AM	21,131.62	5282.91	20.7%	0.00	0.00	0.0%	1,882.21	470.55	1.8%
8:45 AM	19,397.43	4849.36	19.0%	0.00	0.00	0.0%	1,056.70	264.18	1.0%
9:00 AM	18,682.06	4670.51	18.3%	0.00	0.00	0.0%	380.88	95.22	0.4%
9:15 AM	18,157.84	4539.46	17.8%	0.00	0.00	0.0%	33.86	8.47	0.0%
9:30 AM	17,915.83	4478.96	17.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	17,800.51	4450.13	17.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	17,569.08	4392.27	17.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	17,088.11	4272.03	16.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	15,736.37	3934.09	15.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	14,546.05	3636.51	14.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	13,358.31	3339.58	13.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	12,285.45	3071.36	12.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	11,157.78	2789.45	10.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	10,142.33	2535.58	9.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	9,085.14	2271.29	8.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	8,257.13	2064.28	8.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	7,321.36	1830.34	7.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	6,656.79	1664.20	6.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	6,317.80	1579.45	6.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	6,190.80	1547.70	6.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	5,865.13	1466.28	5.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	5,724.37	1431.09	5.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	5,437.74	1359.44	5.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	5,352.46	1338.12	5.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	5,646.45	1411.61	5.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	6,699.73	1674.93	6.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	7,840.31	1960.08	7.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	9,188.50	2297.13	9.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	10,556.13	2639.03	10.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	12,177.05	3044.26	11.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	13,922.48	3480.62	13.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	15,936.22	3984.05	15.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	17,834.19	4458.55	17.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	19,938.19	4984.55	19.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	22,143.52	5535.88	21.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	25,119.25	6279.81	24.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	28,498.21	7124.55	27.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	32,454.30	8113.58	31.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	38,112.09	9528.02	37.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	43,767.69	10941.92	42.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	50,353.03	12588.26	49.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	60,110.48	15027.62	58.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	73,144.30	18286.08	71.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	92,187.41	13828.11	90.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:18 PM	98,917.52	2967.53	96.8%	0.00	0.00	0.0%	0.00	0.00	0.0%

AUGUST 9

Analysis Hours: 7:19 AM-7:10 PM (PDT)

MAY 3 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:19 AM	63,738.44	5736.46	62.3%	0.00	0.00	0.0%	3,962.59	356.63	3.9%
7:30 AM	47,249.95	9922.49	46.2%	0.00	0.00	0.0%	8,782.28	1844.28	8.6%
7:45 AM	35,666.80	8916.70	34.9%	0.00	0.00	0.0%	10,906.22	2726.56	10.7%
8:00 AM	30,881.52	7720.38	30.2%	0.00	0.00	0.0%	8,179.25	2044.81	8.0%
8:15 AM	29,025.14	7256.29	28.4%	0.00	0.00	0.0%	4,735.17	1183.79	4.6%
8:30 AM	25,935.90	6483.97	25.4%	0.00	0.00	0.0%	2,438.70	609.67	2.4%
8:45 AM	22,632.30	5658.08	22.1%	0.00	0.00	0.0%	1,130.00	282.50	1.1%
9:00 AM	19,811.35	4952.84	19.4%	0.00	0.00	0.0%	922.92	230.73	0.9%
9:15 AM	19,067.61	4766.90	18.7%	0.00	0.00	0.0%	344.52	86.13	0.3%
9:30 AM	18,674.18	4668.54	18.3%	0.00	0.00	0.0%	10.25	2.56	0.0%
9:45 AM	18,523.55	4630.89	18.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	18,287.30	4571.83	17.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	17,980.00	4495.00	17.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	16,592.44	4148.11	16.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	15,359.06	3839.77	15.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	14,133.91	3533.48	13.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	13,023.43	3255.86	12.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	11,848.77	2962.19	11.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	10,797.14	2699.29	10.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	9,761.40	2440.35	9.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	8,917.50	2229.38	8.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	7,964.14	1991.04	7.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	7,348.56	1837.14	7.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	7,000.35	1750.09	6.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	6,877.68	1719.42	6.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	6,555.90	1638.97	6.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	6,489.03	1622.26	6.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	6,205.08	1551.27	6.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	6,101.17	1525.29	6.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	6,599.07	1649.77	6.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	7,606.87	1901.72	7.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	8,710.41	2177.60	8.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	10,108.65	2527.16	9.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	11,545.15	2886.29	11.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	13,164.29	3291.07	12.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	14,970.32	3742.58	14.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	17,086.24	4271.56	16.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	19,077.44	4769.36	18.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	20,257.56	5064.39	19.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	21,286.20	5321.55	20.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	24,149.81	6037.45	23.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	27,591.24	6897.81	27.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	31,639.43	7909.86	31.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	37,270.03	9317.51	36.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	42,580.60	10645.15	41.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	49,367.81	12341.95	48.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	59,716.84	20303.73	58.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:10 PM	89,814.95	18861.14	87.9%	0.00	0.00	0.0%	0.00	0.00	0.0%

AUGUST 16

Analysis Hours: 7:25 AM-7:02 PM (PDT)

APRIL 26 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:25 AM	60,026.57	2401.06	58.7%	0.00	0.00	0.0%	11,057.86	442.31	10.8%
7:30 AM	53,461.60	9088.47	52.3%	0.00	0.00	0.0%	13,682.60	2326.04	13.4%
7:45 AM	42,361.11	10590.28	41.4%	0.00	0.00	0.0%	14,282.43	3570.61	14.0%
8:00 AM	41,450.78	10362.69	40.5%	0.00	0.00	0.0%	9,017.94	2254.49	8.8%
8:15 AM	38,490.89	9622.72	37.7%	0.00	0.00	0.0%	5,087.48	1271.87	5.0%
8:30 AM	34,021.24	8505.31	33.3%	0.00	0.00	0.0%	2,473.10	618.28	2.4%
8:45 AM	28,597.94	7149.49	28.0%	0.00	0.00	0.0%	877.94	219.48	0.9%
9:00 AM	23,577.08	5894.27	23.1%	0.00	0.00	0.0%	618.76	154.69	0.6%
9:15 AM	20,075.28	5018.82	19.6%	0.00	0.00	0.0%	852.87	213.22	0.8%
9:30 AM	19,532.17	4883.04	19.1%	0.00	0.00	0.0%	312.12	78.03	0.3%
9:45 AM	19,309.18	4827.30	18.9%	0.00	0.00	0.0%	7.52	1.88	0.0%
10:00 AM	19,089.76	4772.44	18.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	18,862.58	4715.64	18.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	17,526.80	4381.70	17.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	16,247.62	4061.90	15.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	14,984.27	3746.07	14.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	13,844.92	3461.23	13.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	12,627.63	3156.91	12.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	11,546.92	2886.73	11.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	10,537.32	2634.33	10.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	9,669.69	2417.42	9.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	8,699.01	2174.75	8.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	8,145.68	2036.42	8.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	7,797.43	1949.36	7.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	7,676.46	1919.12	7.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	7,426.14	1856.53	7.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	7,374.70	1843.68	7.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	7,094.61	1773.65	6.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	7,110.06	1777.52	7.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	7,748.02	1937.01	7.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	8,708.32	2177.08	8.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	9,819.79	2454.95	9.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	11,219.78	2804.94	11.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	12,727.85	3181.96	12.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	14,392.04	3598.01	14.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	16,288.29	4072.07	15.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	18,457.00	4614.25	18.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	20,512.58	5128.14	20.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	20,834.43	5208.61	20.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	21,170.03	5292.51	20.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	23,075.50	5768.88	22.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	26,526.41	6631.60	25.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	30,760.44	7690.11	30.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	36,186.66	9046.66	35.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	41,109.07	10277.27	40.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	48,233.01	12058.25	47.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	58,869.25	15894.70	57.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:02 PM	79,670.40	11153.86	77.9%	0.00	0.00	0.0%	0.00	0.00	0.0%

AUGUST 23

Analysis Hours: 7:31 AM-6:52 PM (PDT)

APRIL 19 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:31 AM	62,062.38	6826.86	60.7%	0.00	0.00	0.0%	15,079.53	1658.75	14.8%
7:45 AM	55,918.73	12861.31	54.7%	0.00	0.00	0.0%	13,514.55	3108.35	13.2%
8:00 AM	55,790.73	13947.68	54.6%	0.00	0.00	0.0%	8,910.80	2227.70	8.7%
8:15 AM	51,843.18	12960.80	50.7%	0.00	0.00	0.0%	4,628.66	1157.17	4.5%
8:30 AM	45,366.15	11341.54	44.4%	0.00	0.00	0.0%	1,923.81	480.95	1.9%
8:45 AM	38,147.30	9536.82	37.3%	0.00	0.00	0.0%	489.58	122.40	0.5%
9:00 AM	30,435.98	7609.00	29.8%	0.00	0.00	0.0%	163.05	40.76	0.2%
9:15 AM	24,500.93	6125.23	24.0%	0.00	0.00	0.0%	621.07	155.27	0.6%
9:30 AM	20,405.78	5101.44	20.0%	0.00	0.00	0.0%	760.20	190.05	0.7%
9:45 AM	20,143.89	5035.97	19.7%	0.00	0.00	0.0%	298.35	74.59	0.3%
10:00 AM	19,979.55	4994.89	19.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	19,765.99	4941.50	19.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	18,498.55	4624.64	18.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	17,177.92	4294.48	16.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	15,875.11	3968.78	15.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	14,705.14	3676.29	14.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	13,461.02	3365.25	13.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	12,431.04	3107.76	12.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	11,391.67	2847.92	11.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	10,495.94	2623.99	10.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	9,511.06	2377.76	9.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	9,047.48	2261.87	8.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	8,708.49	2177.12	8.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	8,647.98	2161.99	8.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	8,436.29	2109.07	8.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	8,382.70	2095.68	8.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	8,106.91	2026.73	7.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	8,414.68	2103.67	8.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	9,109.09	2277.27	8.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	10,083.76	2520.94	9.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	11,150.48	2787.62	10.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	12,577.30	3144.32	12.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	14,149.92	3537.48	13.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	15,969.43	3992.36	15.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	17,895.75	4473.94	17.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	20,173.95	5043.49	19.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	21,293.79	5323.45	20.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	21,607.51	5401.88	21.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	21,975.18	5493.79	21.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	22,417.02	5604.25	21.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	25,383.16	6345.79	24.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	30,014.54	7503.63	29.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	34,824.46	8706.12	34.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	39,505.03	9876.26	38.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	46,976.31	11744.08	46.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	58,154.22	11049.30	56.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:52 PM	68,445.17	4106.71	67.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

AUGUST 30

Analysis Hours: 7:37 AM-6:42 PM (PDT)

APRIL 12 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:37 AM	73,087.76	4385.27	71.5%	0.00	0.00	0.0%	11,669.79	700.19	11.4%
7:45 AM	70,656.20	13424.68	69.1%	0.00	0.00	0.0%	11,121.40	2113.07	10.9%
8:00 AM	70,186.24	17546.56	68.7%	0.00	0.00	0.0%	7,471.97	1867.99	7.3%
8:15 AM	70,005.71	17501.43	68.5%	0.00	0.00	0.0%	3,419.16	854.79	3.3%
8:30 AM	60,693.07	15173.27	59.4%	0.00	0.00	0.0%	1,113.23	278.31	1.1%
8:45 AM	51,123.64	12780.91	50.0%	0.00	0.00	0.0%	219.31	54.83	0.2%
9:00 AM	41,619.38	10404.84	40.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	33,338.64	8334.66	32.6%	0.00	0.00	0.0%	144.48	36.12	0.1%
9:30 AM	25,854.24	6463.56	25.3%	0.00	0.00	0.0%	640.15	160.04	0.6%
9:45 AM	22,002.01	5500.50	21.5%	0.00	0.00	0.0%	722.53	180.63	0.7%
10:00 AM	21,238.97	5309.74	20.8%	0.00	0.00	0.0%	280.15	70.04	0.3%
10:15 AM	20,809.06	5202.27	20.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	19,523.20	4880.80	19.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	18,160.44	4540.11	17.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	16,824.09	4206.02	16.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	15,619.08	3904.77	15.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	14,395.90	3598.97	14.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	13,424.13	3356.03	13.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	12,352.77	3088.19	12.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	11,428.31	2857.08	11.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	10,427.46	2606.87	10.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	10,066.44	2516.61	9.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	9,786.86	2446.71	9.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	9,787.76	2446.94	9.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	9,577.49	2394.37	9.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	9,522.84	2380.71	9.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	9,253.23	2313.31	9.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	9,918.01	2479.50	9.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	10,664.45	2666.11	10.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	11,674.47	2918.62	11.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	12,710.80	3177.70	12.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	14,210.12	3552.53	13.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	15,803.46	3950.86	15.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	17,792.68	4448.17	17.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	19,829.56	4957.39	19.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	21,789.67	5447.42	21.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	22,186.98	5546.75	21.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	22,590.04	5647.51	22.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	22,999.43	5749.86	22.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	23,389.84	5847.46	22.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	24,350.57	6087.64	23.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	29,157.13	7289.28	28.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	33,116.99	8279.25	32.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	37,733.68	9433.42	36.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	45,298.68	10418.70	44.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:42 PM	56,459.78	6210.58	55.2%	0.00	0.00	0.0%	0.00	0.00	0.0%

SEPTEMBER 6

Analysis Hours: 7:44 AM-6:31 PM (PDT)

APRIL 5 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:44 AM	84,977.53	11047.08	83.1%	0.00	0.00	0.0%	7,520.52	977.67	7.4%
8:00 AM	86,201.96	21550.49	84.3%	0.00	0.00	0.0%	4,336.45	1084.11	4.2%
8:15 AM	87,800.09	21950.02	85.9%	0.00	0.00	0.0%	1,894.28	473.57	1.9%
8:30 AM	79,438.57	19859.64	77.7%	0.00	0.00	0.0%	381.47	95.37	0.4%
8:45 AM	67,735.90	16933.97	66.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	55,973.55	13993.39	54.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	46,145.04	11536.26	45.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	36,509.45	9127.36	35.7%	0.00	0.00	0.0%	218.33	54.58	0.2%
9:45 AM	28,840.80	7210.20	28.2%	0.00	0.00	0.0%	674.03	168.51	0.7%
10:00 AM	23,928.64	5982.16	23.4%	0.00	0.00	0.0%	686.11	171.53	0.7%
10:15 AM	22,848.97	5712.24	22.4%	0.00	0.00	0.0%	277.63	69.41	0.3%
10:30 AM	21,128.62	5282.15	20.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	19,352.17	4838.04	18.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	17,769.13	4442.28	17.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	16,539.03	4134.76	16.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	15,437.98	3859.49	15.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	14,466.63	3616.66	14.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	13,394.07	3348.52	13.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	12,465.73	3116.43	12.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	11,464.90	2866.23	11.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	11,253.50	2813.37	11.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	11,067.67	2766.92	10.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	11,063.90	2765.97	10.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	10,853.63	2713.41	10.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	10,804.15	2701.04	10.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	10,762.18	2690.54	10.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	11,610.67	2902.67	11.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	12,413.50	3103.38	12.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	13,480.85	3370.21	13.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	14,538.73	3634.68	14.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	16,075.00	4018.75	15.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	17,780.60	4445.15	17.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	19,900.25	4975.06	19.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	22,125.22	5531.31	21.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	22,964.54	5741.13	22.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	23,445.80	5861.45	22.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	23,872.15	5968.04	23.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	24,378.62	6094.65	23.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	24,711.70	6177.93	24.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	25,169.90	6292.48	24.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	27,454.86	6863.71	26.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	31,120.43	7780.11	30.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	35,588.54	9608.90	34.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:31 PM	44,464.12	6224.98	43.5%	0.00	0.00	0.0%	0.00	0.00	0.0%

SEPTEMBER 13

Analysis Hours: 7:50 AM-6:21 PM (PDT)

MARCH 29 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:50 AM	97,171.16	7773.69	95.1%	0.00	0.00	0.0%	3,005.76	240.46	2.9%
8:00 AM	97,211.32	20414.38	95.1%	0.00	0.00	0.0%	1,781.30	374.07	1.7%
8:15 AM	96,125.65	24031.41	94.0%	0.00	0.00	0.0%	383.45	95.86	0.4%
8:30 AM	93,642.40	23410.60	91.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	81,813.13	20453.28	80.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	70,198.98	17549.74	68.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	60,447.33	15111.83	59.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	49,369.57	12342.39	48.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	39,716.64	9929.16	38.9%	0.00	0.00	0.0%	274.31	68.58	0.3%
10:00 AM	30,838.04	7709.51	30.2%	0.00	0.00	0.0%	623.67	155.92	0.6%
10:15 AM	25,840.27	6460.07	25.3%	0.00	0.00	0.0%	616.09	154.02	0.6%
10:30 AM	23,442.70	5860.68	22.9%	0.00	0.00	0.0%	246.12	61.53	0.2%
10:45 AM	21,134.76	5283.69	20.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	19,052.79	4763.20	18.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	17,685.59	4421.40	17.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	16,578.91	4144.73	16.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	15,601.31	3900.33	15.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	14,521.12	3630.28	14.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	13,605.81	3401.45	13.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	12,744.66	3186.17	12.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	12,644.15	3161.04	12.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	12,486.59	3121.65	12.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	12,485.24	3121.31	12.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	12,279.85	3069.96	12.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	12,239.01	3059.75	12.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	12,582.93	3145.73	12.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	13,516.18	3379.05	13.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	14,369.18	3592.29	14.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	15,510.57	3877.64	15.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	16,649.37	4162.34	16.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	18,232.86	4558.21	17.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	20,080.16	5020.04	19.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	22,354.86	5588.71	21.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	23,876.81	5969.20	23.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	24,629.79	6157.45	24.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	25,107.36	6276.84	24.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	25,605.73	6401.43	25.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	25,945.79	6486.45	25.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	26,215.23	6553.81	25.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	26,985.06	6746.26	26.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	26,972.52	6743.13	26.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	28,719.65	7179.91	28.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	33,009.87	5941.78	32.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:21 PM	35,043.75	1752.19	34.3%	0.00	0.00	0.0%	0.00	0.00	0.0%

SEPTEMBER 20

Analysis Hours: 7:57 AM-6:09 PM (PDT)

APPROXIMATE EQUINOXES
MARCH 22 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:57 AM	102,000.10	2040.00	99.8%	0.00	0.00	0.0%	228.46	4.57	0.2%
8:00 AM	101,868.39	15280.26	99.6%	0.00	0.00	0.0%	129.18	19.38	0.1%
8:15 AM	101,192.11	25298.03	99.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	99,269.25	24817.31	97.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	93,164.74	23291.19	91.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	83,125.50	20781.38	81.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	74,978.21	18744.55	73.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	63,899.77	15974.94	62.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	53,242.46	13310.61	52.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	42,533.21	10633.30	41.6%	0.00	0.00	0.0%	302.43	75.61	0.3%
10:15 AM	33,174.14	8293.53	32.5%	0.00	0.00	0.0%	553.12	138.28	0.5%
10:30 AM	26,887.08	6721.77	26.3%	0.00	0.00	0.0%	562.59	140.65	0.6%
10:45 AM	23,873.84	5968.46	23.4%	0.00	0.00	0.0%	236.28	59.07	0.2%
11:00 AM	21,122.85	5280.71	20.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	19,368.91	4842.23	18.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	17,891.95	4472.99	17.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	16,876.48	4219.12	16.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	15,793.93	3948.48	15.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	14,906.44	3726.61	14.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	14,265.56	3566.39	14.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	14,191.59	3547.90	13.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	14,043.39	3510.85	13.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	14,056.93	3514.23	13.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	13,863.71	3465.93	13.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	13,923.80	3480.95	13.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	14,604.66	3651.17	14.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	15,624.11	3906.03	15.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	16,538.74	4134.69	16.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	17,790.82	4447.70	17.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	19,016.01	4754.00	18.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	20,758.45	5189.61	20.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	22,729.34	5682.33	22.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	24,928.74	6232.19	24.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	25,822.92	6455.73	25.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	26,804.11	6701.03	26.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	27,246.78	6811.70	26.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	27,645.43	6911.36	27.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	27,846.51	6961.63	27.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	28,084.23	7021.06	27.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	28,884.90	7221.22	28.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	28,292.79	7073.20	27.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	26,984.48	5666.74	26.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:09 PM	28,331.07	2266.49	27.7%	0.00	0.00	0.0%	0.00	0.00	0.0%

SEPTEMBER 27

Analysis Hours: 8:03 AM-5:58 PM (PDT)

MARCH 15 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:03 AM	102,575.40	10257.54	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	102,464.65	22542.22	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	100,915.86	25228.97	98.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	99,636.83	24909.21	97.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	93,943.20	23485.80	91.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	86,283.52	21570.88	84.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	76,962.28	19240.57	75.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	65,934.60	16483.65	64.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	55,179.80	13794.95	54.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	45,478.62	11369.66	44.5%	0.00	0.00	0.0%	229.65	57.41	0.2%
10:30 AM	34,215.55	8553.89	33.5%	0.00	0.00	0.0%	700.83	175.21	0.7%
10:45 AM	27,726.61	6931.65	27.1%	0.00	0.00	0.0%	517.64	129.41	0.5%
11:00 AM	24,741.74	6185.43	24.2%	0.00	0.00	0.0%	216.57	54.14	0.2%
11:15 AM	22,314.66	5578.66	21.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	19,882.95	4970.74	19.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	18,372.71	4593.18	18.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	17,213.84	4303.46	16.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	16,392.16	4098.04	16.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	15,901.85	3975.46	15.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	15,872.07	3968.02	15.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	15,731.91	3932.98	15.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	15,767.62	3941.91	15.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	15,606.02	3901.50	15.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	16,053.85	4013.46	15.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	16,837.73	4209.43	16.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	17,937.97	4484.49	17.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	18,939.45	4734.86	18.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	20,310.86	5077.72	19.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	21,728.18	5432.05	21.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	23,640.36	5910.09	23.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	25,763.35	6440.84	25.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	27,135.40	6783.85	26.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	28,390.15	7097.54	27.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	29,457.15	7364.29	28.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	29,907.70	7476.93	29.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	30,198.95	7549.74	29.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	30,161.23	7540.31	29.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	30,296.57	7574.14	29.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	30,823.11	7705.78	30.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	29,754.76	6843.59	29.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:58 PM	28,424.07	3126.65	27.8%	0.00	0.00	0.0%	0.00	0.00	0.0%

OCTOBER 4

Analysis Hours: 8:09 AM-5:47 PM (PDT)

MARCH 8 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:09 AM	102,575.43	4103.02	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	102,575.41	17437.82	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	101,913.32	25478.33	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	101,558.73	25389.68	99.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	100,464.53	25116.13	98.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	93,306.91	23326.73	91.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	86,064.74	21516.18	84.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	77,949.34	19487.33	76.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	66,711.08	16677.77	65.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	57,615.85	14403.96	56.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	47,714.28	11928.57	46.7%	0.00	0.00	0.0%	234.42	58.60	0.2%
10:45 AM	36,162.13	9040.53	35.4%	0.00	0.00	0.0%	604.71	151.18	0.6%
11:00 AM	29,720.88	7430.22	29.1%	0.00	0.00	0.0%	511.94	127.98	0.5%
11:15 AM	26,834.13	6708.53	26.2%	0.00	0.00	0.0%	228.10	57.02	0.2%
11:30 AM	23,446.85	5861.71	22.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	20,902.46	5225.61	20.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	18,889.62	4722.41	18.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	18,051.58	4512.89	17.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	17,656.53	4414.13	17.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	17,665.12	4416.28	17.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	17,558.63	4389.66	17.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	17,639.07	4409.77	17.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	17,496.49	4374.12	17.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	18,362.07	4590.52	18.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	19,247.31	4811.83	18.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	20,449.82	5112.45	20.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	21,566.96	5391.74	21.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	23,084.74	5771.19	22.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	24,751.21	6187.80	24.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	26,873.22	6718.31	26.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	28,492.10	7123.02	27.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	30,048.06	7512.01	29.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	31,473.21	7868.30	30.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	32,687.25	8171.81	32.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	33,423.05	8355.76	32.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	33,882.53	8470.63	33.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	33,531.06	8382.77	32.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	33,415.26	8353.81	32.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	33,375.27	9011.32	32.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:47 PM	31,716.19	4440.27	31.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

OCTOBER 11

Analysis Hours: 8:16 AM-5:37 PM (PDT)

MARCH 1 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:16 AM	102,575.43	12309.05	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	102,409.03	24578.17	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	102,105.31	25526.33	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	101,759.36	25439.84	99.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	96,648.62	24162.15	94.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	91,947.62	22986.90	89.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	86,790.86	21697.71	84.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	78,065.40	19516.35	76.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	68,635.23	17158.81	67.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	59,761.68	14940.42	58.5%	0.00	0.00	0.0%	23.62	5.91	0.0%
10:45 AM	50,277.26	12569.31	49.2%	0.00	0.00	0.0%	96.84	24.21	0.1%
11:00 AM	38,059.41	9514.85	37.2%	0.00	0.00	0.0%	710.88	177.72	0.7%
11:15 AM	32,575.25	8143.81	31.9%	0.00	0.00	0.0%	549.73	137.43	0.5%
11:30 AM	28,754.07	7188.52	28.1%	0.00	0.00	0.0%	218.42	54.61	0.2%
11:45 AM	25,346.51	6336.63	24.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	22,071.20	5517.80	21.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	20,309.43	5077.36	19.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	19,718.63	4929.66	19.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	19,703.61	4925.90	19.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	19,498.60	4874.65	19.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	19,604.24	4901.06	19.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	19,743.50	4935.88	19.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	20,810.66	5202.66	20.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	21,808.61	5452.15	21.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	23,144.51	5786.13	22.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	24,412.57	6103.14	23.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	26,165.57	6541.39	25.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	28,031.29	7007.82	27.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	30,360.61	7590.15	29.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	31,603.88	7900.97	30.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	33,495.03	8373.76	32.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	35,067.80	8766.95	34.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	36,746.11	9186.53	35.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	37,901.41	9475.35	37.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	38,830.66	9707.66	38.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	38,729.98	9682.49	37.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	38,555.73	9638.93	37.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	38,842.23	7380.02	38.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:37 PM	38,932.11	2335.93	38.1%	0.00	0.00	0.0%	0.00	0.00	0.0%

OCTOBER 18

Analysis Hours: 8:22 AM-5:27 PM (PDT)

FEBRUARY 22 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:22 AM	102,348.50	6140.91	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	102,151.65	18387.30	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	101,852.85	25463.21	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	101,525.09	25381.27	99.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	98,717.24	24679.31	96.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	95,407.65	23851.91	93.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	91,484.96	22871.24	89.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	86,693.46	21673.36	84.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	79,582.04	19895.51	77.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	70,207.53	17551.88	68.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	61,921.03	15480.26	60.6%	0.00	0.00	0.0%	40.58	10.15	0.0%
11:00 AM	51,952.70	12988.17	50.8%	0.00	0.00	0.0%	342.98	85.74	0.3%
11:15 AM	41,260.13	10315.03	40.4%	0.00	0.00	0.0%	828.70	207.17	0.8%
11:30 AM	35,068.03	8767.01	34.3%	0.00	0.00	0.0%	558.43	139.61	0.5%
11:45 AM	31,468.40	7867.10	30.8%	0.00	0.00	0.0%	238.46	59.61	0.2%
12:00 PM	27,236.76	6809.19	26.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	24,493.53	6123.38	24.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	22,522.69	5630.67	22.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	22,263.64	5565.91	21.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	21,760.69	5440.17	21.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	21,689.07	5422.27	21.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	22,168.02	5542.00	21.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	23,356.36	5839.09	22.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	24,479.44	6119.86	23.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	25,976.33	6494.08	25.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	27,420.43	6855.11	26.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	29,421.04	7355.26	28.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	31,581.87	7895.47	30.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	33,619.17	8404.79	32.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	35,405.23	8851.31	34.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	37,492.38	9373.09	36.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	39,499.23	9874.81	38.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	41,745.02	10436.25	40.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	43,498.83	10874.71	42.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	45,282.74	11320.68	44.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	46,129.61	11532.40	45.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	46,971.33	10333.69	45.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:27 PM	48,392.79	4839.28	47.3%	0.00	0.00	0.0%	0.00	0.00	0.0%

OCTOBER 25

Analysis Hours: 7:30 AM-4:18 PM (PST)

FEBRUARY 15 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:30 AM	102,076.94	13270.00	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	101,634.86	25408.72	99.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	101,417.02	25354.26	99.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	101,007.90	25251.97	98.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	98,687.96	24671.99	96.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	95,457.94	23864.49	93.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	91,995.03	22998.76	90.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	87,012.99	21753.25	85.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	79,834.99	19958.75	78.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	71,809.99	17952.50	70.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	63,329.30	15832.32	61.9%	0.00	0.00	0.0%	19.15	4.79	0.0%
10:15 AM	54,899.24	13724.81	53.7%	0.00	0.00	0.0%	359.01	89.75	0.4%
10:30 AM	43,653.95	10913.49	42.7%	0.00	0.00	0.0%	940.59	235.15	0.9%
10:45 AM	38,394.74	9598.68	37.6%	0.00	0.00	0.0%	599.57	149.89	0.6%
11:00 AM	33,957.23	8489.31	33.2%	0.00	0.00	0.0%	228.89	57.22	0.2%
11:15 AM	30,368.89	7592.22	29.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	27,036.84	6759.21	26.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	25,521.95	6380.49	25.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	24,672.42	6168.11	24.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	24,218.39	6054.60	23.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	24,642.02	6160.51	24.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	25,949.07	6487.27	25.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	27,194.11	6798.53	26.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	28,857.27	7214.32	28.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	30,516.93	7629.23	29.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	32,823.71	8205.93	32.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	35,211.28	8802.82	34.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	37,403.10	9350.77	36.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	39,684.79	9921.20	38.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	42,185.41	10546.35	41.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	44,723.14	11180.78	43.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	47,770.06	11942.52	46.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	50,421.85	12605.46	49.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	53,664.06	13416.02	52.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	56,314.24	14078.56	55.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	59,976.23	8996.43	58.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:18 PM	60,894.77	1826.84	59.6%	0.00	0.00	0.0%	0.00	0.00	0.0%

NOVEMBER 1

Analysis Hours: 7:36 AM-4:10 PM (PST)

FEBRUARY 8 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:36 AM	101,778.39	7124.49	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	101,446.28	19274.79	99.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	101,550.15	25387.54	99.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	101,790.67	25447.67	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	101,779.51	25444.88	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	99,745.20	24936.30	97.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	96,608.31	24152.08	94.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	93,300.35	23325.09	91.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	87,528.37	21882.09	85.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	80,067.99	20017.00	78.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	72,055.03	18013.76	70.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	65,247.67	16311.92	63.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	56,633.32	14158.33	55.4%	0.00	0.00	0.0%	276.61	69.15	0.3%
10:45 AM	47,206.15	11801.54	46.2%	0.00	0.00	0.0%	969.63	242.41	0.9%
11:00 AM	41,116.50	10279.12	40.2%	0.00	0.00	0.0%	603.37	150.84	0.6%
11:15 AM	37,341.17	9335.29	36.5%	0.00	0.00	0.0%	250.94	62.74	0.2%
11:30 AM	33,067.48	8266.87	32.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	30,450.06	7612.51	29.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	28,197.37	7049.34	27.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	27,676.79	6919.20	27.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	27,491.92	6872.98	26.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	28,525.53	7131.38	27.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	29,889.51	7472.38	29.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	31,713.29	7928.32	31.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	33,638.75	8409.69	32.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	36,356.14	9089.04	35.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	38,590.84	9647.71	37.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	41,435.20	10358.80	40.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	44,288.78	11072.19	43.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	47,542.20	11885.55	46.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	50,667.76	12666.94	49.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	54,822.18	13705.55	53.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	58,918.57	14729.64	57.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	64,236.95	16059.24	62.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	69,207.64	14533.61	67.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:10 PM	74,039.07	6663.52	72.4%	0.00	0.00	0.0%	0.00	0.00	0.0%

NOVEMBER 8

Analysis Hours: 7:43 AM-4:03 PM (PST)

FEBRUARY 1 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:43 AM	101,475.88	1014.76	99.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	101,445.88	13187.96	99.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	101,671.35	25417.84	99.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	101,907.18	25476.80	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	102,096.18	25524.04	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	101,942.04	25485.51	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	100,414.56	25103.64	98.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	98,862.19	24715.55	96.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	94,305.29	23576.32	92.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	87,821.49	21955.37	85.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	79,701.47	19925.37	78.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	73,537.77	18384.44	71.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	66,181.14	16545.28	64.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	58,942.66	14735.67	57.7%	0.00	0.00	0.0%	212.46	53.11	0.2%
11:00 AM	49,305.80	12326.45	48.2%	0.00	0.00	0.0%	1,110.51	277.63	1.1%
11:15 AM	44,815.64	11203.91	43.8%	0.00	0.00	0.0%	649.84	162.46	0.6%
11:30 AM	40,281.50	10070.37	39.4%	0.00	0.00	0.0%	236.18	59.04	0.2%
11:45 AM	36,836.45	9209.11	36.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	33,319.72	8329.93	32.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	31,726.54	7931.63	31.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	31,266.85	7816.71	30.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	31,481.43	7870.36	30.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	32,468.91	8117.23	31.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	34,457.99	8614.50	33.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	36,739.74	9184.93	35.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	39,795.27	9948.82	38.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	42,150.52	10537.63	41.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	45,466.36	11366.59	44.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	48,990.33	12247.58	47.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	53,242.53	13310.63	52.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	57,329.73	14332.43	56.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	63,157.98	15789.50	61.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	68,826.59	17206.65	67.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	76,153.31	19038.33	74.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	85,522.87	12828.43	83.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:03 PM	87,960.03	2638.80	86.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

NOVEMBER 15

Analysis Hours: 7:51 AM-3:57 PM (PST)

JANUARY 25 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:51 AM	101,630.84	8130.47	99.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	101,765.67	20353.13	99.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	101,997.11	25499.28	99.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	102,226.49	25556.62	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	101,990.54	25497.63	99.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	101,624.90	25406.22	99.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	101,909.55	25477.39	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	99,977.63	24994.41	97.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	95,033.28	23758.32	93.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	87,400.41	21850.10	85.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	80,699.88	20174.97	78.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	74,445.55	18611.39	72.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	68,080.63	17020.16	66.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	60,081.13	15020.28	58.8%	0.00	0.00	0.0%	249.98	62.50	0.2%
11:15 AM	52,544.30	13136.07	51.4%	0.00	0.00	0.0%	1,183.87	295.97	1.2%
11:30 AM	47,267.31	11816.83	46.2%	0.00	0.00	0.0%	628.92	157.23	0.6%
11:45 AM	43,958.10	10989.53	43.0%	0.00	0.00	0.0%	248.40	62.10	0.2%
12:00 PM	39,591.00	9897.75	38.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	37,145.15	9286.29	36.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	35,380.77	8845.19	34.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	35,481.74	8870.43	34.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	35,113.07	8778.27	34.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	37,043.31	9260.83	36.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	39,635.58	9908.90	38.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	42,797.64	10699.41	41.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	45,583.54	11395.88	44.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	49,436.19	12359.05	48.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	53,596.07	13399.02	52.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	59,085.62	14771.41	57.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	64,435.53	16108.88	63.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	71,839.31	17959.83	70.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	78,237.73	19559.43	76.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	88,278.94	20304.16	86.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:57 PM	97,196.36	10691.60	95.1%	0.00	0.00	0.0%	0.00	0.00	0.0%

NOVEMBER 22

Analysis Hours: 7:57 AM-3:54 PM (PST)

JANUARY 18 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:57 AM	101,800.31	2036.01	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	101,831.85	15274.78	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	102,059.53	25514.88	99.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	102,285.03	25571.26	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	101,848.17	25462.04	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	101,771.68	25442.92	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	102,500.90	25625.22	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	102,177.18	25544.30	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	100,032.91	25008.23	97.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	94,464.40	23616.10	92.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	87,746.23	21936.56	85.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	81,166.17	20291.54	79.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	76,028.90	19007.23	74.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	68,922.61	17230.65	67.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	62,396.39	15599.10	61.0%	0.00	0.00	0.0%	302.67	75.67	0.3%
11:30 AM	54,114.27	13528.57	52.9%	0.00	0.00	0.0%	1,416.69	354.17	1.4%
11:45 AM	50,732.11	12683.03	49.6%	0.00	0.00	0.0%	629.39	157.35	0.6%
12:00 PM	46,431.77	11607.94	45.4%	0.00	0.00	0.0%	126.51	31.63	0.1%
12:15 PM	43,343.01	10835.75	42.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	40,478.34	10119.59	39.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	39,599.35	9899.84	38.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	39,065.93	9766.48	38.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	39,414.83	9853.71	38.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	42,150.21	10537.55	41.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	45,442.55	11360.64	44.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	48,688.64	12172.16	47.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	53,028.93	13257.23	51.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	57,777.46	14444.36	56.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	64,191.93	16047.98	62.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	71,665.18	17916.30	70.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	78,563.07	19640.77	76.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	87,511.45	21877.86	85.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	100,484.24	20096.85	98.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:54 PM	100,700.63	8056.05	98.5%	0.00	0.00	0.0%	0.00	0.00	0.0%

NOVEMBER 29

Analysis Hours: 8:04 AM-3:51 PM (PST)

JANUARY 11 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:04 AM	101,935.32	9174.18	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	102,095.89	21440.14	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	102,317.39	25579.35	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	101,735.21	25433.80	99.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	101,842.74	25460.68	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	102,552.71	25638.18	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	102,516.03	25629.01	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	101,958.85	25489.71	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	98,765.57	24691.39	96.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	93,488.79	23372.20	91.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	87,211.70	21802.92	85.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	82,540.97	20635.24	80.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	75,424.40	18856.10	73.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	69,806.76	17451.69	68.3%	0.00	0.00	0.0%	22.86	5.72	0.0%
11:30 AM	62,348.36	15587.09	61.0%	0.00	0.00	0.0%	606.91	151.73	0.6%
11:45 AM	57,262.73	14315.68	56.0%	0.00	0.00	0.0%	1,314.76	328.69	1.3%
12:00 PM	53,257.32	13314.33	52.1%	0.00	0.00	0.0%	335.28	83.82	0.3%
12:15 PM	49,967.15	12491.79	48.9%	0.00	0.00	0.0%	2.99	0.75	0.0%
12:30 PM	45,808.46	11452.12	44.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	44,170.67	11042.67	43.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	42,831.74	10707.94	41.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	43,207.45	10801.86	42.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	44,126.88	11031.72	43.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	47,635.69	11908.92	46.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	51,231.91	12807.98	50.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	55,986.47	13996.62	54.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	61,146.43	15286.61	59.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	68,095.76	17023.94	66.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	76,038.12	19009.53	74.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	84,005.89	21001.47	82.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	95,735.71	23933.93	93.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	102,573.09	18463.16	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:51 PM	102,060.05	5103.00	99.8%	0.00	0.00	0.0%	0.00	0.00	0.0%

DECEMBER 6

Analysis Hours: 8:10 AM-3:51 PM (PST)

JANUARY 4 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:10 AM	102,034.31	4081.37	99.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	102,104.87	17357.83	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	102,324.53	25581.13	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	101,715.70	25428.92	99.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	101,843.44	25460.86	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	102,556.84	25639.21	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	102,575.43	25643.86	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	102,231.88	25557.97	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	100,894.67	25223.67	98.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	97,044.90	24261.22	94.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	91,653.50	22913.38	89.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	87,760.59	21940.15	85.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	80,836.56	20209.14	79.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	74,739.18	18684.79	73.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	68,608.71	17152.18	67.1%	0.00	0.00	0.0%	117.94	29.49	0.1%
11:45 AM	62,719.93	15679.98	61.4%	0.00	0.00	0.0%	929.23	232.31	0.9%
12:00 PM	57,633.86	14408.46	56.4%	0.00	0.00	0.0%	450.16	112.54	0.4%
12:15 PM	54,620.50	13655.13	53.4%	0.00	0.00	0.0%	11.78	2.94	0.0%
12:30 PM	50,916.25	12729.06	49.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	48,610.72	12152.68	47.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	46,255.94	11563.98	45.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	46,319.22	11579.81	45.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	46,473.29	11618.32	45.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	49,092.58	12273.14	48.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	52,930.99	13232.75	51.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	57,955.66	14488.91	56.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	63,118.10	15779.53	61.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	70,232.62	17558.16	68.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	78,400.35	19600.09	76.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	87,770.07	21942.52	85.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	97,995.72	24498.93	95.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	102,369.31	17402.78	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:51 PM	102,575.20	5128.76	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

DECEMBER 13

Analysis Hours: 8:15 AM-3:52 PM (PST)

DECEMBER 28 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:15 AM	102,095.98	12251.52	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	102,306.90	25576.72	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	101,833.17	25458.29	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	101,776.30	25444.08	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	102,551.86	25637.97	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	102,575.40	25643.85	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	102,387.21	25596.80	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	101,729.23	25432.31	99.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	99,279.18	24819.79	97.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	94,507.04	23626.76	92.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	90,830.13	22707.53	88.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	84,973.69	21243.42	83.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	78,676.47	19669.12	77.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	72,318.69	18079.67	70.7%	0.00	0.00	0.0%	76.42	19.10	0.1%
11:45 AM	67,122.94	16780.73	65.7%	0.00	0.00	0.0%	607.98	151.99	0.6%
12:00 PM	61,230.41	15307.60	59.9%	0.00	0.00	0.0%	894.72	223.68	0.9%
12:15 PM	58,272.82	14568.20	57.0%	0.00	0.00	0.0%	54.61	13.65	0.1%
12:30 PM	54,634.47	13658.62	53.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	52,132.57	13033.14	51.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	49,070.64	12267.66	48.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	48,396.93	12099.23	47.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	48,529.01	12132.25	47.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	49,664.97	12416.24	48.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	53,595.06	13398.76	52.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	58,645.94	14661.48	57.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	63,594.30	15898.57	62.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	70,683.34	17670.84	69.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	78,838.33	19709.58	77.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	89,020.90	22255.22	87.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	98,440.84	24610.21	96.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	102,108.19	18379.47	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:52 PM	102,575.40	6154.52	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

DECEMBER 20

Analysis Hours: 8:19 AM-3:54 PM (PST)

WINTER SOLSTICE
DECEMBER 21 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:19 AM	102,119.28	8169.54	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	102,268.27	21476.34	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	102,070.43	25517.61	99.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	101,650.75	25412.69	99.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	102,513.14	25628.29	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	102,575.43	25643.86	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	102,481.31	25620.33	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	102,079.15	25519.79	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	100,351.30	25087.82	98.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	96,140.31	24035.08	94.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	92,216.51	23054.13	90.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	87,349.99	21837.50	85.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	81,128.14	20282.03	79.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	74,462.85	18615.71	72.8%	0.00	0.00	0.0%	71.94	17.99	0.1%
11:45 AM	69,679.74	17419.94	68.2%	0.00	0.00	0.0%	358.97	89.74	0.4%
12:00 PM	63,426.13	15856.53	62.0%	0.00	0.00	0.0%	883.18	220.79	0.9%
12:15 PM	59,997.08	14999.27	58.7%	0.00	0.00	0.0%	201.43	50.36	0.2%
12:30 PM	56,411.35	14102.84	55.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	54,039.96	13509.99	52.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	50,633.10	12658.27	49.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	49,399.21	12349.80	48.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	49,316.38	12329.09	48.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	50,237.15	12559.29	49.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	53,205.61	13301.40	52.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	58,152.61	14538.15	56.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	62,979.35	15744.84	61.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	69,629.77	17407.44	68.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	77,699.77	19424.94	76.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	87,363.12	21840.78	85.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	97,634.54	24408.63	95.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	101,847.16	21387.90	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:54 PM	102,575.43	8206.03	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

EXHIBIT J: QUANTITATIVE SHADOW DATA

Quantitative Shadow Data for Mint Plaza

Shadow data for existing conditions, net new shadow from project, and cumulative condition shadow

JUNE 21

Analysis Hours: 6:46 AM-7:36 PM (PDT)

SUMMER SOLSTICE

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
6:46 AM	15,495.72	1704.53	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 AM	15,495.73	3564.02	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	15,431.51	3857.88	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,214.60	3803.65	98.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	14,586.74	3646.69	94.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	13,347.30	3336.82	86.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	11,695.69	2923.92	75.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	10,227.74	2556.94	66.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	9,051.05	2262.76	58.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	8,078.52	2019.63	52.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	7,234.92	1808.73	46.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	6,452.60	1613.15	41.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	5,759.88	1439.97	37.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	5,128.06	1282.02	33.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	4,588.43	1147.11	29.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	4,078.63	1019.66	26.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	3,679.09	919.77	23.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	3,273.78	818.45	21.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	2,917.71	729.43	18.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	2,535.76	633.94	16.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	2,203.56	550.89	14.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	1,937.61	484.40	12.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	1,869.60	467.40	12.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	1,698.27	424.57	11.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	1,694.32	423.58	10.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	1,693.01	423.25	10.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	1,777.29	444.32	11.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	1,763.06	440.76	11.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	2,156.90	539.23	13.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	3,659.10	914.77	23.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	5,151.26	1287.82	33.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	6,848.94	1712.23	44.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	8,539.78	2134.95	55.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	10,367.85	2591.96	66.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	12,156.31	3039.08	78.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	13,520.86	3380.22	87.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,349.26	3587.32	92.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,785.26	3696.31	95.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,094.51	3773.63	97.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,323.76	3830.94	98.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,459.38	3864.85	99.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	15,495.73	4648.72	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:36 PM	15,495.73	2789.23	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

JUNE 28

Analysis Hours: 6:48 AM-7:36 PM (PDT)

JUNE 14 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
6:48 AM	15,495.73	1549.57	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 AM	15,495.73	3409.06	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	15,469.23	3867.31	99.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,238.86	3809.72	98.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	14,785.00	3696.25	95.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	13,608.99	3402.25	87.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	11,935.26	2983.82	77.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	10,438.61	2609.65	67.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	9,225.39	2306.35	59.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	8,221.37	2055.34	53.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	7,364.60	1841.15	47.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	6,570.47	1642.62	42.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	5,863.33	1465.83	37.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	5,218.44	1304.61	33.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	4,668.55	1167.14	30.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	4,152.57	1038.14	26.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	3,743.83	935.96	24.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	3,335.94	833.98	21.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	2,977.17	744.29	19.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	2,593.52	648.38	16.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	2,259.69	564.92	14.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	1,979.62	494.90	12.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	1,909.99	477.50	12.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	1,737.43	434.36	11.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	1,709.60	427.40	11.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	1,709.62	427.40	11.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	1,794.38	448.59	11.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	1,783.72	445.93	11.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	2,017.81	504.45	13.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	3,482.28	870.57	22.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	4,967.42	1241.85	32.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	6,660.26	1665.06	43.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	8,342.79	2085.70	53.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	10,167.45	2541.86	65.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	11,949.54	2987.39	77.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	13,389.78	3347.44	86.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,304.36	3576.09	92.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,756.19	3689.05	95.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,079.56	3769.89	97.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,312.91	3828.23	98.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,453.53	3863.38	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.42	3873.85	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	15,495.73	4648.72	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:36 PM	15,495.73	2789.23	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

JULY 5

Analysis Hours: 6:52 AM-7:36 PM (PDT)

JUNE 7 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
6:52 AM	15,495.73	929.74	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 AM	15,495.73	2944.19	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,319.47	3829.87	98.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,085.79	3771.45	97.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	14,034.36	3508.59	90.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	12,313.49	3078.37	79.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	10,812.36	2703.09	69.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	9,528.25	2382.06	61.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	8,472.11	2118.03	54.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	7,590.83	1897.71	49.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	6,775.25	1693.81	43.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	6,041.13	1510.28	39.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	5,372.99	1343.25	34.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	4,804.44	1201.11	31.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	4,275.35	1068.84	27.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	3,858.51	964.63	24.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	3,444.75	861.19	22.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	3,081.28	770.32	19.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	2,694.44	673.61	17.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	2,357.53	589.38	15.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	2,081.95	520.49	13.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	2,010.01	502.50	13.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	1,836.17	459.04	11.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	1,787.99	447.00	11.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	1,771.42	442.86	11.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	1,856.53	464.13	12.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	1,851.94	462.99	12.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	1,905.98	476.49	12.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	3,266.92	816.73	21.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	4,751.26	1187.81	30.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	6,446.48	1611.62	41.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	8,127.22	2031.80	52.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	9,940.69	2485.17	64.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	11,719.31	2929.83	75.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	13,258.38	3314.59	85.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,275.30	3568.82	92.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,748.06	3687.01	95.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,088.40	3772.10	97.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,327.47	3831.87	98.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,451.32	3862.83	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.29	3873.82	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.71	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	15,495.73	4648.72	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:36 PM	15,495.73	2789.23	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

JULY 12

Analysis Hours: 6:56 AM-7:33 PM (PDT)

MAY 31 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
6:56 AM	15,495.73	464.87	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 AM	15,495.73	2324.36	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,407.85	3851.96	99.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,250.01	3812.50	98.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	14,561.34	3640.34	94.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	12,808.35	3202.09	82.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	11,307.98	2826.99	73.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	9,958.25	2489.56	64.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	8,829.12	2207.28	57.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	7,909.64	1977.41	51.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	7,062.16	1765.54	45.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	6,294.13	1573.53	40.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	5,590.90	1397.72	36.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	4,994.15	1248.54	32.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	4,445.35	1111.34	28.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	4,022.08	1005.52	26.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	3,599.83	899.96	23.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	3,229.28	807.32	20.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	2,837.26	709.32	18.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	2,496.40	624.10	16.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	2,243.63	560.91	14.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	2,169.47	542.37	14.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	1,993.14	498.28	12.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	1,942.10	485.52	12.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	1,878.33	469.58	12.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	1,963.98	490.99	12.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	1,963.52	490.88	12.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	2,017.38	504.34	13.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	3,023.97	755.99	19.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	4,506.22	1126.56	29.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	6,210.19	1552.55	40.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	7,896.08	1974.02	51.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	9,692.70	2423.18	62.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	11,473.10	2868.28	74.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	13,128.78	3282.19	84.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,261.35	3565.34	92.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,762.38	3690.59	95.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,121.00	3780.25	97.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,351.52	3837.88	99.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,452.78	3863.19	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	15,495.73	4338.80	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:33 PM	15,495.73	2324.36	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

JULY 19

Analysis Hours: 7:01 AM-7:30 PM (PDT)

MAY 24 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:01 AM	15,495.72	2014.44	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:16 AM	15,495.73	3718.97	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	15,495.72	3718.97	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,474.82	3868.70	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,368.35	3842.09	99.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	14,965.87	3741.47	96.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	13,441.03	3360.26	86.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	11,800.62	2950.15	76.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	10,497.14	2624.28	67.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	9,274.79	2318.70	59.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	8,304.91	2076.23	53.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	7,416.60	1854.15	47.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	6,612.25	1653.06	42.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	5,862.63	1465.66	37.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	5,230.76	1307.69	33.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	4,655.81	1163.95	30.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	4,228.27	1057.07	27.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	3,794.28	948.57	24.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	3,415.03	853.76	22.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	3,016.92	754.23	19.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	2,671.17	667.79	17.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	2,462.03	615.51	15.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	2,385.87	596.47	15.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	2,210.40	552.60	14.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	2,150.62	537.65	13.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	2,030.97	507.74	13.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	2,116.87	529.22	13.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	2,118.21	529.55	13.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	2,181.90	545.48	14.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	2,791.62	697.90	18.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	4,255.20	1063.80	27.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	5,976.12	1494.03	38.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	7,646.16	1911.54	49.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	9,450.98	2362.74	61.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	11,237.97	2809.49	72.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	13,011.49	3252.87	84.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,270.42	3567.61	92.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,803.14	3700.78	95.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,177.82	3794.45	97.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,360.88	3840.22	99.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,461.99	3865.50	99.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 PM	15,495.72	2014.44	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

JULY 26

Analysis Hours: 7:07 AM-7:25 PM (PDT)

MAY 17 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:07 AM	15,495.72	929.74	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 AM	15,495.73	2944.19	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,495.71	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,455.33	3863.83	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,099.53	3774.88	97.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	14,102.74	3525.69	91.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	12,378.77	3094.69	79.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	10,988.08	2747.02	70.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	9,810.51	2452.63	63.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	8,777.86	2194.47	56.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	7,837.65	1959.41	50.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	6,986.26	1746.56	45.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	6,194.28	1548.57	40.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	5,514.38	1378.59	35.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	4,917.96	1229.49	31.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	4,478.88	1119.72	28.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	4,030.15	1007.54	26.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	3,641.65	910.41	23.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	3,234.82	808.70	20.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	2,924.86	731.22	18.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	2,738.30	684.57	17.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	2,659.60	664.90	17.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	2,484.70	621.18	16.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	2,414.25	603.56	15.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	2,251.24	562.81	14.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	2,315.63	578.91	14.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	2,318.69	579.67	15.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	2,393.00	598.25	15.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	2,584.51	646.13	16.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	3,988.85	997.21	25.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	5,732.13	1433.03	37.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	7,389.84	1847.46	47.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	9,207.78	2301.95	59.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	11,005.64	2751.41	71.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	12,886.89	3221.72	83.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,238.15	3559.54	91.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,865.42	3716.36	95.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,207.33	3801.83	98.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,376.68	3844.17	99.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,476.60	3869.15	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.67	3873.92	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	15,495.73	3254.10	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:25 PM	15,495.72	1394.61	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

AUGUST 2

Analysis Hours: 7:12 AM-7:18 PM (PDT)

MAY 10 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:12 AM	15,495.72	309.91	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 AM	15,495.72	2324.36	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,495.71	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,493.04	3873.26	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,220.03	3805.01	98.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	14,335.86	3583.97	92.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	12,999.78	3249.95	83.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	11,499.94	2874.99	74.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	10,312.40	2578.10	66.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	9,302.28	2325.57	60.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	8,301.57	2075.39	53.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	7,393.78	1848.45	47.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	6,558.43	1639.61	42.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	5,832.85	1458.21	37.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	5,225.99	1306.50	33.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	4,764.33	1191.08	30.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	4,298.50	1074.63	27.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	3,902.30	975.57	25.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	3,482.81	870.70	22.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	3,252.25	813.06	21.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	3,069.53	767.38	19.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	2,987.08	746.77	19.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	2,811.36	702.84	18.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	2,735.64	683.91	17.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	2,569.26	642.32	16.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	2,559.75	639.94	16.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	2,566.29	641.57	16.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	2,641.78	660.45	17.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	2,625.22	656.30	16.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	3,742.36	935.59	24.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	5,488.34	1372.09	35.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	7,164.51	1791.13	46.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	9,000.26	2250.06	58.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	10,813.66	2703.41	69.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	12,755.83	3188.96	82.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,226.12	3556.53	91.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,928.06	3732.01	96.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,224.23	3806.06	98.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,399.93	3849.98	99.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,488.51	3872.13	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	15,495.73	2324.36	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:18 PM	15,495.72	464.87	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

AUGUST 9

Analysis Hours: 7:19 AM-7:10 PM (PDT)

MAY 3 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:19 AM	15,495.71	1394.61	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	15,495.73	3254.10	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,324.56	3831.14	98.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	14,529.37	3632.34	93.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	13,280.58	3320.14	85.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	12,088.82	3022.20	78.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	10,793.47	2698.37	69.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	9,791.63	2447.91	63.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	8,804.94	2201.23	56.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	7,833.90	1958.48	50.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	6,951.79	1737.95	44.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	6,190.84	1547.71	40.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	5,581.43	1395.36	36.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	5,090.05	1272.51	32.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	4,602.44	1150.61	29.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	4,197.79	1049.45	27.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	3,770.10	942.53	24.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	3,636.49	909.12	23.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	3,455.70	863.93	22.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	3,367.95	841.99	21.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	3,191.11	797.78	20.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	3,111.04	777.76	20.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	2,936.96	734.24	19.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	2,873.82	718.45	18.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	2,860.84	715.21	18.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	2,933.91	733.48	18.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	2,927.45	731.86	18.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	3,540.65	885.16	22.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	5,261.60	1315.40	34.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	6,962.31	1740.58	44.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	8,818.20	2204.55	56.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	10,651.68	2662.92	68.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	12,624.69	3156.17	81.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,185.51	3546.38	91.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,956.13	3739.03	96.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,247.92	3811.98	98.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,423.83	3855.96	99.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,494.29	3873.57	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	15,495.73	5268.55	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:10 PM	15,495.73	3254.10	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

AUGUST 16

Analysis Hours: 7:25 AM-7:02 PM (PDT)

APRIL 26 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:25 AM	15,495.73	619.83	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	15,495.73	2634.27	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,495.70	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,420.10	3855.03	99.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	14,737.16	3684.29	95.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	13,482.11	3370.53	87.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	12,425.24	3106.31	80.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	11,317.15	2829.29	73.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,224.10	2556.02	66.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	9,272.89	2318.22	59.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	8,320.19	2080.05	53.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	7,386.53	1846.63	47.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	6,606.99	1651.75	42.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	5,992.58	1498.15	38.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	5,459.14	1364.78	35.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	4,952.08	1238.02	32.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	4,529.90	1132.48	29.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	4,199.60	1049.90	27.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	4,079.30	1019.82	26.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	3,895.88	973.97	25.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	3,801.88	950.47	24.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	3,624.53	906.13	23.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	3,539.17	884.79	22.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	3,361.06	840.26	21.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	3,288.08	822.02	21.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	3,199.63	799.91	20.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	3,262.24	815.56	21.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	3,269.50	817.38	21.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	3,437.14	859.28	22.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	5,048.52	1262.13	32.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	6,777.65	1694.41	43.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	8,657.12	2164.28	55.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	10,511.61	2627.90	67.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	12,452.83	3113.21	80.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,085.78	3521.44	90.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,969.86	3742.47	96.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,270.51	3817.63	98.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,441.72	3860.43	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	15,495.73	4183.85	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:02 PM	15,495.73	2169.40	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

AUGUST 23

Analysis Hours: 7:31 AM-6:52 PM (PDT)

APRIL 19 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:31 AM	15,495.72	1704.53	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	15,495.72	3564.02	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,494.53	3873.63	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	14,912.79	3728.20	96.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	13,668.07	3417.02	88.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	12,573.90	3143.48	81.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	11,584.82	2896.20	74.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,656.10	2664.03	68.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	9,598.58	2399.65	61.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	8,715.44	2178.86	56.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	7,844.15	1961.04	50.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	7,084.89	1771.22	45.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	6,434.28	1608.57	41.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	5,872.68	1468.17	37.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	5,339.50	1334.88	34.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	4,929.83	1232.46	31.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	4,693.62	1173.40	30.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	4,574.90	1143.73	29.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	4,385.81	1096.45	28.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	4,286.44	1071.61	27.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	4,106.67	1026.67	26.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	4,014.97	1003.74	25.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	3,836.13	959.03	24.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	3,746.49	936.62	24.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	3,580.47	895.12	23.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	3,624.19	906.05	23.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	3,639.42	909.85	23.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	3,714.25	928.56	24.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	4,895.73	1223.93	31.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	6,658.25	1664.56	43.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	8,560.92	2140.23	55.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	10,369.78	2592.45	66.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	12,266.51	3066.63	79.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,018.15	3504.54	90.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,973.06	3743.26	96.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,296.58	3824.14	98.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,462.43	3865.61	99.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	15,495.72	2944.19	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:52 PM	15,495.73	929.74	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

AUGUST 30

Analysis Hours: 7:37 AM-6:42 PM (PDT)

APRIL 12 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:37 AM	15,495.72	929.74	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	15,495.72	2944.19	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,495.71	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,495.71	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,495.19	3873.80	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	15,023.11	3755.78	97.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	13,844.23	3461.06	89.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	12,572.90	3143.22	81.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	11,670.80	2917.70	75.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,848.40	2712.10	70.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	9,917.37	2479.34	64.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	8,974.42	2243.61	57.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	8,229.82	2057.45	53.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	7,606.75	1901.69	49.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	6,914.65	1728.66	44.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	6,342.08	1585.52	40.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	5,782.77	1445.69	37.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	5,481.87	1370.47	35.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	5,251.67	1312.92	33.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	5,123.38	1280.85	33.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	4,928.59	1232.15	31.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	4,822.93	1205.73	31.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	4,638.49	1159.62	29.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	4,541.40	1135.35	29.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	4,359.19	1089.80	28.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	4,240.26	1060.07	27.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	4,047.38	1011.84	26.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	4,024.37	1006.09	26.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	4,052.56	1013.14	26.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	4,158.60	1039.65	26.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	4,814.97	1203.74	31.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	6,566.38	1641.59	42.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	8,406.47	2101.62	54.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	10,185.77	2546.44	65.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	12,087.32	3021.83	78.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	13,911.03	3477.76	89.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,969.40	3742.35	96.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,322.83	3830.71	98.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,481.21	3870.30	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	15,495.73	3564.02	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:42 PM	15,495.73	1704.53	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

SEPTEMBER 6

Analysis Hours: 7:44 AM-6:31 PM (PDT)

APRIL 5 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:44 AM	15,495.72	2014.44	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,495.70	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	15,072.89	3768.22	97.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	13,864.28	3466.07	89.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	12,431.35	3107.84	80.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	11,603.64	2900.91	74.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,848.35	2712.09	70.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	10,046.24	2511.56	64.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	9,236.39	2309.10	59.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	8,517.19	2129.30	55.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	8,039.76	2009.94	51.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	7,440.90	1860.22	48.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	6,858.34	1714.59	44.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	6,356.31	1589.08	41.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	6,124.25	1531.06	39.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	5,870.81	1467.70	37.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	5,726.41	1431.60	37.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	5,522.77	1380.69	35.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	5,408.56	1352.14	34.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	5,219.60	1304.90	33.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	5,115.32	1278.83	33.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	4,898.96	1224.74	31.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	4,749.15	1187.29	30.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	4,548.29	1137.07	29.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	4,480.81	1120.20	28.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	4,507.92	1126.98	29.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	4,638.16	1159.54	29.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	4,861.08	1215.27	31.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	6,392.70	1598.18	41.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	8,228.76	2057.19	53.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	10,016.53	2504.13	64.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	11,906.34	2976.59	76.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	13,915.74	3478.94	89.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,958.13	3739.53	96.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,340.51	3835.13	99.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,493.74	3873.44	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.73	4183.85	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:31 PM	15,495.73	2169.40	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

SEPTEMBER 13

Analysis Hours: 7:50 AM-6:21 PM (PDT)

MARCH 29 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:50 AM	15,495.72	1239.66	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,495.72	3254.10	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	15,107.18	3776.80	97.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	13,742.99	3435.75	88.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	12,323.74	3080.93	79.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	11,471.78	2867.94	74.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,677.74	2669.43	68.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	9,945.05	2486.26	64.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	9,322.47	2330.62	60.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	8,829.74	2207.44	57.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	8,315.21	2078.80	53.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	7,901.66	1975.41	51.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	7,432.74	1858.19	48.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	7,057.52	1764.38	45.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	6,836.61	1709.15	44.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	6,556.08	1639.02	42.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	6,386.09	1596.52	41.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	6,165.63	1541.41	39.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	6,042.90	1510.73	39.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	5,846.17	1461.54	37.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	5,686.17	1421.54	36.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	5,440.24	1360.06	35.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	5,291.85	1322.96	34.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	5,098.17	1274.54	32.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	5,023.94	1255.98	32.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	5,006.57	1251.64	32.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	5,120.44	1280.11	33.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	5,108.88	1277.22	33.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	6,230.86	1557.72	40.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	8,074.58	2018.65	52.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	9,868.08	2467.02	63.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	11,845.92	2961.48	76.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,042.56	3510.64	90.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,969.40	3742.35	96.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,361.99	3840.50	99.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,495.71	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.73	2789.23	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:21 PM	15,495.73	774.79	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

SEPTEMBER 20

Analysis Hours: 7:57 AM-6:09 PM (PDT)

APPROXIMATE EQUINOXES
MARCH 22 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:57 AM	15,495.72	309.91	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,495.72	2324.36	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,495.71	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	15,183.56	3795.89	98.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	13,523.75	3380.94	87.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	12,074.10	3018.52	77.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	11,342.61	2835.65	73.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,488.28	2622.07	67.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	9,773.06	2443.26	63.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	9,265.10	2316.28	59.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	8,979.62	2244.90	57.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	8,605.49	2151.37	55.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	8,198.51	2049.63	52.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	8,056.25	2014.06	52.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	7,829.91	1957.48	50.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	7,596.23	1899.06	49.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	7,305.69	1826.42	47.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	7,107.33	1776.83	45.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	6,860.39	1715.10	44.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	6,722.13	1680.53	43.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	6,454.10	1613.53	41.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	6,253.74	1563.44	40.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	6,010.69	1502.67	38.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	5,865.54	1466.39	37.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	5,682.08	1420.52	36.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	5,608.23	1402.06	36.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	5,511.44	1377.86	35.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	5,561.85	1390.46	35.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	5,559.51	1389.88	35.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	6,122.49	1530.62	39.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	7,949.85	1987.46	51.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	9,778.76	2444.69	63.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	11,734.19	2933.55	75.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,188.44	3547.11	91.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	15,119.85	3779.96	97.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,410.45	3852.61	99.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,495.69	3873.92	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.73	3254.10	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:09 PM	15,495.73	1239.66	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

SEPTEMBER 27

Analysis Hours: 8:03 AM-5:58 PM (PDT)

MARCH 15 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:03 AM	15,495.72	1549.57	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,495.69	3409.05	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	15,030.56	3757.64	97.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	13,181.80	3295.45	85.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	11,798.62	2949.65	76.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	11,086.58	2771.64	71.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,325.86	2581.47	66.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	9,634.67	2408.67	62.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	9,182.19	2295.55	59.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	8,885.82	2221.45	57.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	8,754.26	2188.56	56.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	8,597.45	2149.36	55.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	8,582.97	2145.74	55.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	8,537.50	2134.38	55.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	8,401.60	2100.40	54.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	8,096.82	2024.20	52.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	7,889.43	1972.36	50.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	7,610.54	1902.64	49.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	7,352.10	1838.02	47.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	7,034.76	1758.69	45.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	6,837.58	1709.39	44.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	6,604.80	1651.20	42.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	6,465.90	1616.48	41.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	6,294.38	1573.59	40.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	6,202.65	1550.66	40.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	6,058.24	1514.56	39.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	6,056.51	1514.13	39.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	6,047.83	1511.96	39.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	6,161.06	1540.27	39.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	7,879.60	1969.90	50.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	9,752.54	2438.14	62.9%	28.58	7.14	0.2%	28.58	7.14	0.2%
4:00 PM	11,762.31	2940.58	75.9%	8.49	2.12	0.1%	8.49	2.12	0.1%
4:15 PM	14,010.60	3502.65	90.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	15,336.72	3834.18	99.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,456.65	3864.16	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.72	3564.02	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:58 PM	15,495.72	1704.53	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

OCTOBER 4

Analysis Hours: 8:09 AM-5:47 PM (PDT)

MARCH 8 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:09 AM	15,495.72	619.83	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,495.73	2634.27	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,126.46	3781.61	97.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	14,480.93	3620.23	93.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	12,780.74	3195.19	82.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	11,631.32	2907.83	75.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	10,854.53	2713.63	70.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,133.10	2533.28	65.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	9,562.10	2390.52	61.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	9,128.01	2282.00	58.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	8,771.38	2192.85	56.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	8,723.13	2180.78	56.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	8,996.22	2249.06	58.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	9,135.72	2283.93	59.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	9,112.75	2278.19	58.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	9,127.67	2281.92	58.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	8,924.84	2231.21	57.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	8,709.25	2177.31	56.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	8,316.09	2079.02	53.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	8,020.63	2005.16	51.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	7,693.03	1923.26	49.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	7,468.05	1867.01	48.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	7,218.10	1804.52	46.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	7,086.24	1771.56	45.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	6,925.58	1731.40	44.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	6,827.72	1706.93	44.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	6,658.19	1664.55	43.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	6,599.37	1649.84	42.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	6,580.90	1645.22	42.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	6,586.36	1646.59	42.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	7,843.03	1960.76	50.6%	338.49	84.62	2.2%	338.49	84.62	2.2%
3:45 PM	9,777.44	2444.36	63.1%	1,167.87	291.97	7.5%	1,167.87	291.97	7.5%
4:00 PM	11,787.81	2946.95	76.1%	443.70	110.93	2.9%	443.70	110.93	2.9%
4:15 PM	13,715.18	3428.80	88.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	15,387.55	3846.89	99.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,485.92	3871.48	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.73	4183.85	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:47 PM	15,495.72	2169.40	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

OCTOBER 11

Analysis Hours: 8:16 AM-5:37 PM (PDT)

MARCH 1 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:16 AM	15,495.72	1859.49	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	14,600.31	3504.07	94.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	14,109.97	3527.49	91.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	14,241.78	3560.45	91.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	13,119.22	3279.81	84.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	10,722.65	2680.66	69.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,021.30	2505.32	64.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	9,554.10	2388.53	61.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	9,131.10	2282.77	58.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	8,813.15	2203.29	56.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	8,849.19	2212.30	57.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	9,191.19	2297.80	59.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	9,561.60	2390.40	61.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	9,682.71	2420.68	62.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	9,715.53	2428.88	62.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	9,671.79	2417.95	62.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	9,434.31	2358.58	60.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	9,020.27	2255.07	58.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	8,704.47	2176.12	56.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	8,335.65	2083.91	53.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	8,076.14	2019.03	52.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	7,842.63	1960.66	50.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	7,718.21	1929.55	49.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	7,571.80	1892.95	48.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	7,488.88	1872.22	48.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	7,304.75	1826.19	47.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	7,211.30	1802.82	46.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	7,178.29	1794.57	46.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	7,234.78	1808.69	46.7%	622.15	155.54	4.0%	622.15	155.54	4.0%
3:30 PM	7,855.58	1963.89	50.7%	2,023.02	505.76	13.1%	2,023.02	505.76	13.1%
3:45 PM	9,819.56	2454.89	63.4%	2,904.31	726.08	18.7%	2,904.31	726.08	18.7%
4:00 PM	11,815.26	2953.82	76.2%	1,410.48	352.62	9.1%	1,410.48	352.62	9.1%
4:15 PM	13,674.60	3418.65	88.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	15,249.97	3812.49	98.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.72	2944.19	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:37 PM	15,495.73	929.74	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

OCTOBER 18

Analysis Hours: 8:22 AM-5:27 PM (PDT)

FEBRUARY 22 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:22 AM	15,495.72	929.74	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	14,477.77	2606.00	93.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	14,944.17	3736.04	96.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	13,916.40	3479.10	89.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	13,169.25	3292.31	85.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	11,045.19	2761.30	71.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,043.82	2510.95	64.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	9,597.22	2399.31	61.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	9,182.97	2295.74	59.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	8,985.24	2246.31	58.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	9,153.13	2288.28	59.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	9,394.35	2348.59	60.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	9,772.28	2443.07	63.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	10,123.73	2530.93	65.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	10,294.90	2573.72	66.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	10,177.10	2544.27	65.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	10,071.88	2517.97	65.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	9,750.51	2437.63	62.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	9,424.68	2356.17	60.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	9,051.38	2262.84	58.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	8,774.94	2193.74	56.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	8,468.76	2117.19	54.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	8,352.62	2088.15	53.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	8,222.08	2055.52	53.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	8,175.20	2043.80	52.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	7,991.50	1997.88	51.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	7,899.41	1974.85	51.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	7,857.36	1964.34	50.7%	177.99	44.50	1.1%	177.99	44.50	1.1%
3:15 PM	7,949.04	1987.26	51.3%	1,928.44	482.11	12.4%	1,928.44	482.11	12.4%
3:30 PM	8,059.26	2014.82	52.0%	3,937.50	984.37	25.4%	3,937.50	984.37	25.4%
3:45 PM	9,910.40	2477.60	64.0%	4,760.03	1190.01	30.7%	4,760.03	1190.01	30.7%
4:00 PM	11,881.72	2970.43	76.7%	2,983.83	745.96	19.3%	2,983.83	745.96	19.3%
4:15 PM	13,649.86	3412.47	88.1%	95.65	23.91	0.6%	95.65	23.91	0.6%
4:30 PM	15,120.36	3780.09	97.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,495.71	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,495.72	3409.06	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:27 PM	15,495.73	1549.57	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

OCTOBER 25

Analysis Hours: 7:30 AM-4:18 PM (PST)

FEBRUARY 15 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:30 AM	15,424.81	2005.22	99.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	14,699.31	3674.83	94.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	13,649.43	3412.36	88.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	12,851.24	3212.81	82.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	11,795.52	2948.88	76.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	10,147.24	2536.81	65.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	9,695.40	2423.85	62.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	9,342.64	2335.66	60.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	9,311.99	2328.00	60.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	9,500.58	2375.15	61.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	9,704.95	2426.24	62.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	9,975.79	2493.95	64.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	10,336.74	2584.18	66.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	10,628.94	2657.24	68.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	10,667.06	2666.76	68.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	10,589.90	2647.48	68.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	10,417.45	2604.36	67.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	10,165.90	2541.47	65.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	9,786.55	2446.64	63.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	9,510.65	2377.66	61.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	9,175.39	2293.85	59.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	8,978.38	2244.60	57.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	8,863.41	2215.85	57.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	8,853.76	2213.44	57.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	8,705.94	2176.49	56.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	8,639.15	2159.79	55.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	8,578.63	2144.66	55.4%	330.73	82.68	2.1%	330.73	82.68	2.1%
2:15 PM	8,714.02	2178.51	56.2%	2,532.67	633.17	16.3%	2,532.67	633.17	16.3%
2:30 PM	8,788.35	2197.09	56.7%	5,665.87	1416.47	36.6%	5,665.87	1416.47	36.6%
2:45 PM	10,056.02	2514.01	64.9%	5,439.71	1359.93	35.1%	5,439.71	1359.93	35.1%
3:00 PM	12,004.55	3001.14	77.5%	3,491.17	872.79	22.5%	3,491.17	872.79	22.5%
3:15 PM	13,724.64	3431.16	88.6%	660.47	165.12	4.3%	660.47	165.12	4.3%
3:30 PM	15,064.92	3766.23	97.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	15,495.72	2324.36	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:18 PM	15,495.73	464.87	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

NOVEMBER 1

Analysis Hours: 7:36 AM-4:10 PM (PST)

FEBRUARY 8 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:36 AM	14,940.92	1045.86	96.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	14,451.91	2745.86	93.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	13,386.80	3346.70	86.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	12,561.97	3140.49	81.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	11,215.97	2803.99	72.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	10,121.53	2530.38	65.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	9,863.14	2465.78	63.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	9,613.78	2403.44	62.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	9,667.56	2416.89	62.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	9,818.56	2454.64	63.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	9,995.37	2498.84	64.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	10,254.49	2563.62	66.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	10,501.37	2625.34	67.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	10,784.53	2696.13	69.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	11,026.49	2756.62	71.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	11,084.78	2771.19	71.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	10,953.74	2738.44	70.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	10,847.49	2711.87	70.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	10,526.40	2631.60	67.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	10,251.38	2562.84	66.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	9,918.57	2479.64	64.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	9,691.58	2422.89	62.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	9,477.69	2369.42	61.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	9,514.83	2378.71	61.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	9,441.25	2360.31	60.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	9,403.56	2350.89	60.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	9,356.17	2339.04	60.4%	37.22	9.30	0.2%	37.22	9.30	0.2%
2:15 PM	9,500.21	2375.05	61.3%	2,203.49	550.87	14.2%	2,203.49	550.87	14.2%
2:30 PM	9,650.47	2412.62	62.3%	5,810.83	1452.71	37.5%	5,810.83	1452.71	37.5%
2:45 PM	10,288.75	2572.19	66.4%	5,206.97	1301.74	33.6%	5,206.97	1301.74	33.6%
3:00 PM	12,315.51	3078.88	79.5%	3,180.22	795.05	20.5%	3,180.22	795.05	20.5%
3:15 PM	13,939.62	3484.90	90.0%	1,243.31	310.83	8.0%	1,243.31	310.83	8.0%
3:30 PM	15,148.19	3787.05	97.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	15,495.72	3254.10	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:10 PM	15,495.73	1394.62	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

NOVEMBER 8

Analysis Hours: 7:43 AM-4:03 PM (PST)

FEBRUARY 1 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:43 AM	14,099.65	141.00	91.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	14,034.44	1824.48	90.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	13,090.76	3272.69	84.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	12,292.65	3073.16	79.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	10,252.94	2563.24	66.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	10,019.49	2504.87	64.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	9,988.83	2497.21	64.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	10,002.24	2500.56	64.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	10,023.59	2505.90	64.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,091.29	2522.82	65.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	10,241.08	2560.27	66.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	10,485.97	2621.49	67.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	10,703.20	2675.80	69.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	10,958.27	2739.57	70.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	11,170.33	2792.58	72.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	11,394.83	2848.71	73.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	11,443.33	2860.83	73.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	11,382.76	2845.69	73.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	11,215.88	2803.97	72.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	10,979.38	2744.85	70.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	10,652.47	2663.12	68.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	10,438.24	2609.56	67.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	10,170.42	2542.60	65.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	10,144.89	2536.22	65.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	10,171.48	2542.87	65.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	10,152.99	2538.25	65.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	10,118.83	2529.71	65.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	10,283.32	2570.83	66.4%	1,165.69	291.42	7.5%	1,165.69	291.42	7.5%
2:30 PM	10,520.74	2630.18	67.9%	4,304.47	1076.12	27.8%	4,304.47	1076.12	27.8%
2:45 PM	10,980.85	2745.21	70.9%	4,514.88	1128.72	29.1%	4,514.88	1128.72	29.1%
3:00 PM	12,843.72	3210.93	82.9%	2,652.00	663.00	17.1%	2,652.00	663.00	17.1%
3:15 PM	14,279.20	3569.80	92.1%	1,216.53	304.13	7.9%	1,216.53	304.13	7.9%
3:30 PM	15,447.03	3861.76	99.7%	16.42	4.11	0.1%	16.42	4.11	0.1%
3:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	15,495.72	2324.36	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:03 PM	15,495.73	464.87	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

NOVEMBER 15

Analysis Hours: 7:51 AM-3:57 PM (PST)

JANUARY 25 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:51 AM	13,489.28	1079.14	87.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	12,823.78	2564.76	82.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	11,617.31	2904.33	75.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	10,203.33	2550.83	65.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	9,948.42	2487.10	64.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	10,007.34	2501.84	64.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	10,279.88	2569.97	66.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	10,311.67	2577.92	66.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,337.22	2584.31	66.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	10,455.61	2613.90	67.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	10,680.08	2670.02	68.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	10,887.78	2721.95	70.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	11,113.35	2778.34	71.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	11,296.89	2824.22	72.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	11,524.88	2881.22	74.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	11,753.85	2938.46	75.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	11,851.17	2962.79	76.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	11,747.60	2936.90	75.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	11,654.69	2913.67	75.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	11,351.91	2837.98	73.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	11,159.89	2789.97	72.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	10,926.24	2731.56	70.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	10,807.84	2701.96	69.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	10,832.77	2708.19	69.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	10,851.84	2712.96	70.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	10,840.67	2710.17	70.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	11,027.90	2756.97	71.2%	195.38	48.84	1.3%	195.38	48.84	1.3%
2:30 PM	11,330.93	2832.73	73.1%	2,739.47	684.87	17.7%	2,739.47	684.87	17.7%
2:45 PM	12,040.18	3010.05	77.7%	3,455.55	863.89	22.3%	3,455.55	863.89	22.3%
3:00 PM	13,411.36	3352.84	86.5%	2,084.37	521.09	13.5%	2,084.37	521.09	13.5%
3:15 PM	14,855.67	3713.92	95.9%	640.06	160.01	4.1%	640.06	160.01	4.1%
3:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	15,495.72	3564.01	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:57 PM	15,495.73	1704.53	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

NOVEMBER 22

Analysis Hours: 7:57 AM-3:54 PM (PST)

JANUARY 18 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:57 AM	13,143.82	262.88	84.8%	0.00	0.00	0.0%	663.65	13.27	4.3%
8:00 AM	12,675.86	1901.38	81.8%	0.00	0.00	0.0%	1,088.12	163.22	7.0%
8:15 AM	10,928.30	2732.07	70.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	10,299.42	2574.86	66.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	10,067.16	2516.79	65.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	10,034.16	2508.54	64.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	10,427.16	2606.79	67.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	10,495.28	2623.82	67.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,544.78	2636.19	68.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	10,641.27	2660.32	68.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	10,845.42	2711.35	70.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	11,037.82	2759.45	71.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	11,225.75	2806.44	72.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	11,412.86	2853.22	73.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	11,640.28	2910.07	75.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	11,866.26	2966.56	76.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	12,124.63	3031.16	78.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	12,177.49	3044.37	78.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	12,159.36	3039.84	78.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	11,987.40	2996.85	77.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	11,830.68	2957.67	76.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	11,585.15	2896.29	74.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	11,485.88	2871.47	74.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	11,392.38	2848.09	73.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	11,477.08	2869.27	74.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	11,480.37	2870.09	74.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	11,693.67	2923.42	75.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	12,033.92	3008.48	77.7%	1,463.54	365.89	9.4%	1,463.54	365.89	9.4%
2:45 PM	12,652.96	3163.24	81.7%	2,833.99	708.50	18.3%	2,833.99	708.50	18.3%
3:00 PM	13,853.15	3463.29	89.4%	1,642.57	410.64	10.6%	1,642.57	410.64	10.6%
3:15 PM	15,404.35	3851.09	99.4%	91.38	22.84	0.6%	91.38	22.84	0.6%
3:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	15,495.73	3099.15	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:54 PM	15,495.73	1239.66	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

NOVEMBER 29

Analysis Hours: 8:04 AM-3:51 PM (PST)

JANUARY 11 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:04 AM	12,967.21	1167.05	83.7%	0.00	0.00	0.0%	2,220.24	199.82	14.3%
8:15 AM	10,529.24	2211.14	67.9%	0.00	0.00	0.0%	8.15	1.71	0.1%
8:30 AM	10,321.95	2580.49	66.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	10,493.20	2623.30	67.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	10,050.48	2512.62	64.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	10,518.98	2629.74	67.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	10,572.65	2643.16	68.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,715.10	2678.78	69.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	10,786.07	2696.52	69.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	10,969.67	2742.42	70.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	11,134.63	2783.66	71.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	11,321.98	2830.49	73.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	11,505.94	2876.48	74.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	11,733.95	2933.49	75.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	11,956.19	2989.05	77.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	12,194.67	3048.67	78.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	12,427.72	3106.93	80.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	12,553.18	3138.30	81.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	12,476.80	3119.20	80.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	12,387.01	3096.75	79.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	12,123.44	3030.86	78.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	12,051.40	3012.85	77.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	11,928.42	2982.10	77.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	11,988.71	2997.18	77.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	12,001.56	3000.39	77.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	12,231.09	3057.77	78.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	12,589.26	3147.31	81.2%	450.48	112.62	2.9%	450.48	112.62	2.9%
2:45 PM	13,193.21	3298.30	85.1%	1,910.77	477.69	12.3%	1,910.77	477.69	12.3%
3:00 PM	14,352.64	3588.16	92.6%	1,143.09	285.77	7.4%	1,143.09	285.77	7.4%
3:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	15,495.73	2789.23	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:51 PM	15,495.72	774.79	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

DECEMBER 6

Analysis Hours: 8:10 AM-3:51 PM (PST)

JANUARY 4 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:10 AM	12,233.66	489.35	78.9%	0.00	0.00	0.0%	2,546.88	101.88	16.4%
8:15 AM	10,585.10	1799.47	68.3%	0.00	0.00	0.0%	3,524.18	599.11	22.7%
8:30 AM	10,329.69	2582.42	66.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	10,677.09	2669.27	68.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	10,114.14	2528.53	65.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	10,534.06	2633.52	68.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	10,621.58	2655.39	68.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,785.53	2696.38	69.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	10,888.71	2722.18	70.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	11,051.07	2762.77	71.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	11,200.65	2800.16	72.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	11,388.54	2847.14	73.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	11,569.69	2892.42	74.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	11,795.21	2948.80	76.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	12,013.84	3003.46	77.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	12,275.71	3068.93	79.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	12,539.76	3134.94	80.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	12,818.65	3204.66	82.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	12,786.43	3196.61	82.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	12,765.83	3191.46	82.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	12,527.42	3131.85	80.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	12,451.09	3112.77	80.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	12,330.05	3082.51	79.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	12,426.53	3106.63	80.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	12,377.68	3094.42	79.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	12,606.31	3151.58	81.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	12,962.51	3240.63	83.7%	15.40	3.85	0.1%	15.40	3.85	0.1%
2:45 PM	13,520.66	3380.16	87.3%	1,218.40	304.60	7.9%	1,218.40	304.60	7.9%
3:00 PM	14,524.33	3631.08	93.7%	971.40	242.85	6.3%	971.40	242.85	6.3%
3:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	15,495.73	2634.27	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:51 PM	15,495.73	774.79	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

DECEMBER 13

Analysis Hours: 8:15 AM-3:52 PM (PST)

DECEMBER 28 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:15 AM	11,744.70	1409.36	75.8%	0.00	0.00	0.0%	2,526.85	303.22	16.3%
8:30 AM	10,310.57	2577.64	66.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	10,648.81	2662.20	68.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	10,175.92	2543.98	65.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	10,517.51	2629.38	67.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	10,641.15	2660.29	68.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,815.53	2703.88	69.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	10,948.31	2737.08	70.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	11,087.09	2771.77	71.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	11,231.12	2807.78	72.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	11,416.25	2854.06	73.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	11,594.65	2898.66	74.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	11,817.12	2954.28	76.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	12,030.81	3007.70	77.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	12,285.04	3071.26	79.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	12,544.31	3136.08	81.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	12,848.92	3212.23	82.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	12,986.50	3246.63	83.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	12,942.56	3235.64	83.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	12,792.84	3198.21	82.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	12,702.48	3175.62	82.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	12,587.69	3146.92	81.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	12,651.58	3162.90	81.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	12,602.72	3150.68	81.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	12,812.49	3203.12	82.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	13,141.35	3285.34	84.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	13,650.43	3412.61	88.1%	724.71	181.18	4.7%	724.71	181.18	4.7%
3:00 PM	14,508.40	3627.10	93.6%	982.20	245.55	6.3%	982.20	245.55	6.3%
3:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	15,495.72	2789.23	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:52 PM	15,495.73	929.74	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

DECEMBER 20

Analysis Hours: 8:19 AM-3:54 PM (PST)

WINTER SOLSTICE
DECEMBER 21 SIMILAR

Analysis Time	CURRENT SHADOW			NEW SHADOW FROM 469 STEVENSON			469 STEVENSON + CUMULATIVE SHADOW		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:19 AM	11,576.56	926.13	74.7%	0.00	0.00	0.0%	2,515.32	201.23	16.2%
8:30 AM	10,371.34	2177.98	66.9%	0.00	0.00	0.0%	848.26	178.13	5.5%
8:45 AM	10,578.70	2644.68	68.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	10,269.51	2567.38	66.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	10,440.22	2610.06	67.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	10,640.76	2660.19	68.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,804.56	2701.14	69.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	10,944.70	2736.18	70.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	11,079.65	2769.91	71.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	11,220.79	2805.20	72.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	11,402.06	2850.52	73.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	11,576.70	2894.18	74.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	11,795.79	2948.95	76.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	12,004.70	3001.18	77.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	12,256.56	3064.14	79.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	12,511.41	3127.85	80.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	12,814.27	3203.57	82.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	13,060.36	3265.09	84.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	13,027.25	3256.81	84.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	12,911.74	3227.93	83.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	12,809.92	3202.48	82.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	12,700.94	3175.23	82.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	12,726.94	3181.74	82.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	12,694.24	3173.56	81.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	12,856.88	3214.22	83.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	13,142.63	3285.66	84.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	13,615.00	3403.75	87.9%	345.97	86.49	2.2%	345.97	86.49	2.2%
3:00 PM	14,372.94	3593.23	92.8%	994.91	248.73	6.4%	994.91	248.73	6.4%
3:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	15,495.73	3254.10	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:54 PM	15,495.72	1239.66	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

EXHIBIT K: PROJECT ALTERNATIVE QUANTITATIVE SHADOW DATA

Quantitative Shadow Data for UN Plaza

Shadow data for existing conditions, net new shadow from Reduced Density Project Alternative B, and No Residential Parking - Tower Only Project Alternative C

JUNE 21

SUMMER SOLSTICE

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
6:46 AM	64,919.39	7141.13	63.5%	0.00	0.00	0.0%	1,823.13	200.54	1.8%
7:00 AM	49,575.69	11402.41	48.5%	0.00	0.00	0.0%	10.60	2.44	0.0%
7:15 AM	35,664.72	8916.18	34.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	26,592.77	6648.19	26.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	21,910.84	5477.71	21.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	18,924.95	4731.24	18.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	16,709.04	4177.26	16.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,707.80	3926.95	15.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	15,937.52	3984.38	15.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	15,973.40	3993.35	15.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	15,929.91	3982.48	15.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	15,786.93	3946.73	15.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	15,616.27	3904.07	15.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	15,247.53	3811.88	14.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	14,012.07	3503.02	13.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	12,819.72	3204.93	12.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	11,763.49	2940.87	11.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	10,737.36	2684.34	10.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	9,802.22	2450.55	9.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	8,809.29	2202.32	8.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	7,908.49	1977.12	7.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	6,937.81	1734.45	6.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	6,093.98	1523.50	6.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	5,209.70	1302.43	5.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	4,686.39	1171.60	4.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	4,343.21	1085.80	4.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	4,233.46	1058.36	4.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	3,877.91	969.48	3.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	3,739.75	934.94	3.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	3,422.90	855.72	3.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	3,402.75	850.69	3.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	3,750.45	937.61	3.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	4,892.69	1223.17	4.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	6,051.57	1512.89	5.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	7,373.45	1843.36	7.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	8,776.99	2194.25	8.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	10,386.55	2596.64	10.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	12,245.07	3061.27	12.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	15,063.01	3765.75	14.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	18,287.36	4571.84	17.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	21,971.79	5492.95	21.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	25,784.29	6446.07	25.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	28,896.11	7224.03	28.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	32,379.35	8094.84	31.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	36,792.35	9198.09	36.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	42,504.09	10626.02	41.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	48,737.26	12184.32	47.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	55,735.58	13933.89	54.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	65,069.99	16267.50	63.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	76,469.00	19117.25	74.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	89,177.43	26753.23	87.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:36 PM	102,575.43	18463.58	100.3%	0.00	0.00	0.0%	0.00	0.00	0.0%

JUNE 28

JUNE 14 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
6:48 AM	64,782.40	6478.24	63.4%	0.00	0.00	0.0%	1,054.00	105.40	1.0%
7:00 AM	51,606.15	11353.35	50.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 AM	37,434.19	9358.55	36.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	27,575.32	6893.83	27.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	22,373.39	5593.35	21.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	19,204.86	4801.22	18.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	16,894.47	4223.62	16.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,825.54	3956.39	15.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	15,983.09	3995.77	15.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	16,032.06	4008.01	15.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	15,996.68	3999.17	15.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	15,864.40	3966.10	15.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	15,691.85	3922.96	15.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	15,415.55	3853.89	15.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	14,205.45	3551.36	13.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	12,998.47	3249.62	12.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	11,928.85	2982.21	11.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	10,893.94	2723.49	10.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	9,955.33	2488.83	9.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	8,957.89	2239.47	8.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	8,052.12	2013.03	7.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	7,078.11	1769.53	6.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	6,225.97	1556.49	6.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	5,339.06	1334.76	5.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	4,757.93	1189.48	4.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	4,417.73	1104.43	4.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	4,304.51	1076.13	4.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	3,951.81	987.95	3.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	3,812.31	953.08	3.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	3,487.32	871.83	3.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	3,432.21	858.05	3.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	3,698.37	924.59	3.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	4,833.21	1208.30	4.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	5,977.52	1494.38	5.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	7,295.64	1823.91	7.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	8,682.94	2170.74	8.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	10,271.27	2567.82	10.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	12,073.80	3018.45	11.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,723.55	3680.89	14.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	17,915.17	4478.79	17.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	21,553.81	5388.45	21.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	25,415.06	6353.77	24.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	28,501.88	7125.47	27.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	31,935.92	7983.98	31.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	36,220.46	9055.12	35.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	41,811.22	10452.80	40.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	48,040.81	12010.20	47.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	54,841.44	13710.36	53.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	64,023.27	16005.82	62.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	75,314.83	18828.71	73.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	87,966.59	26389.98	86.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:36 PM	102,575.41	18463.57	100.3%	0.00	0.00	0.0%	0.00	0.00	0.0%

JULY 5

JUNE 7 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
6:52 AM	64,587.28	3875.24	63.2%	0.00	0.00	0.0%	24.97	1.50	0.0%
7:00 AM	54,973.95	10445.05	53.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 AM	40,597.57	10149.39	39.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	29,244.14	7311.04	28.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	22,990.95	5747.74	22.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	19,478.47	4869.62	19.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	17,089.03	4272.26	16.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	16,164.97	4041.24	15.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	16,155.36	4038.84	15.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	16,209.41	4052.35	15.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	16,186.13	4046.53	15.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	16,062.51	4015.63	15.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	15,885.60	3971.40	15.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	15,629.31	3907.33	15.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	14,537.07	3634.27	14.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	13,307.67	3326.92	13.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	12,218.51	3054.63	12.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	11,170.48	2792.62	10.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	10,219.98	2555.00	10.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	9,210.04	2302.51	9.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	8,293.97	2073.49	8.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	7,311.42	1827.85	7.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	6,454.89	1613.72	6.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	5,561.72	1390.43	5.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	4,930.28	1232.57	4.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	4,595.31	1148.83	4.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	4,478.47	1119.62	4.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	4,129.63	1032.41	4.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	3,983.88	995.97	3.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	3,648.78	912.20	3.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	3,579.12	894.78	3.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	3,775.17	943.79	3.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	4,901.71	1225.43	4.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	6,046.66	1511.66	5.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	7,352.47	1838.12	7.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	8,724.96	2181.24	8.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	10,302.80	2575.70	10.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	12,000.36	3000.09	11.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,341.91	3585.48	14.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	17,525.08	4381.27	17.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	21,130.99	5282.75	20.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	24,950.00	6237.50	24.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	28,003.01	7000.75	27.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	31,410.39	7852.60	30.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	35,573.25	8893.31	34.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	41,073.34	10268.34	40.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	47,296.55	11824.14	46.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	53,892.67	13473.17	52.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	63,052.03	15763.01	61.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	74,355.67	18588.92	72.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	87,199.94	26159.98	85.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:36 PM	102,575.43	18463.58	100.3%	0.00	0.00	0.0%	0.00	0.00	0.0%

JULY 12

MAY 31 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
6:56 AM	64,918.84	1947.57	63.5%	0.00	0.00	0.0%	1,098.93	32.97	1.1%
7:00 AM	60,499.20	9074.88	59.2%	0.00	0.00	0.0%	819.62	122.94	0.8%
7:15 AM	44,590.45	11147.61	43.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	31,751.12	7937.78	31.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	23,780.77	5945.19	23.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	19,831.39	4957.85	19.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	17,403.75	4350.94	17.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	16,776.44	4194.11	16.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	16,526.19	4131.55	16.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	16,498.94	4124.73	16.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	16,490.93	4122.73	16.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	16,375.94	4093.99	16.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	16,198.74	4049.68	15.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	15,961.87	3990.47	15.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	15,006.52	3751.63	14.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	13,748.66	3437.17	13.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	12,632.56	3158.14	12.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	11,562.74	2890.68	11.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	10,593.81	2648.45	10.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	9,564.34	2391.09	9.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	8,633.36	2158.34	8.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	7,635.52	1908.88	7.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	6,777.47	1694.37	6.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	5,878.95	1469.74	5.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	5,203.76	1300.94	5.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	4,875.48	1218.87	4.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	4,754.16	1188.54	4.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	4,411.39	1102.85	4.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	4,259.38	1064.85	4.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	3,907.62	976.91	3.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	3,852.40	963.10	3.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	3,998.70	999.67	3.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	5,099.69	1274.92	5.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	6,255.37	1563.84	6.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	7,545.85	1886.46	7.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	8,907.43	2226.86	8.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	10,496.07	2624.02	10.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	12,168.83	3042.21	11.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,175.94	3543.98	13.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	17,135.10	4283.78	16.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	20,725.25	5181.31	20.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	24,380.08	6095.02	23.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	27,402.62	6850.66	26.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	30,793.07	7698.27	30.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	34,869.34	8717.33	34.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	40,276.12	10069.03	39.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	46,515.76	11628.94	45.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	52,926.95	13231.74	51.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	62,137.55	15534.39	60.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	73,588.41	18397.10	72.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	87,118.50	24393.18	85.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:33 PM	102,575.43	15386.31	100.3%	0.00	0.00	0.0%	0.00	0.00	0.0%

JULY 19

MAY 24 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:01 AM	66,011.34	8581.47	64.6%	0.00	0.00	0.0%	1,281.41	166.58	1.3%
7:16 AM	48,084.36	11540.25	47.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	34,910.39	8378.49	34.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	25,815.33	6453.83	25.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	20,361.26	5090.32	19.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	18,248.49	4562.12	17.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	17,683.35	4420.84	17.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	17,244.77	4311.19	16.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	16,888.73	4222.18	16.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	16,901.59	4225.40	16.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	16,797.02	4199.25	16.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	16,622.73	4155.68	16.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	16,405.18	4101.30	16.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	15,589.93	3897.48	15.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	14,302.59	3575.65	14.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	13,159.20	3289.80	12.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	12,058.82	3014.71	11.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	11,062.23	2765.56	10.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	10,008.79	2502.20	9.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	9,054.76	2263.69	8.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	8,039.51	2009.88	7.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	7,185.56	1796.39	7.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	6,276.64	1569.16	6.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	5,581.70	1395.43	5.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	5,256.24	1314.06	5.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	5,129.86	1282.46	5.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	4,793.19	1198.30	4.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	4,637.29	1159.32	4.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	4,268.93	1067.23	4.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	4,240.60	1060.15	4.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	4,372.04	1093.01	4.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	5,449.01	1362.25	5.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	6,623.06	1655.76	6.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	7,908.09	1977.02	7.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	9,267.44	2316.86	9.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	10,863.60	2715.90	10.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	12,539.81	3134.95	12.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,421.50	3605.37	14.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	16,817.37	4204.34	16.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	20,403.98	5101.00	20.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	23,737.85	5934.46	23.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	26,734.17	6683.54	26.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	30,111.59	7527.90	29.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	34,155.27	8538.82	33.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	39,484.25	9871.06	38.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	45,729.13	11432.28	44.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	52,086.77	13021.69	51.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	61,356.19	15339.05	60.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	73,160.70	18290.18	71.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	87,511.45	21877.86	85.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 PM	102,119.30	13275.51	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%

JULY 26

MAY 17 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:07 AM	67,382.70	4042.96	65.9%	0.00	0.00	0.0%	986.06	59.16	1.0%
7:15 AM	55,973.62	10634.99	54.8%	0.00	0.00	0.0%	39.86	7.57	0.0%
7:30 AM	38,424.51	9606.13	37.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	28,877.47	7219.37	28.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	22,256.73	5564.18	21.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	19,781.50	4945.37	19.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	18,845.24	4711.31	18.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	18,188.53	4547.13	17.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	17,699.71	4424.93	17.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	17,403.69	4350.92	17.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	17,315.61	4328.90	16.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	17,158.86	4289.71	16.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	16,940.45	4235.11	16.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	16,291.97	4072.99	15.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	14,972.64	3743.16	14.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	13,812.51	3453.13	13.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	12,664.60	3166.15	12.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	11,634.23	2908.56	11.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	10,546.44	2636.61	10.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	9,564.02	2391.00	9.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	8,525.59	2131.40	8.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	7,683.45	1920.86	7.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	6,762.49	1690.62	6.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	6,066.33	1516.58	5.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	5,738.03	1434.51	5.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	5,610.02	1402.50	5.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	5,278.56	1319.64	5.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	5,120.67	1280.17	5.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	4,791.39	1197.85	4.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	4,739.29	1184.82	4.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	4,892.38	1223.09	4.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	5,973.38	1493.34	5.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	7,142.60	1785.65	7.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	8,453.87	2113.47	8.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	9,807.85	2451.96	9.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	11,403.25	2850.81	11.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	13,112.44	3278.11	12.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	15,043.46	3760.86	14.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	16,969.11	4242.28	16.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	20,162.88	5040.72	19.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	22,980.44	5745.11	22.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	25,961.31	6490.33	25.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	29,325.58	7331.39	28.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	33,316.07	8329.02	32.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	38,744.31	9686.08	37.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	44,807.42	11201.85	43.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	51,215.82	12803.95	50.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	60,623.99	15156.00	59.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	72,924.20	18231.05	71.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	88,847.62	18658.00	86.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:25 PM	101,672.87	9150.56	99.5%	0.00	0.00	0.0%	0.00	0.00	0.0%

AUGUST 2

MAY 10 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:12 AM	67,231.75	1344.64	65.8%	0.00	0.00	0.0%	642.45	12.85	0.6%
7:15 AM	62,704.24	9405.64	61.3%	0.00	0.00	0.0%	489.05	73.36	0.5%
7:30 AM	42,526.07	10631.52	41.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	32,317.34	8079.33	31.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	25,590.22	6397.55	25.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	22,900.09	5725.02	22.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	21,131.51	5282.88	20.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	19,397.47	4849.37	19.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	18,682.04	4670.51	18.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	18,157.84	4539.46	17.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	17,915.94	4478.98	17.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	17,800.51	4450.13	17.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	17,569.12	4392.28	17.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	17,088.11	4272.03	16.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	15,736.30	3934.07	15.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	14,545.82	3636.45	14.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	13,358.24	3339.56	13.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	12,285.50	3071.38	12.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	11,157.82	2789.45	10.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	10,142.30	2535.57	9.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	9,085.18	2271.29	8.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	8,257.03	2064.26	8.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	7,321.26	1830.31	7.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	6,656.74	1664.18	6.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	6,317.82	1579.45	6.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	6,190.69	1547.67	6.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	5,864.96	1466.24	5.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	5,724.41	1431.10	5.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	5,437.74	1359.44	5.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	5,352.32	1338.08	5.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	5,646.42	1411.60	5.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	6,699.69	1674.92	6.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	7,840.33	1960.08	7.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	9,188.54	2297.13	9.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	10,556.07	2639.02	10.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	12,177.11	3044.28	11.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	13,922.42	3480.61	13.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	15,936.16	3984.04	15.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	17,834.25	4458.56	17.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	19,938.12	4984.53	19.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	22,143.54	5535.88	21.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	25,119.28	6279.82	24.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	28,498.26	7124.56	27.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	32,454.32	8113.58	31.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	38,112.11	9528.03	37.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	43,767.62	10941.90	42.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	50,353.04	12588.26	49.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	60,110.37	15027.59	58.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	73,144.05	18286.01	71.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	92,187.38	13828.11	90.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:18 PM	98,917.45	2967.52	96.8%	0.00	0.00	0.0%	0.00	0.00	0.0%

AUGUST 9

MAY 3 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:19 AM	63,738.35	5736.45	62.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	47,249.95	9922.49	46.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	35,666.86	8916.71	34.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	30,881.50	7720.37	30.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	29,025.09	7256.27	28.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	25,935.88	6483.97	25.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	22,632.25	5658.06	22.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	19,811.44	4952.86	19.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	19,067.66	4766.92	18.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	18,674.19	4668.55	18.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	18,523.53	4630.88	18.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	18,287.25	4571.81	17.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	17,979.91	4494.98	17.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	16,592.35	4148.09	16.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	15,359.13	3839.78	15.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	14,133.80	3533.45	13.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	13,023.45	3255.86	12.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	11,848.79	2962.20	11.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	10,797.07	2699.27	10.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	9,761.44	2440.36	9.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	8,917.49	2229.37	8.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	7,964.14	1991.04	7.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	7,348.59	1837.15	7.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	7,000.27	1750.07	6.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	6,877.64	1719.41	6.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	6,555.90	1638.97	6.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	6,489.01	1622.25	6.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	6,204.99	1551.25	6.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	6,101.14	1525.28	6.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	6,598.98	1649.74	6.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	7,606.78	1901.70	7.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	8,710.33	2177.58	8.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	10,108.62	2527.15	9.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	11,545.18	2886.30	11.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	13,164.33	3291.08	12.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	14,970.36	3742.59	14.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	17,086.44	4271.61	16.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	19,077.30	4769.32	18.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	20,257.60	5064.40	19.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	21,286.33	5321.58	20.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	24,149.81	6037.45	23.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	27,591.22	6897.81	27.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	31,639.54	7909.88	31.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	37,269.94	9317.48	36.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	42,580.64	10645.16	41.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	49,367.81	12341.95	48.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	59,716.86	20303.73	58.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:10 PM	89,814.94	18861.14	87.9%	0.00	0.00	0.0%	0.00	0.00	0.0%

AUGUST 16

APRIL 26 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:25 AM	60,026.76	2401.07	58.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	53,461.39	9088.44	52.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	42,361.11	10590.28	41.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	41,450.65	10362.66	40.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	38,490.87	9622.72	37.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	34,021.11	8505.28	33.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	28,597.96	7149.49	28.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	23,576.91	5894.23	23.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	20,075.12	5018.78	19.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	19,532.02	4883.01	19.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	19,309.04	4827.26	18.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	19,089.75	4772.44	18.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	18,862.72	4715.68	18.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	17,526.76	4381.69	17.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	16,247.54	4061.89	15.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	14,984.25	3746.06	14.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	13,844.88	3461.22	13.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	12,627.55	3156.89	12.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	11,546.78	2886.69	11.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	10,537.32	2634.33	10.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	9,669.67	2417.42	9.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	8,698.99	2174.75	8.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	8,145.62	2036.41	8.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	7,797.39	1949.35	7.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	7,676.53	1919.13	7.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	7,425.99	1856.50	7.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	7,374.56	1843.64	7.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	7,094.65	1773.66	6.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	7,110.05	1777.51	7.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	7,748.13	1937.03	7.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	8,708.31	2177.08	8.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	9,819.68	2454.92	9.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	11,219.71	2804.93	11.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	12,727.76	3181.94	12.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	14,392.06	3598.01	14.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	16,288.13	4072.03	15.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	18,456.97	4614.24	18.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	20,512.56	5128.14	20.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	20,834.28	5208.57	20.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	21,169.94	5292.49	20.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	23,075.32	5768.83	22.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	26,526.32	6631.58	25.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	30,760.48	7690.12	30.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	36,186.62	9046.66	35.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	41,109.05	10277.26	40.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	48,232.99	12058.25	47.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	58,869.16	15894.67	57.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:02 PM	79,670.29	11153.84	77.9%	0.00	0.00	0.0%	0.00	0.00	0.0%

AUGUST 23

APRIL 19 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:31 AM	62,062.38	6826.86	60.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	55,918.82	12861.33	54.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	55,790.71	13947.68	54.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	51,843.13	12960.78	50.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	45,366.08	11341.52	44.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	38,147.44	9536.86	37.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	30,435.93	7608.98	29.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	24,500.96	6125.24	24.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	20,405.74	5101.44	20.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	20,144.00	5036.00	19.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	19,979.46	4994.87	19.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	19,766.08	4941.52	19.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	18,498.49	4624.62	18.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	17,177.93	4294.48	16.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	15,875.06	3968.76	15.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	14,705.36	3676.34	14.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	13,460.85	3365.21	13.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	12,430.98	3107.75	12.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	11,391.78	2847.95	11.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	10,495.96	2623.99	10.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	9,511.08	2377.77	9.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	9,047.35	2261.84	8.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	8,708.45	2177.11	8.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	8,647.98	2161.99	8.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	8,436.26	2109.06	8.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	8,382.81	2095.70	8.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	8,106.87	2026.72	7.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	8,414.74	2103.68	8.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	9,109.20	2277.30	8.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	10,083.71	2520.93	9.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	11,150.46	2787.62	10.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	12,577.33	3144.33	12.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	14,149.90	3537.48	13.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	15,969.30	3992.33	15.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	17,895.83	4473.96	17.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	20,174.02	5043.51	19.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	21,293.95	5323.49	20.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	21,607.69	5401.92	21.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	21,975.09	5493.77	21.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	22,417.09	5604.27	21.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	25,383.29	6345.82	24.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	30,014.39	7503.60	29.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	34,824.45	8706.11	34.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	39,505.01	9876.25	38.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	46,976.33	11744.08	46.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	58,154.27	11049.31	56.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:52 PM	68,445.09	4106.71	67.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

AUGUST 30

APRIL 12 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:37 AM	73,087.74	4385.26	71.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	70,656.11	13424.66	69.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	70,186.15	17546.54	68.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	70,005.83	17501.46	68.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	60,693.03	15173.26	59.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	51,123.37	12780.84	50.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	41,619.38	10404.84	40.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	33,338.71	8334.68	32.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	25,854.30	6463.57	25.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	22,002.08	5500.52	21.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	21,239.09	5309.77	20.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	20,809.01	5202.25	20.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	19,523.09	4880.77	19.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	18,160.35	4540.09	17.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	16,824.00	4206.00	16.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	15,619.02	3904.76	15.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	14,395.88	3598.97	14.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	13,424.04	3356.01	13.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	12,352.88	3088.22	12.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	11,428.45	2857.11	11.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	10,427.33	2606.83	10.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	10,066.44	2516.61	9.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	9,786.77	2446.69	9.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	9,787.76	2446.94	9.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	9,577.51	2394.38	9.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	9,522.78	2380.70	9.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	9,253.20	2313.30	9.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	9,917.99	2479.50	9.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	10,664.45	2666.11	10.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	11,674.39	2918.60	11.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	12,710.89	3177.72	12.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	14,210.11	3552.53	13.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	15,803.58	3950.90	15.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	17,792.61	4448.15	17.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	19,829.52	4957.38	19.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	21,789.62	5447.41	21.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	22,187.02	5546.75	21.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	22,590.02	5647.50	22.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	22,999.30	5749.83	22.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	23,389.89	5847.47	22.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	24,350.61	6087.65	23.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	29,157.16	7289.29	28.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	33,116.98	8279.24	32.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	37,733.74	9433.43	36.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	45,298.66	10418.69	44.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:42 PM	56,459.76	6210.57	55.2%	0.00	0.00	0.0%	0.00	0.00	0.0%

SEPTEMBER 6

APRIL 5 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:44 AM	84,977.42	11047.06	83.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	86,201.85	21550.46	84.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	87,800.02	21950.00	85.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	79,438.30	19859.57	77.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	67,735.61	16933.90	66.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	55,973.64	13993.41	54.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	46,144.81	11536.20	45.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	36,509.47	9127.37	35.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	28,840.87	7210.22	28.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	23,928.60	5982.15	23.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	22,849.00	5712.25	22.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	21,128.63	5282.16	20.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	19,352.17	4838.04	18.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	17,769.24	4442.31	17.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	16,538.98	4134.74	16.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	15,437.94	3859.49	15.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	14,466.59	3616.65	14.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	13,394.11	3348.53	13.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	12,465.73	3116.43	12.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	11,464.94	2866.24	11.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	11,253.33	2813.33	11.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	11,067.67	2766.92	10.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	11,063.83	2765.96	10.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	10,853.58	2713.39	10.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	10,804.14	2701.03	10.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	10,762.05	2690.51	10.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	11,610.60	2902.65	11.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	12,413.50	3103.38	12.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	13,480.89	3370.22	13.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	14,538.61	3634.65	14.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	16,074.96	4018.74	15.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	17,780.58	4445.15	17.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	19,900.29	4975.07	19.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	22,125.19	5531.30	21.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	22,964.52	5741.13	22.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	23,445.78	5861.45	22.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	23,872.24	5968.06	23.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	24,378.60	6094.65	23.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	24,711.85	6177.96	24.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	25,169.92	6292.48	24.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	27,454.93	6863.73	26.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	31,120.34	7780.08	30.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	35,588.68	9608.94	34.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:31 PM	44,464.01	6224.96	43.5%	0.00	0.00	0.0%	0.00	0.00	0.0%

SEPTEMBER 13

MARCH 29 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:50 AM	97,171.08	7773.69	95.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	97,211.34	20414.38	95.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	96,125.69	24031.42	94.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	93,642.29	23410.57	91.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	81,813.15	20453.29	80.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	70,198.93	17549.73	68.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	60,447.31	15111.83	59.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	49,369.63	12342.41	48.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	39,716.51	9929.13	38.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	30,837.76	7709.44	30.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	25,840.16	6460.04	25.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	23,442.65	5860.66	22.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	21,134.56	5283.64	20.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	19,052.91	4763.23	18.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	17,685.72	4421.43	17.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	16,578.87	4144.72	16.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	15,601.34	3900.34	15.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	14,521.18	3630.29	14.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	13,605.85	3401.46	13.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	12,744.74	3186.18	12.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	12,644.20	3161.05	12.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	12,486.53	3121.63	12.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	12,485.28	3121.32	12.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	12,280.07	3070.02	12.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	12,238.94	3059.74	12.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	12,582.93	3145.73	12.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	13,516.11	3379.03	13.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	14,369.27	3592.32	14.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	15,510.38	3877.59	15.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	16,649.26	4162.31	16.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	18,232.68	4558.17	17.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	20,080.18	5020.04	19.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	22,354.80	5588.70	21.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	23,876.84	5969.21	23.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	24,629.63	6157.41	24.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	25,107.29	6276.82	24.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	25,605.69	6401.42	25.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	25,945.79	6486.45	25.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	26,215.42	6553.86	25.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	26,984.93	6746.23	26.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	26,972.50	6743.13	26.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	28,719.71	7179.93	28.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	33,009.74	5941.75	32.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:21 PM	35,043.74	1752.19	34.3%	0.00	0.00	0.0%	0.00	0.00	0.0%

SEPTEMBER 20

APPROXIMATE EQUINOXES
MARCH 22 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:57 AM	102,000.07	2040.00	99.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	101,868.39	15280.26	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	101,192.10	25298.02	99.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	99,269.29	24817.32	97.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	93,164.64	23291.16	91.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	83,125.32	20781.33	81.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	74,978.01	18744.50	73.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	63,899.75	15974.94	62.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	53,242.64	13310.66	52.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	42,533.08	10633.27	41.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	33,174.23	8293.56	32.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	26,886.99	6721.75	26.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	23,873.94	5968.49	23.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	21,122.98	5280.75	20.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	19,369.09	4842.27	18.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	17,891.89	4472.97	17.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	16,876.52	4219.13	16.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	15,793.89	3948.47	15.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	14,906.51	3726.63	14.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	14,265.45	3566.36	14.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	14,191.50	3547.88	13.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	14,043.41	3510.85	13.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	14,057.00	3514.25	13.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	13,863.62	3465.90	13.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	13,923.77	3480.94	13.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	14,604.72	3651.18	14.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	15,624.15	3906.04	15.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	16,538.94	4134.74	16.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	17,790.73	4447.68	17.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	19,015.96	4753.99	18.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	20,758.36	5189.59	20.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	22,729.38	5682.34	22.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	24,928.64	6232.16	24.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	25,822.86	6455.72	25.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	26,803.92	6700.98	26.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	27,246.74	6811.69	26.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	27,645.43	6911.36	27.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	27,846.26	6961.56	27.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	28,084.17	7021.04	27.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	28,884.66	7221.17	28.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	28,292.59	7073.15	27.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	26,984.52	5666.75	26.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:09 PM	28,331.15	2266.49	27.7%	0.00	0.00	0.0%	0.00	0.00	0.0%

SEPTEMBER 27

MARCH 15 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:03 AM	102,575.43	10257.54	100.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	102,464.63	22542.22	100.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	100,915.90	25228.97	98.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	99,636.76	24909.19	97.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	93,943.17	23485.79	91.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	86,283.45	21570.86	84.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	76,962.28	19240.57	75.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	65,934.60	16483.65	64.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	55,179.75	13794.94	54.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	45,478.50	11369.62	44.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	34,215.82	8553.95	33.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	27,726.61	6931.65	27.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	24,741.77	6185.44	24.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	22,314.35	5578.59	21.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	19,882.86	4970.72	19.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	18,372.72	4593.18	18.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	17,213.81	4303.45	16.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	16,392.14	4098.03	16.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	15,901.87	3975.47	15.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	15,872.08	3968.02	15.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	15,731.86	3932.96	15.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	15,767.69	3941.92	15.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	15,605.93	3901.48	15.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	16,053.78	4013.45	15.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	16,837.77	4209.44	16.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	17,938.00	4484.50	17.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	18,939.43	4734.86	18.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	20,310.79	5077.70	19.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	21,728.09	5432.02	21.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	23,640.16	5910.04	23.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	25,763.46	6440.86	25.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	27,135.21	6783.80	26.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	28,389.97	7097.49	27.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	29,457.13	7364.28	28.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	29,907.81	7476.95	29.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	30,199.17	7549.79	29.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	30,161.11	7540.28	29.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	30,296.64	7574.16	29.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	30,823.27	7705.82	30.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	29,754.72	6843.59	29.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:58 PM	28,424.07	3126.65	27.8%	0.00	0.00	0.0%	0.00	0.00	0.0%

OCTOBER 4

MARCH 8 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:09 AM	102,575.43	4103.02	100.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	102,575.43	17437.82	100.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	101,913.30	25478.33	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	101,558.68	25389.67	99.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	100,464.49	25116.12	98.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	93,306.95	23326.74	91.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	86,064.77	21516.19	84.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	77,949.39	19487.35	76.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	66,711.08	16677.77	65.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	57,615.83	14403.96	56.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	47,714.30	11928.57	46.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	36,161.84	9040.46	35.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	29,720.95	7430.24	29.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	26,834.11	6708.53	26.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	23,446.80	5861.70	22.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	20,902.44	5225.61	20.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	18,889.50	4722.37	18.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	18,051.52	4512.88	17.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	17,656.57	4414.14	17.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	17,665.07	4416.27	17.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	17,558.67	4389.67	17.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	17,639.07	4409.77	17.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	17,496.45	4374.11	17.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	18,362.02	4590.50	18.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	19,247.29	4811.82	18.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	20,449.73	5112.43	20.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	21,566.91	5391.73	21.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	23,084.89	5771.22	22.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	24,751.23	6187.81	24.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	26,873.11	6718.28	26.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	28,492.05	7123.01	27.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	30,048.04	7512.01	29.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	31,473.28	7868.32	30.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	32,687.18	8171.80	32.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	33,423.25	8355.81	32.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	33,882.43	8470.61	33.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	33,531.03	8382.76	32.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	33,415.11	8353.78	32.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	33,375.02	9011.25	32.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:47 PM	31,716.10	4440.25	31.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

OCTOBER 11

MARCH 1 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:16 AM	102,575.43	12309.05	100.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	102,409.06	24578.17	100.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	102,105.31	25526.33	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	101,759.38	25439.85	99.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	96,648.58	24162.15	94.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	91,947.60	22986.90	89.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	86,790.82	21697.70	84.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	78,065.31	19516.33	76.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	68,635.23	17158.81	67.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	59,761.56	14940.39	58.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	50,277.39	12569.35	49.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	38,059.48	9514.87	37.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	32,575.15	8143.79	31.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	28,754.06	7188.51	28.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	25,346.54	6336.64	24.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	22,071.40	5517.85	21.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	20,309.21	5077.30	19.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	19,718.63	4929.66	19.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	19,703.65	4925.91	19.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	19,498.74	4874.69	19.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	19,604.29	4901.07	19.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	19,743.50	4935.88	19.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	20,810.46	5202.61	20.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	21,808.61	5452.15	21.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	23,144.48	5786.12	22.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	24,412.31	6103.08	23.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	26,165.49	6541.37	25.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	28,031.22	7007.80	27.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	30,360.61	7590.15	29.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	31,603.78	7900.94	30.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	33,494.90	8373.72	32.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	35,067.63	8766.91	34.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	36,745.84	9186.46	35.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	37,901.28	9475.32	37.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	38,830.68	9707.67	38.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	38,729.96	9682.49	37.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	38,555.71	9638.93	37.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	38,842.23	7380.02	38.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:37 PM	38,932.11	2335.93	38.1%	0.00	0.00	0.0%	0.00	0.00	0.0%

OCTOBER 18

FEBRUARY 22 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:22 AM	102,348.42	6140.91	100.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	102,151.65	18387.30	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	101,852.81	25463.20	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	101,525.13	25381.28	99.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	98,717.18	24679.30	96.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	95,407.70	23851.93	93.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	91,484.94	22871.23	89.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	86,693.42	21673.36	84.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	79,581.98	19895.50	77.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	70,207.53	17551.88	68.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	61,920.80	15480.20	60.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	51,952.84	12988.21	50.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	41,260.15	10315.04	40.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	35,067.94	8766.99	34.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	31,468.11	7867.03	30.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	27,236.49	6809.12	26.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	24,493.48	6123.37	24.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	22,522.66	5630.66	22.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	22,263.78	5565.95	21.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	21,760.81	5440.20	21.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	21,689.20	5422.30	21.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	22,168.03	5542.01	21.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	23,356.43	5839.11	22.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	24,479.20	6119.80	23.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	25,976.24	6494.06	25.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	27,420.42	6855.10	26.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	29,421.09	7355.27	28.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	31,581.87	7895.47	30.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	33,619.15	8404.79	32.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	35,405.06	8851.27	34.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	37,492.22	9373.05	36.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	39,499.25	9874.81	38.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	41,745.06	10436.26	40.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	43,498.87	10874.72	42.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	45,282.61	11320.65	44.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	46,129.54	11532.38	45.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	46,971.44	10333.72	45.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:27 PM	48,392.84	4839.28	47.3%	0.00	0.00	0.0%	0.00	0.00	0.0%

OCTOBER 25

FEBRUARY 15 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:30 AM	102,076.90	13270.00	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	101,634.90	25408.72	99.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	101,417.00	25354.25	99.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	101,007.84	25251.96	98.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	98,687.96	24671.99	96.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	95,457.91	23864.48	93.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	91,995.03	22998.76	90.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	87,013.14	21753.28	85.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	79,835.03	19958.76	78.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	71,810.03	17952.51	70.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	63,329.26	15832.32	61.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	54,899.22	13724.80	53.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	43,653.95	10913.49	42.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	38,394.70	9598.68	37.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	33,957.03	8489.26	33.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	30,368.86	7592.21	29.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	27,036.93	6759.23	26.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	25,521.88	6380.47	25.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	24,672.42	6168.11	24.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	24,218.32	6054.58	23.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	24,642.17	6160.54	24.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	25,949.08	6487.27	25.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	27,194.08	6798.52	26.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	28,857.20	7214.30	28.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	30,516.66	7629.16	29.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	32,823.86	8205.96	32.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	35,211.34	8802.83	34.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	37,403.02	9350.76	36.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	39,684.84	9921.21	38.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	42,185.65	10546.41	41.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	44,723.23	11180.81	43.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	47,770.12	11942.53	46.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	50,421.62	12605.40	49.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	53,664.26	13416.07	52.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	56,314.10	14078.52	55.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	59,976.08	8996.41	58.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:18 PM	60,894.55	1826.84	59.6%	0.00	0.00	0.0%	0.00	0.00	0.0%

NOVEMBER 1

FEBRUARY 8 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:36 AM	101,778.37	7124.49	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	101,446.26	19274.79	99.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	101,550.15	25387.54	99.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	101,790.65	25447.66	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	101,779.51	25444.88	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	99,745.13	24936.28	97.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	96,608.25	24152.06	94.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	93,300.44	23325.11	91.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	87,528.19	21882.05	85.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	80,067.94	20016.99	78.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	72,054.99	18013.75	70.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	65,247.25	16311.81	63.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	56,633.50	14158.38	55.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	47,206.00	11801.50	46.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	41,116.26	10279.07	40.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	37,341.08	9335.27	36.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	33,067.32	8266.83	32.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	30,450.09	7612.52	29.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	28,197.55	7049.39	27.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	27,676.74	6919.18	27.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	27,491.85	6872.96	26.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	28,525.60	7131.40	27.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	29,889.64	7472.41	29.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	31,713.28	7928.32	31.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	33,638.97	8409.74	32.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	36,356.03	9089.01	35.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	38,590.70	9647.67	37.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	41,434.87	10358.72	40.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	44,288.76	11072.19	43.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	47,542.20	11885.55	46.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	50,667.67	12666.92	49.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	54,822.09	13705.52	53.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	58,918.58	14729.65	57.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	64,236.80	16059.20	62.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	69,207.30	14533.53	67.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:10 PM	74,038.93	6663.50	72.4%	0.00	0.00	0.0%	0.00	0.00	0.0%

NOVEMBER 8

FEBRUARY 1 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:43 AM	101,475.90	1014.76	99.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	101,445.88	13187.96	99.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	101,671.31	25417.83	99.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	101,907.13	25476.78	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	102,096.20	25524.05	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	101,942.07	25485.52	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	100,414.56	25103.64	98.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	98,862.21	24715.55	96.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	94,305.11	23576.28	92.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	87,821.36	21955.34	85.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	79,701.54	19925.38	78.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	73,537.99	18384.50	71.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	66,180.97	16545.24	64.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	58,942.19	14735.55	57.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	49,305.20	12326.30	48.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	44,815.59	11203.90	43.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	40,281.46	10070.37	39.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	36,836.28	9209.07	36.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	33,319.63	8329.91	32.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	31,726.63	7931.66	31.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	31,266.71	7816.68	30.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	31,481.34	7870.34	30.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	32,468.96	8117.24	31.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	34,457.92	8614.48	33.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	36,739.97	9184.99	35.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	39,795.23	9948.81	38.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	42,150.54	10537.63	41.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	45,466.48	11366.62	44.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	48,990.33	12247.58	47.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	53,242.44	13310.61	52.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	57,329.78	14332.45	56.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	63,157.91	15789.48	61.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	68,826.42	17206.61	67.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	76,153.18	19038.30	74.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	85,522.76	12828.41	83.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:03 PM	87,959.83	2638.79	86.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

NOVEMBER 15

JANUARY 25 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:51 AM	101,630.84	8130.47	99.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	101,765.65	20353.13	99.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	101,997.10	25499.27	99.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	102,226.49	25556.62	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	101,990.50	25497.63	99.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	101,624.91	25406.23	99.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	101,909.48	25477.37	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	99,977.54	24994.38	97.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	95,033.11	23758.28	93.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	87,400.28	21850.07	85.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	80,699.72	20174.93	78.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	74,445.48	18611.37	72.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	68,080.30	17020.08	66.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	60,081.36	15020.34	58.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	52,543.97	13135.99	51.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	47,267.35	11816.84	46.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	43,958.43	10989.61	43.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	39,591.07	9897.77	38.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	37,145.05	9286.26	36.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	35,380.73	8845.18	34.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	35,481.70	8870.42	34.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	35,112.89	8778.22	34.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	37,043.40	9260.85	36.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	39,635.93	9908.98	38.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	42,797.61	10699.40	41.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	45,583.56	11395.89	44.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	49,436.17	12359.04	48.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	53,596.07	13399.02	52.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	59,085.80	14771.45	57.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	64,435.51	16108.88	63.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	71,839.02	17959.75	70.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	78,237.87	19559.47	76.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	88,278.89	20304.14	86.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:57 PM	97,196.27	10691.59	95.1%	0.00	0.00	0.0%	0.00	0.00	0.0%

NOVEMBER 22

JANUARY 18 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:57 AM	101,800.29	2036.01	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	101,831.87	15274.78	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	102,059.51	25514.88	99.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	102,285.03	25571.26	100.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	101,848.14	25462.03	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	101,771.74	25442.93	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	102,500.86	25625.22	100.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	102,177.18	25544.30	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	100,032.87	25008.22	97.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	94,464.31	23616.08	92.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	87,746.12	21936.53	85.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	81,166.22	20291.56	79.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	76,028.90	19007.23	74.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	68,922.77	17230.69	67.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	62,396.26	15599.07	61.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	54,114.44	13528.61	52.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	50,731.95	12682.99	49.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	46,431.73	11607.93	45.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	43,342.68	10835.67	42.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	40,478.45	10119.61	39.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	39,599.20	9899.80	38.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	39,065.91	9766.48	38.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	39,414.61	9853.65	38.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	42,150.41	10537.60	41.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	45,442.59	11360.65	44.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	48,688.67	12172.17	47.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	53,028.98	13257.25	51.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	57,777.42	14444.35	56.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	64,192.76	16048.19	62.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	71,664.68	17916.17	70.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	78,562.93	19640.73	76.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	87,511.85	21877.96	85.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	100,484.29	20096.86	98.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:54 PM	100,700.54	8056.04	98.5%	0.00	0.00	0.0%	0.00	0.00	0.0%

NOVEMBER 29

JANUARY 11 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:04 AM	101,935.30	9174.18	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	102,095.85	21440.13	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	102,317.37	25579.34	100.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	101,735.23	25433.81	99.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	101,842.77	25460.69	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	102,552.73	25638.18	100.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	102,516.01	25629.00	100.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	101,958.76	25489.69	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	98,765.63	24691.41	96.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	93,488.59	23372.15	91.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	87,211.61	21802.90	85.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	82,540.91	20635.23	80.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	75,424.62	18856.16	73.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	69,806.44	17451.61	68.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	62,348.51	15587.13	61.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	57,262.60	14315.65	56.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	53,257.24	13314.31	52.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	49,967.17	12491.79	48.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	45,808.25	11452.06	44.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	44,170.56	11042.64	43.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	42,831.72	10707.93	41.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	43,207.31	10801.83	42.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	44,126.81	11031.70	43.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	47,635.60	11908.90	46.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	51,231.91	12807.98	50.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	55,986.83	13996.71	54.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	61,146.49	15286.62	59.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	68,096.01	17024.00	66.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	76,038.39	19009.60	74.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	84,005.92	21001.48	82.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	95,735.70	23933.92	93.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	102,573.09	18463.16	100.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:51 PM	102,060.05	5103.00	99.8%	0.00	0.00	0.0%	0.00	0.00	0.0%

DECEMBER 6

JANUARY 4 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:10 AM	102,034.34	4081.37	99.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	102,104.87	17357.83	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	102,324.47	25581.12	100.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	101,715.61	25428.90	99.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	101,843.46	25460.87	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	102,556.83	25639.21	100.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	102,575.41	25643.85	100.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	102,231.84	25557.96	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	100,894.59	25223.65	98.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	97,044.81	24261.20	94.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	91,653.34	22913.33	89.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	87,760.52	21940.13	85.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	80,836.33	20209.08	79.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	74,739.18	18684.79	73.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	68,608.71	17152.18	67.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	62,719.87	15679.97	61.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	57,634.06	14408.51	56.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	54,620.34	13655.09	53.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	50,915.78	12728.95	49.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	48,610.64	12152.66	47.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	46,255.65	11563.91	45.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	46,319.35	11579.84	45.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	46,473.36	11618.34	45.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	49,092.36	12273.09	48.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	52,930.90	13232.72	51.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	57,955.80	14488.95	56.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	63,118.20	15779.55	61.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	70,232.60	17558.15	68.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	78,400.29	19600.07	76.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	87,770.12	21942.53	85.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	97,995.59	24498.90	95.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	102,369.26	17402.77	100.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:51 PM	102,575.16	5128.76	100.3%	0.00	0.00	0.0%	0.00	0.00	0.0%

DECEMBER 13

DECEMBER 28 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:15 AM	102,095.92	12251.51	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	102,306.88	25576.72	100.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	101,833.17	25458.29	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	101,776.34	25444.08	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	102,551.90	25637.97	100.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	102,575.41	25643.85	100.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	102,387.23	25596.81	100.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	101,729.14	25432.29	99.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	99,279.20	24819.80	97.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	94,507.04	23626.76	92.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	90,830.02	22707.51	88.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	84,973.54	21243.39	83.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	78,676.52	19669.13	77.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	72,318.61	18079.65	70.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	67,123.01	16780.75	65.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	61,230.26	15307.57	59.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	58,272.76	14568.19	57.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	54,634.67	13658.67	53.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	52,132.13	13033.03	51.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	49,070.46	12267.61	48.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	48,397.19	12099.30	47.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	48,529.04	12132.26	47.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	49,665.26	12416.32	48.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	53,595.00	13398.75	52.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	58,645.85	14661.46	57.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	63,594.59	15898.65	62.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	70,683.29	17670.82	69.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	78,838.15	19709.54	77.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	89,020.90	22255.22	87.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	98,440.79	24610.20	96.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	102,108.19	18379.47	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:52 PM	102,575.40	6154.52	100.3%	0.00	0.00	0.0%	0.00	0.00	0.0%

DECEMBER 20

WINTER SOLSTICE
DECEMBER 21 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:19 AM	102,119.30	8169.54	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	102,268.31	21476.34	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	102,070.40	25517.60	99.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	101,650.75	25412.69	99.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	102,513.11	25628.28	100.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	102,575.41	25643.85	100.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	102,481.33	25620.33	100.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	102,079.11	25519.78	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	100,351.33	25087.83	98.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	96,140.31	24035.08	94.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	92,216.53	23054.13	90.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	87,349.90	21837.47	85.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	81,128.26	20282.07	79.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	74,462.82	18615.70	72.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	69,679.89	17419.97	68.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	63,426.44	15856.61	62.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	59,997.06	14999.27	58.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	56,411.40	14102.85	55.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	54,039.89	13509.97	52.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	50,632.88	12658.22	49.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	49,398.74	12349.69	48.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	49,316.29	12329.07	48.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	50,236.80	12559.20	49.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	53,205.79	13301.45	52.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	58,152.41	14538.10	56.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	62,979.33	15744.83	61.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	69,629.76	17407.44	68.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	77,699.65	19424.91	76.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	87,363.09	21840.77	85.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	97,634.34	24408.58	95.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	101,847.16	21387.90	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:54 PM	102,575.40	8206.03	100.3%	0.00	0.00	0.0%	0.00	0.00	0.0%

EXHIBIT L: PROJECT ALTERNATIVE QUANTITATIVE SHADOW DATA

Quantitative Shadow Data for Mint Plaza

Shadow data for existing conditions, net new shadow from Reduced Density Project Alternative B, and No Residential Parking - Tower Only Project Alternative C

JUNE 21

SUMMER SOLSTICE

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
6:46 AM	15,495.73	1704.53	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 AM	15,495.73	3564.02	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	15,431.50	3857.88	99.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,214.63	3803.66	98.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	14,586.88	3646.72	94.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	13,347.25	3336.81	86.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	11,695.71	2923.93	75.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	10,227.90	2556.97	66.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	9,051.13	2262.78	58.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	8,078.65	2019.66	52.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	7,234.96	1808.74	46.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	6,452.65	1613.16	41.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	5,759.85	1439.96	37.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	5,127.99	1282.00	33.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	4,588.45	1147.11	29.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	4,078.65	1019.66	26.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	3,679.10	919.78	23.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	3,273.80	818.45	21.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	2,917.72	729.43	18.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	2,535.74	633.94	16.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	2,203.63	550.91	14.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	1,937.56	484.39	12.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	1,869.57	467.39	12.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	1,698.24	424.56	11.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	1,694.31	423.58	10.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	1,693.01	423.25	10.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	1,777.28	444.32	11.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	1,763.07	440.77	11.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	2,156.84	539.21	13.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	3,659.14	914.78	23.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	5,151.22	1287.80	33.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	6,848.82	1712.20	44.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	8,539.79	2134.95	55.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	10,367.81	2591.95	66.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	12,156.31	3039.08	78.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	13,520.87	3380.22	87.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,349.28	3587.32	92.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,785.26	3696.31	95.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,094.55	3773.64	97.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,323.74	3830.94	98.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,459.37	3864.84	99.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.69	3873.92	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	15,495.73	4648.72	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:36 PM	15,495.73	2789.23	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

JUNE 28

JUNE 14 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
6:48 AM	15,495.73	1549.57	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 AM	15,495.72	3409.06	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	15,469.22	3867.31	99.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,238.85	3809.71	98.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	14,785.08	3696.27	95.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	13,609.09	3402.27	87.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	11,935.23	2983.81	77.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	10,438.67	2609.67	67.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	9,225.34	2306.34	59.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	8,221.29	2055.32	53.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	7,364.56	1841.14	47.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	6,570.44	1642.61	42.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	5,863.39	1465.85	37.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	5,218.49	1304.62	33.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	4,668.56	1167.14	30.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	4,152.58	1038.14	26.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	3,743.90	935.98	24.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	3,335.89	833.97	21.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	2,977.19	744.30	19.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	2,593.51	648.38	16.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	2,259.69	564.92	14.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	1,979.60	494.90	12.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	1,909.94	477.49	12.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	1,737.40	434.35	11.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	1,709.60	427.40	11.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	1,709.64	427.41	11.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	1,794.38	448.59	11.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	1,783.76	445.94	11.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	2,017.79	504.45	13.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	3,482.17	870.54	22.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	4,967.47	1241.87	32.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	6,660.33	1665.08	43.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	8,342.78	2085.69	53.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	10,167.48	2541.87	65.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	11,949.53	2987.38	77.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	13,389.80	3347.45	86.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,304.40	3576.10	92.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,756.20	3689.05	95.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,079.62	3769.90	97.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,312.90	3828.22	98.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,453.52	3863.38	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.40	3873.85	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.71	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	15,495.73	4648.72	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:36 PM	15,495.73	2789.23	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

JULY 5

JUNE 7 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
6:52 AM	15,495.73	929.74	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 AM	15,495.73	2944.19	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,319.44	3829.86	98.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,085.80	3771.45	97.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	14,034.23	3508.56	90.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	12,313.58	3078.40	79.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	10,812.21	2703.05	69.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	9,528.28	2382.07	61.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	8,472.02	2118.01	54.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	7,590.92	1897.73	49.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	6,775.26	1693.82	43.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	6,041.17	1510.29	39.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	5,373.00	1343.25	34.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	4,804.40	1201.10	31.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	4,275.33	1068.83	27.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	3,858.49	964.62	24.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	3,444.71	861.18	22.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	3,081.22	770.31	19.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	2,694.42	673.61	17.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	2,357.56	589.39	15.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	2,081.94	520.48	13.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	2,010.07	502.52	13.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	1,836.17	459.04	11.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	1,787.97	446.99	11.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	1,771.41	442.85	11.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	1,856.55	464.14	12.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	1,851.92	462.98	12.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	1,905.97	476.49	12.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	3,266.92	816.73	21.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	4,751.11	1187.78	30.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	6,446.51	1611.63	41.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	8,127.24	2031.81	52.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	9,940.71	2485.18	64.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	11,719.34	2929.84	75.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	13,258.33	3314.58	85.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,275.33	3568.83	92.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,748.04	3687.01	95.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,088.38	3772.10	97.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,327.48	3831.87	98.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,451.29	3862.82	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.30	3873.82	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	15,495.72	4648.71	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:36 PM	15,495.72	2789.23	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

JULY 12

MAY 31 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
6:56 AM	15,495.72	464.87	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 AM	15,495.72	2324.36	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,407.85	3851.96	99.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,249.99	3812.50	98.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	14,561.47	3640.37	94.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	12,808.14	3202.03	82.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	11,307.93	2826.98	73.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	9,958.08	2489.52	64.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	8,829.17	2207.29	57.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	7,909.63	1977.41	51.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	7,062.21	1765.55	45.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	6,294.13	1573.53	40.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	5,590.90	1397.73	36.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	4,994.17	1248.54	32.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	4,445.35	1111.34	28.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	4,022.03	1005.51	26.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	3,599.89	899.97	23.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	3,229.24	807.31	20.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	2,837.42	709.36	18.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	2,496.50	624.13	16.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	2,243.61	560.90	14.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	2,169.47	542.37	14.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	1,993.08	498.27	12.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	1,942.05	485.51	12.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	1,878.37	469.59	12.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	1,963.99	491.00	12.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	1,963.53	490.88	12.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	2,017.40	504.35	13.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	3,023.92	755.98	19.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	4,506.25	1126.56	29.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	6,210.24	1552.56	40.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	7,896.12	1974.03	51.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	9,692.77	2423.19	62.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	11,473.04	2868.26	74.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	13,129.06	3282.26	84.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,261.35	3565.34	92.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,762.40	3690.60	95.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,121.05	3780.26	97.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,351.51	3837.88	99.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,452.78	3863.20	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	15,495.72	4338.80	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:33 PM	15,495.72	2324.36	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

JULY 19

MAY 24 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:01 AM	15,495.72	2014.44	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:16 AM	15,495.72	3718.97	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	15,495.72	3718.97	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,474.81	3868.70	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,368.36	3842.09	99.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	14,965.86	3741.47	96.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	13,441.00	3360.25	86.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	11,800.67	2950.17	76.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	10,497.04	2624.26	67.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	9,274.76	2318.69	59.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	8,304.98	2076.24	53.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	7,416.58	1854.15	47.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	6,612.28	1653.07	42.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	5,862.66	1465.66	37.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	5,230.78	1307.69	33.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	4,655.88	1163.97	30.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	4,228.26	1057.06	27.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	3,794.36	948.59	24.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	3,415.04	853.76	22.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	3,016.94	754.24	19.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	2,671.16	667.79	17.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	2,461.99	615.50	15.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	2,385.83	596.46	15.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	2,210.36	552.59	14.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	2,150.67	537.67	13.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	2,030.94	507.74	13.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	2,116.90	529.23	13.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	2,118.24	529.56	13.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	2,181.90	545.47	14.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	2,791.58	697.90	18.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	4,255.21	1063.80	27.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	5,976.05	1494.01	38.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	7,646.10	1911.53	49.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	9,451.06	2362.76	61.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	11,237.93	2809.48	72.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	13,011.49	3252.87	84.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,270.40	3567.60	92.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,803.15	3700.79	95.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,177.81	3794.45	97.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,360.90	3840.23	99.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,461.99	3865.50	99.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.71	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 PM	15,495.73	2014.44	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

JULY 26

MAY 17 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:07 AM	15,495.72	929.74	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 AM	15,495.72	2944.19	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,455.31	3863.83	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,099.57	3774.89	97.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	14,102.74	3525.68	91.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	12,378.86	3094.72	79.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	10,988.08	2747.02	70.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	9,810.45	2452.61	63.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	8,777.85	2194.46	56.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	7,837.53	1959.38	50.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	6,986.36	1746.59	45.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	6,194.13	1548.53	40.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	5,514.35	1378.59	35.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	4,917.95	1229.49	31.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	4,478.92	1119.73	28.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	4,030.17	1007.54	26.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	3,641.67	910.42	23.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	3,234.84	808.71	20.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	2,924.95	731.24	18.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	2,738.27	684.57	17.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	2,659.61	664.90	17.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	2,484.59	621.15	16.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	2,414.23	603.56	15.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	2,251.25	562.81	14.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	2,315.61	578.90	14.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	2,318.73	579.68	15.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	2,393.03	598.26	15.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	2,584.49	646.12	16.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	3,988.81	997.20	25.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	5,732.17	1433.04	37.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	7,389.87	1847.47	47.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	9,207.78	2301.94	59.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	11,005.56	2751.39	71.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	12,886.90	3221.72	83.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,238.17	3559.54	91.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,865.40	3716.35	95.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,207.33	3801.83	98.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,376.69	3844.17	99.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,476.60	3869.15	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	15,495.72	3254.10	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:25 PM	15,495.72	1394.61	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

AUGUST 2

MAY 10 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:12 AM	15,495.73	309.91	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 AM	15,495.73	2324.36	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,493.05	3873.26	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,220.05	3805.01	98.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	14,335.90	3583.97	92.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	12,999.73	3249.93	83.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	11,499.86	2874.97	74.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	10,312.41	2578.10	66.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	9,302.40	2325.60	60.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	8,301.65	2075.41	53.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	7,393.76	1848.44	47.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	6,558.44	1639.61	42.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	5,832.95	1458.24	37.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	5,225.99	1306.50	33.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	4,764.38	1191.10	30.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	4,298.54	1074.64	27.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	3,902.34	975.59	25.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	3,482.79	870.70	22.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	3,252.20	813.05	21.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	3,069.53	767.38	19.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	2,987.13	746.78	19.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	2,811.38	702.84	18.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	2,735.66	683.91	17.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	2,569.28	642.32	16.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	2,559.74	639.93	16.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	2,566.22	641.56	16.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	2,641.78	660.45	17.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	2,625.21	656.30	16.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	3,742.38	935.59	24.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	5,488.38	1372.10	35.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	7,164.35	1791.09	46.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	9,000.26	2250.07	58.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	10,813.83	2703.46	69.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	12,755.85	3188.96	82.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,226.10	3556.53	91.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,928.01	3732.00	96.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,224.23	3806.06	98.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,399.94	3849.99	99.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,488.52	3872.13	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:15 PM	15,495.73	2324.36	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:18 PM	15,495.73	464.87	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

AUGUST 9

MAY 3 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:19 AM	15,495.72	1394.61	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	15,495.73	3254.10	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,324.57	3831.14	98.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	14,529.37	3632.34	93.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	13,280.60	3320.15	85.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	12,088.82	3022.20	78.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	10,793.44	2698.36	69.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	9,791.65	2447.91	63.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	8,804.86	2201.22	56.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	7,833.92	1958.48	50.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	6,951.77	1737.94	44.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	6,190.80	1547.70	40.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	5,581.42	1395.36	36.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	5,090.10	1272.53	32.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	4,602.43	1150.61	29.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	4,197.82	1049.45	27.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	3,770.14	942.53	24.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	3,636.49	909.12	23.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	3,455.69	863.92	22.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	3,367.95	841.99	21.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	3,191.20	797.80	20.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	3,111.04	777.76	20.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	2,936.93	734.23	19.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	2,873.88	718.47	18.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	2,860.84	715.21	18.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	2,933.85	733.46	18.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	2,927.49	731.87	18.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	3,540.66	885.16	22.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	5,261.65	1315.41	34.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	6,962.12	1740.53	44.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	8,818.28	2204.57	56.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	10,651.69	2662.92	68.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	12,624.70	3156.18	81.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,185.54	3546.39	91.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,956.13	3739.03	96.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,247.92	3811.98	98.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,423.84	3855.96	99.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,494.30	3873.57	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.70	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	15,495.73	5268.55	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:10 PM	15,495.72	3254.10	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

AUGUST 16

APRIL 26 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:25 AM	15,495.72	619.83	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:30 AM	15,495.72	2634.27	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,495.69	3873.92	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,420.08	3855.02	99.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	14,737.16	3684.29	95.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	13,482.15	3370.54	87.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	12,425.23	3106.31	80.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	11,317.20	2829.30	73.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,224.14	2556.03	66.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	9,272.90	2318.22	59.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	8,320.27	2080.07	53.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	7,386.57	1846.64	47.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	6,606.97	1651.74	42.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	5,992.54	1498.14	38.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	5,459.15	1364.79	35.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	4,952.02	1238.01	32.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	4,529.88	1132.47	29.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	4,199.64	1049.91	27.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	4,079.38	1019.84	26.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	3,895.94	973.99	25.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	3,801.88	950.47	24.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	3,624.50	906.13	23.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	3,539.19	884.80	22.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	3,361.04	840.26	21.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	3,288.07	822.02	21.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	3,199.61	799.90	20.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	3,262.25	815.56	21.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	3,269.47	817.37	21.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	3,437.21	859.30	22.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	5,048.61	1262.15	32.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	6,777.72	1694.43	43.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	8,657.14	2164.28	55.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	10,511.63	2627.91	67.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	12,452.76	3113.19	80.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,085.72	3521.43	90.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,969.86	3742.47	96.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,270.51	3817.63	98.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,441.71	3860.43	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.71	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.71	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	15,495.73	4183.85	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:02 PM	15,495.72	2169.40	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

AUGUST 23

APRIL 19 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:31 AM	15,495.72	1704.53	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	15,495.73	3564.02	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,494.55	3873.64	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	14,912.88	3728.22	96.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	13,668.08	3417.02	88.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	12,573.99	3143.50	81.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	11,584.82	2896.20	74.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,656.11	2664.03	68.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	9,598.60	2399.65	61.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	8,715.56	2178.89	56.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	7,844.23	1961.06	50.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	7,084.85	1771.21	45.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	6,434.23	1608.56	41.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	5,872.71	1468.18	37.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	5,339.56	1334.89	34.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	4,929.88	1232.47	31.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	4,693.62	1173.40	30.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	4,574.86	1143.72	29.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	4,385.81	1096.45	28.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	4,286.48	1071.62	27.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	4,106.63	1026.66	26.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	4,014.94	1003.74	25.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	3,836.09	959.02	24.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	3,746.47	936.62	24.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	3,580.51	895.13	23.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	3,624.16	906.04	23.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	3,639.46	909.86	23.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	3,714.25	928.56	24.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	4,895.70	1223.93	31.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	6,658.30	1664.57	43.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	8,561.01	2140.25	55.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	10,369.90	2592.47	66.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	12,266.46	3066.61	79.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,018.24	3504.56	90.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,973.07	3743.27	96.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,296.60	3824.15	98.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,462.43	3865.61	99.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,495.71	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:45 PM	15,495.72	2944.19	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:52 PM	15,495.72	929.74	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

AUGUST 30

APRIL 12 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:37 AM	15,495.72	929.74	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	15,495.72	2944.19	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,495.17	3873.79	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	15,023.10	3755.77	96.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	13,844.21	3461.05	89.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	12,572.90	3143.22	81.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	11,670.84	2917.71	75.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,848.42	2712.10	70.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	9,917.45	2479.36	64.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	8,974.40	2243.60	57.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	8,229.83	2057.46	53.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	7,606.81	1901.70	49.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	6,914.64	1728.66	44.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	6,342.03	1585.51	40.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	5,782.70	1445.68	37.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	5,481.90	1370.48	35.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	5,251.69	1312.92	33.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	5,123.32	1280.83	33.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	4,928.63	1232.16	31.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	4,822.98	1205.74	31.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	4,638.51	1159.63	29.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	4,541.36	1135.34	29.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	4,359.17	1089.79	28.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	4,240.28	1060.07	27.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	4,047.42	1011.86	26.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	4,024.35	1006.09	26.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	4,052.55	1013.14	26.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	4,158.58	1039.65	26.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	4,814.93	1203.73	31.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	6,566.41	1641.60	42.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	8,406.49	2101.62	54.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	10,185.83	2546.46	65.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	12,087.29	3021.82	78.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	13,910.96	3477.74	89.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,969.42	3742.35	96.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,322.79	3830.70	98.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,481.19	3870.30	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:30 PM	15,495.72	3564.01	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:42 PM	15,495.73	1704.53	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

SEPTEMBER 6

APRIL 5 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:44 AM	15,495.71	2014.44	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	15,072.88	3768.22	97.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	13,864.29	3466.07	89.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	12,431.32	3107.83	80.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	11,603.63	2900.91	74.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,848.34	2712.09	70.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	10,046.33	2511.58	64.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	9,236.44	2309.11	59.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	8,517.20	2129.30	55.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	8,039.82	2009.95	51.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	7,440.92	1860.23	48.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	6,858.37	1714.59	44.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	6,356.19	1589.05	41.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	6,124.28	1531.07	39.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	5,870.80	1467.70	37.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	5,726.42	1431.61	37.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	5,522.74	1380.69	35.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	5,408.56	1352.14	34.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	5,219.60	1304.90	33.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	5,115.26	1278.82	33.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	4,898.92	1224.73	31.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	4,749.12	1187.28	30.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	4,548.32	1137.08	29.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	4,480.82	1120.20	28.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	4,507.94	1126.99	29.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	4,638.13	1159.53	29.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	4,861.06	1215.26	31.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	6,392.68	1598.17	41.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	8,228.77	2057.19	53.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	10,016.60	2504.15	64.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	11,906.33	2976.58	76.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	13,915.71	3478.93	89.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,958.15	3739.54	96.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,340.49	3835.12	99.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,493.73	3873.43	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.72	4183.84	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:31 PM	15,495.72	2169.40	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

SEPTEMBER 13

MARCH 29 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:50 AM	15,495.71	1239.66	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,495.71	3254.10	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	15,107.16	3776.79	97.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	13,742.92	3435.73	88.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	12,323.71	3080.93	79.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	11,471.79	2867.95	74.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,677.70	2669.43	68.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	9,945.06	2486.27	64.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	9,322.48	2330.62	60.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	8,829.85	2207.46	57.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	8,315.27	2078.82	53.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	7,901.62	1975.40	51.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	7,432.76	1858.19	48.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	7,057.57	1764.39	45.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	6,836.65	1709.16	44.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	6,556.08	1639.02	42.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	6,386.14	1596.53	41.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	6,165.61	1541.40	39.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	6,042.89	1510.72	39.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	5,846.20	1461.55	37.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	5,686.21	1421.55	36.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	5,440.28	1360.07	35.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	5,291.81	1322.95	34.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	5,098.21	1274.55	32.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	5,023.96	1255.99	32.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	5,006.56	1251.64	32.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	5,120.41	1280.10	33.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	5,108.85	1277.21	33.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	6,230.86	1557.72	40.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	8,074.62	2018.65	52.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	9,868.12	2467.03	63.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	11,845.99	2961.50	76.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,042.63	3510.66	90.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	14,969.40	3742.35	96.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,361.99	3840.50	99.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,495.68	3873.92	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:15 PM	15,495.73	2789.23	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:21 PM	15,495.73	774.79	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

SEPTEMBER 20

APPROXIMATE EQUINOXES
MARCH 22 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:57 AM	15,495.71	309.91	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	15,495.72	2324.36	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,495.70	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	15,183.54	3795.89	98.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	13,523.74	3380.94	87.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	12,074.08	3018.52	77.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	11,342.61	2835.65	73.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,488.30	2622.07	67.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	9,773.04	2443.26	63.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	9,265.13	2316.28	59.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	8,979.63	2244.91	57.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	8,605.38	2151.34	55.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	8,198.61	2049.65	52.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	8,056.24	2014.06	52.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	7,829.91	1957.48	50.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	7,596.17	1899.04	49.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	7,305.80	1826.45	47.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	7,107.30	1776.82	45.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	6,860.33	1715.08	44.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	6,722.15	1680.54	43.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	6,454.13	1613.53	41.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	6,253.74	1563.43	40.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	6,010.69	1502.67	38.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	5,865.53	1466.38	37.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	5,682.13	1420.53	36.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	5,608.28	1402.07	36.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	5,511.45	1377.86	35.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	5,561.83	1390.46	35.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	5,559.56	1389.89	35.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	6,122.46	1530.61	39.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	7,949.81	1987.45	51.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	9,778.75	2444.69	63.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	11,734.10	2933.53	75.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	14,188.42	3547.11	91.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	15,119.85	3779.96	97.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,410.42	3852.61	99.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,495.71	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,495.71	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:00 PM	15,495.72	3254.10	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
6:09 PM	15,495.73	1239.66	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

SEPTEMBER 27

MARCH 15 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:03 AM	15,495.72	1549.57	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,495.72	3409.06	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	15,030.53	3757.63	97.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	13,181.76	3295.44	85.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	11,798.60	2949.65	76.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	11,086.52	2771.63	71.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,325.85	2581.46	66.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	9,634.70	2408.68	62.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	9,182.25	2295.56	59.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	8,885.81	2221.45	57.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	8,754.28	2188.57	56.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	8,597.40	2149.35	55.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	8,583.05	2145.76	55.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	8,537.57	2134.39	55.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	8,401.63	2100.41	54.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	8,096.90	2024.23	52.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	7,889.44	1972.36	50.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	7,610.56	1902.64	49.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	7,352.06	1838.02	47.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	7,034.70	1758.68	45.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	6,837.56	1709.39	44.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	6,604.76	1651.19	42.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	6,465.91	1616.48	41.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	6,294.38	1573.59	40.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	6,202.56	1550.64	40.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	6,058.14	1514.53	39.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	6,056.46	1514.11	39.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	6,047.81	1511.95	39.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	6,161.07	1540.27	39.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	7,879.58	1969.89	50.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	9,752.47	2438.12	62.9%	0.00	0.00	0.0%	178.24	44.56	1.2%
4:00 PM	11,762.30	2940.57	75.9%	0.00	0.00	0.0%	10.10	2.53	0.1%
4:15 PM	14,010.58	3502.65	90.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	15,336.72	3834.18	99.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,456.62	3864.15	99.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,495.71	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:45 PM	15,495.73	3564.02	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:58 PM	15,495.73	1704.53	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

OCTOBER 4

MARCH 8 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:09 AM	15,495.73	619.83	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	15,495.72	2634.27	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	15,126.47	3781.62	97.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	14,480.90	3620.22	93.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	12,780.71	3195.18	82.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	11,631.34	2907.84	75.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	10,854.49	2713.62	70.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,133.08	2533.27	65.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	9,562.07	2390.52	61.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	9,128.02	2282.01	58.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	8,771.42	2192.85	56.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	8,723.10	2180.78	56.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	8,996.22	2249.06	58.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	9,135.74	2283.94	59.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	9,112.77	2278.19	58.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	9,127.74	2281.93	58.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	8,924.91	2231.23	57.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	8,709.22	2177.31	56.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	8,316.02	2079.01	53.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	8,020.60	2005.15	51.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	7,693.08	1923.27	49.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	7,468.05	1867.01	48.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	7,218.08	1804.52	46.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	7,086.26	1771.56	45.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	6,925.60	1731.40	44.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	6,827.81	1706.95	44.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	6,658.15	1664.54	43.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	6,599.33	1649.83	42.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	6,580.88	1645.22	42.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	6,586.36	1646.59	42.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	7,843.06	1960.77	50.6%	0.00	0.00	0.0%	694.76	173.69	4.5%
3:45 PM	9,777.40	2444.35	63.1%	0.00	0.00	0.0%	1,516.97	379.24	9.8%
4:00 PM	11,787.84	2946.96	76.1%	0.00	0.00	0.0%	492.85	123.21	3.2%
4:15 PM	13,715.26	3428.81	88.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	15,387.57	3846.89	99.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,485.93	3871.48	99.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.73	4183.85	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:47 PM	15,495.72	2169.40	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

OCTOBER 11

MARCH 1 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:16 AM	15,495.72	1859.49	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	14,600.33	3504.08	94.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	14,109.99	3527.50	91.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	14,241.84	3560.46	91.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	13,119.29	3279.82	84.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	10,722.66	2680.66	69.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,021.29	2505.32	64.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	9,554.09	2388.52	61.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	9,131.13	2282.78	58.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	8,813.12	2203.28	56.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	8,849.17	2212.29	57.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	9,191.17	2297.79	59.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	9,561.60	2390.40	61.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	9,682.63	2420.66	62.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	9,715.59	2428.90	62.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	9,671.76	2417.94	62.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	9,434.33	2358.58	60.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	9,020.25	2255.06	58.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	8,704.49	2176.12	56.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	8,335.67	2083.92	53.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	8,076.20	2019.05	52.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	7,842.56	1960.64	50.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	7,718.23	1929.56	49.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	7,572.02	1893.01	48.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	7,488.85	1872.21	48.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	7,304.74	1826.18	47.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	7,211.53	1802.88	46.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	7,178.35	1794.59	46.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:15 PM	7,234.81	1808.70	46.7%	0.00	0.00	0.0%	1,054.69	263.67	6.8%
3:30 PM	7,855.58	1963.90	50.7%	0.00	0.00	0.0%	2,395.42	598.85	15.5%
3:45 PM	9,819.58	2454.90	63.4%	0.00	0.00	0.0%	3,227.17	806.79	20.8%
4:00 PM	11,815.27	2953.82	76.2%	0.00	0.00	0.0%	1,506.69	376.67	9.7%
4:15 PM	13,674.60	3418.65	88.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:30 PM	15,249.99	3812.50	98.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:30 PM	15,495.72	2944.19	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:37 PM	15,495.73	929.74	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

OCTOBER 18

FEBRUARY 22 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:22 AM	15,495.72	929.74	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	14,477.77	2606.00	93.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	14,944.21	3736.05	96.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	13,916.44	3479.11	89.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	13,169.26	3292.32	85.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	11,045.10	2761.28	71.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,043.81	2510.95	64.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	9,597.21	2399.30	61.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	9,182.98	2295.74	59.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	8,985.28	2246.32	58.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	9,153.19	2288.30	59.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	9,394.37	2348.59	60.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	9,772.27	2443.07	63.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	10,123.79	2530.95	65.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	10,294.83	2573.71	66.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	10,177.08	2544.27	65.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	10,071.91	2517.98	65.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	9,750.63	2437.66	62.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	9,424.76	2356.19	60.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	9,051.39	2262.85	58.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	8,774.94	2193.73	56.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	8,468.78	2117.19	54.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	8,352.70	2088.18	53.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	8,222.06	2055.51	53.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	8,175.24	2043.81	52.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	7,991.48	1997.87	51.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	7,899.49	1974.87	51.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:00 PM	7,857.36	1964.34	50.7%	0.00	0.00	0.0%	447.26	111.81	2.9%
3:15 PM	7,949.03	1987.26	51.3%	0.00	0.00	0.0%	2,380.86	595.22	15.4%
3:30 PM	8,059.27	2014.82	52.0%	0.00	0.00	0.0%	4,303.50	1075.87	27.8%
3:45 PM	9,910.47	2477.62	64.0%	0.00	0.00	0.0%	5,069.90	1267.47	32.7%
4:00 PM	11,881.71	2970.43	76.7%	0.00	0.00	0.0%	2,983.83	745.96	19.3%
4:15 PM	13,649.83	3412.46	88.1%	0.00	0.00	0.0%	95.67	23.92	0.6%
4:30 PM	15,120.31	3780.08	97.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:00 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:15 PM	15,495.72	3409.06	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
5:27 PM	15,495.72	1549.57	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

OCTOBER 25

FEBRUARY 15 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:30 AM	15,424.78	2005.22	99.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	14,699.30	3674.82	94.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	13,649.44	3412.36	88.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	12,851.24	3212.81	82.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	11,795.49	2948.87	76.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	10,147.22	2536.80	65.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	9,695.39	2423.85	62.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	9,342.69	2335.67	60.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	9,311.99	2328.00	60.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	9,500.58	2375.15	61.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	9,704.96	2426.24	62.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	9,975.78	2493.95	64.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	10,336.74	2584.18	66.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	10,628.94	2657.23	68.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	10,666.99	2666.75	68.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	10,589.94	2647.48	68.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	10,417.51	2604.38	67.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	10,165.91	2541.48	65.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	9,786.50	2446.63	63.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	9,510.64	2377.66	61.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	9,175.44	2293.86	59.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	8,978.40	2244.60	57.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	8,863.42	2215.86	57.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	8,853.68	2213.42	57.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	8,705.97	2176.49	56.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	8,639.24	2159.81	55.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	8,578.67	2144.67	55.4%	0.00	0.00	0.0%	484.71	121.18	3.1%
2:15 PM	8,714.00	2178.50	56.2%	0.00	0.00	0.0%	2,903.07	725.77	18.7%
2:30 PM	8,788.33	2197.08	56.7%	0.00	0.00	0.0%	6,049.23	1512.31	39.0%
2:45 PM	10,056.03	2514.01	64.9%	0.00	0.00	0.0%	5,439.69	1359.92	35.1%
3:00 PM	12,004.57	3001.14	77.5%	0.00	0.00	0.0%	3,491.16	872.79	22.5%
3:15 PM	13,724.74	3431.19	88.6%	0.00	0.00	0.0%	660.36	165.09	4.3%
3:30 PM	15,064.98	3766.24	97.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	15,495.71	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:15 PM	15,495.73	2324.36	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:18 PM	15,495.72	464.87	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

NOVEMBER 1

FEBRUARY 8 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:36 AM	14,940.90	1045.86	96.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	14,451.93	2745.87	93.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	13,386.82	3346.70	86.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	12,562.00	3140.50	81.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	11,215.98	2803.99	72.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	10,121.56	2530.39	65.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	9,863.14	2465.78	63.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	9,613.83	2403.46	62.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	9,667.53	2416.88	62.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	9,818.54	2454.64	63.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	9,995.33	2498.83	64.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	10,254.43	2563.61	66.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	10,501.40	2625.35	67.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	10,784.58	2696.14	69.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	11,026.49	2756.62	71.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	11,084.77	2771.19	71.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	10,953.65	2738.41	70.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	10,847.44	2711.86	70.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	10,526.40	2631.60	67.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	10,251.37	2562.84	66.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	9,918.60	2479.65	64.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	9,691.54	2422.89	62.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	9,477.70	2369.43	61.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	9,514.81	2378.70	61.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	9,441.32	2360.33	60.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	9,403.51	2350.88	60.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	9,356.19	2339.05	60.4%	0.00	0.00	0.0%	56.99	14.25	0.4%
2:15 PM	9,500.24	2375.06	61.3%	0.00	0.00	0.0%	2,499.58	624.89	16.1%
2:30 PM	9,650.42	2412.61	62.3%	0.00	0.00	0.0%	5,814.92	1453.73	37.5%
2:45 PM	10,288.77	2572.19	66.4%	0.00	0.00	0.0%	5,206.96	1301.74	33.6%
3:00 PM	12,315.48	3078.87	79.5%	0.00	0.00	0.0%	3,180.25	795.06	20.5%
3:15 PM	13,939.68	3484.92	90.0%	0.00	0.00	0.0%	1,243.25	310.81	8.0%
3:30 PM	15,148.19	3787.05	97.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	15,495.72	3254.10	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:10 PM	15,495.72	1394.61	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

NOVEMBER 8

FEBRUARY 1 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:43 AM	14,099.64	141.00	91.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
7:45 AM	14,034.43	1824.48	90.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	13,090.79	3272.70	84.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	12,292.63	3073.16	79.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	10,252.96	2563.24	66.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	10,019.47	2504.87	64.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	9,988.85	2497.21	64.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	10,002.23	2500.56	64.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	10,023.58	2505.89	64.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,091.35	2522.84	65.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	10,241.10	2560.28	66.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	10,486.03	2621.51	67.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	10,703.22	2675.81	69.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	10,958.26	2739.56	70.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	11,170.35	2792.59	72.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	11,394.85	2848.71	73.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	11,443.40	2860.85	73.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	11,382.72	2845.68	73.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	11,215.81	2803.95	72.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	10,979.35	2744.84	70.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	10,652.47	2663.12	68.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	10,438.10	2609.52	67.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	10,170.45	2542.61	65.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	10,144.81	2536.20	65.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	10,171.46	2542.86	65.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	10,152.99	2538.25	65.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	10,118.85	2529.71	65.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	10,283.34	2570.84	66.4%	0.00	0.00	0.0%	1,248.38	312.10	8.1%
2:30 PM	10,520.75	2630.19	67.9%	0.00	0.00	0.0%	4,331.06	1082.76	27.9%
2:45 PM	10,980.89	2745.22	70.9%	0.00	0.00	0.0%	4,514.84	1128.71	29.1%
3:00 PM	12,843.72	3210.93	82.9%	0.00	0.00	0.0%	2,652.01	663.00	17.1%
3:15 PM	14,279.22	3569.80	92.1%	0.00	0.00	0.0%	1,216.51	304.13	7.9%
3:30 PM	15,447.04	3861.76	99.7%	1.04	0.26	0.0%	16.42	4.10	0.1%
3:45 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:00 PM	15,495.73	2324.36	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
4:03 PM	15,495.73	464.87	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

NOVEMBER 15

JANUARY 25 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:51 AM	13,489.28	1079.14	87.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	12,823.79	2564.76	82.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	11,617.26	2904.31	75.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	10,203.31	2550.83	65.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	9,948.41	2487.10	64.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	10,007.35	2501.84	64.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	10,279.81	2569.95	66.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	10,311.68	2577.92	66.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,337.24	2584.31	66.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	10,455.56	2613.89	67.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	10,680.04	2670.01	68.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	10,887.77	2721.94	70.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	11,113.33	2778.33	71.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	11,296.90	2824.23	72.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	11,524.89	2881.22	74.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	11,753.93	2938.48	75.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	11,851.18	2962.80	76.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	11,747.63	2936.91	75.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	11,654.70	2913.68	75.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	11,352.03	2838.01	73.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	11,159.83	2789.96	72.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	10,926.34	2731.59	70.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	10,807.74	2701.93	69.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	10,832.81	2708.20	69.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	10,851.88	2712.97	70.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	10,840.69	2710.17	70.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	11,027.90	2756.98	71.2%	0.00	0.00	0.0%	227.38	56.84	1.5%
2:30 PM	11,330.97	2832.74	73.1%	0.00	0.00	0.0%	2,775.35	693.84	17.9%
2:45 PM	12,040.19	3010.05	77.7%	0.00	0.00	0.0%	3,455.53	863.88	22.3%
3:00 PM	13,411.39	3352.85	86.5%	0.00	0.00	0.0%	2,084.34	521.09	13.5%
3:15 PM	14,855.73	3713.93	95.9%	362.92	90.73	2.3%	640.00	160.00	4.1%
3:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	15,495.73	3564.02	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:57 PM	15,495.72	1704.53	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

NOVEMBER 22

JANUARY 18 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
7:57 AM	13,143.80	262.88	84.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:00 AM	12,675.88	1901.38	81.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	10,928.31	2732.08	70.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	10,299.42	2574.85	66.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	10,067.19	2516.80	65.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	10,034.19	2508.55	64.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	10,427.17	2606.79	67.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	10,495.29	2623.82	67.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,544.77	2636.19	68.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	10,641.22	2660.31	68.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	10,845.45	2711.36	70.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	11,037.87	2759.47	71.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	11,225.78	2806.44	72.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	11,412.87	2853.22	73.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	11,640.24	2910.06	75.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	11,866.28	2966.57	76.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	12,124.60	3031.15	78.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	12,177.51	3044.38	78.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	12,159.36	3039.84	78.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	11,987.47	2996.87	77.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	11,830.73	2957.68	76.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	11,585.14	2896.28	74.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	11,486.02	2871.51	74.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	11,392.35	2848.09	73.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	11,477.05	2869.26	74.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	11,480.39	2870.10	74.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	11,693.75	2923.44	75.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	12,033.96	3008.49	77.7%	0.00	0.00	0.0%	1,506.81	376.70	9.7%
2:45 PM	12,653.06	3163.26	81.7%	0.00	0.00	0.0%	2,837.17	709.29	18.3%
3:00 PM	13,853.18	3463.30	89.4%	0.00	0.00	0.0%	1,642.55	410.64	10.6%
3:15 PM	15,404.38	3851.10	99.4%	91.33	22.83	0.6%	91.35	22.84	0.6%
3:30 PM	15,495.71	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	15,495.73	3099.15	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:54 PM	15,495.73	1239.66	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

NOVEMBER 29

JANUARY 11 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:04 AM	12,967.18	1167.05	83.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	10,529.22	2211.14	67.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	10,321.97	2580.49	66.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	10,493.23	2623.31	67.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	10,050.53	2512.63	64.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	10,518.94	2629.73	67.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	10,572.66	2643.16	68.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,715.06	2678.77	69.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	10,786.08	2696.52	69.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	10,969.65	2742.41	70.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	11,134.63	2783.66	71.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	11,322.00	2830.50	73.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	11,505.97	2876.49	74.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	11,733.96	2933.49	75.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	11,956.15	2989.04	77.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	12,194.68	3048.67	78.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	12,427.72	3106.93	80.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	12,553.25	3138.31	81.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	12,476.76	3119.19	80.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	12,387.02	3096.76	79.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	12,123.44	3030.86	78.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	12,051.44	3012.86	77.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	11,928.45	2982.11	77.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	11,988.67	2997.17	77.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	12,001.53	3000.38	77.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	12,231.19	3057.80	78.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	12,589.15	3147.29	81.2%	0.00	0.00	0.0%	499.99	125.00	3.2%
2:45 PM	13,193.24	3298.31	85.1%	0.00	0.00	0.0%	1,927.49	481.87	12.4%
3:00 PM	14,352.60	3588.15	92.6%	240.00	60.00	1.5%	1,143.13	285.78	7.4%
3:15 PM	15,495.69	3873.92	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	15,495.73	2789.23	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:51 PM	15,495.73	774.79	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

DECEMBER 6

JANUARY 4 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:10 AM	12,233.65	489.35	78.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:15 AM	10,585.13	1799.47	68.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	10,329.70	2582.43	66.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	10,677.10	2669.28	68.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	10,114.09	2528.52	65.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	10,533.98	2633.49	68.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	10,621.56	2655.39	68.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,785.53	2696.38	69.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	10,888.74	2722.18	70.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	11,051.06	2762.76	71.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	11,200.67	2800.17	72.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	11,388.50	2847.13	73.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	11,569.69	2892.42	74.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	11,795.23	2948.81	76.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	12,013.84	3003.46	77.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	12,275.69	3068.92	79.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	12,539.75	3134.94	80.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	12,818.63	3204.66	82.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	12,786.52	3196.63	82.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	12,765.89	3191.47	82.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	12,527.49	3131.87	80.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	12,451.08	3112.77	80.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	12,330.10	3082.52	79.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	12,426.54	3106.64	80.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	12,377.67	3094.42	79.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	12,606.30	3151.57	81.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	12,962.52	3240.63	83.7%	0.00	0.00	0.0%	22.24	5.56	0.1%
2:45 PM	13,520.65	3380.16	87.3%	0.00	0.00	0.0%	1,239.58	309.90	8.0%
3:00 PM	14,524.38	3631.09	93.7%	399.65	99.91	2.6%	971.35	242.84	6.3%
3:15 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	15,495.72	2634.27	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:51 PM	15,495.70	774.79	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

DECEMBER 13

DECEMBER 28 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:15 AM	11,744.88	1409.39	75.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	10,310.56	2577.64	66.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	10,648.81	2662.20	68.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	10,175.90	2543.98	65.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	10,517.49	2629.37	67.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	10,641.11	2660.28	68.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,815.54	2703.89	69.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	10,948.33	2737.08	70.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	11,087.10	2771.78	71.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	11,231.09	2807.77	72.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	11,416.29	2854.07	73.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	11,594.70	2898.68	74.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	11,817.13	2954.28	76.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	12,030.81	3007.70	77.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	12,285.01	3071.25	79.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	12,544.31	3136.08	81.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	12,848.90	3212.22	82.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	12,986.53	3246.63	83.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	12,942.58	3235.64	83.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	12,792.88	3198.22	82.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	12,702.47	3175.62	82.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	12,587.74	3146.94	81.2%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	12,651.52	3162.88	81.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	12,602.74	3150.69	81.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	12,812.51	3203.13	82.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	13,141.27	3285.32	84.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	13,650.44	3412.61	88.1%	0.00	0.00	0.0%	751.11	187.78	4.8%
3:00 PM	14,508.37	3627.09	93.6%	270.84	67.71	1.7%	983.33	245.83	6.3%
3:15 PM	15,495.70	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	15,495.71	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	15,495.73	2789.23	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:52 PM	15,495.72	929.74	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

DECEMBER 20

WINTER SOLSTICE
DECEMBER 21 SIMILAR

Analysis Time	CURRENT SHADOW			ALTERNATIVE B: REDUCED DENSITY			ALTERNATIVE C: NO PARKING TOWER ONLY		
	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage	Area (sf)	Area/Time (sfh)	Coverage
8:19 AM	11,576.49	926.12	74.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:30 AM	10,371.35	2177.98	66.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
8:45 AM	10,578.67	2644.67	68.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:00 AM	10,269.50	2567.38	66.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:15 AM	10,440.23	2610.06	67.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:30 AM	10,640.76	2660.19	68.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
9:45 AM	10,804.58	2701.15	69.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:00 AM	10,944.69	2736.17	70.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:15 AM	11,079.66	2769.91	71.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:30 AM	11,220.82	2805.20	72.4%	0.00	0.00	0.0%	0.00	0.00	0.0%
10:45 AM	11,402.10	2850.52	73.6%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:00 AM	11,576.72	2894.18	74.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:15 AM	11,795.78	2948.94	76.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:30 AM	12,004.71	3001.18	77.5%	0.00	0.00	0.0%	0.00	0.00	0.0%
11:45 AM	12,256.60	3064.15	79.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:00 PM	12,511.42	3127.86	80.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:15 PM	12,814.31	3203.58	82.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:30 PM	13,060.40	3265.10	84.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
12:45 PM	13,027.23	3256.81	84.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:00 PM	12,911.76	3227.94	83.3%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:15 PM	12,809.96	3202.49	82.7%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:30 PM	12,700.91	3175.23	82.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
1:45 PM	12,726.98	3181.74	82.1%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:00 PM	12,694.33	3173.58	81.9%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:15 PM	12,856.80	3214.20	83.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:30 PM	13,142.65	3285.66	84.8%	0.00	0.00	0.0%	0.00	0.00	0.0%
2:45 PM	13,614.90	3403.73	87.9%	0.00	0.00	0.0%	379.13	94.78	2.4%
3:00 PM	14,372.88	3593.22	92.8%	0.00	0.00	0.0%	1,002.54	250.64	6.5%
3:15 PM	15,495.73	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:30 PM	15,495.72	3873.93	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:45 PM	15,495.71	3254.10	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%
3:54 PM	15,495.72	1239.66	100.0%	0.00	0.00	0.0%	0.00	0.00	0.0%

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APPENDIX E REVISED TRANSPORTATION ANALYSIS MEMORANDUM

FEHR PEERS

MEMORANDUM

Date: February 18, 2020

To: Liz White, Jenny Delumo, and Wade Wietgrefe,
Planning Department, City and County of San Francisco

From: Mike Hawkins, Fehr & Peers

Subject: Errata to the 469 Stevenson Street Initial Study Transportation Analysis Planning Department Case No. 2017-014833ENV

Purpose

On October 2, 2019, the San Francisco Planning Department published a notice of preparation of an environmental impact report with an initial study for the 469 Stevenson Street Project. The proposed project included 462 residential dwelling units, 171 vehicle parking spaces, and 192 bicycle parking spaces. The purpose of this memorandum is to document modifications to the 469 Stevenson Street project since the publication of the initial study and evaluate whether these changes would result in any new or more severe impacts than were identified in the project's initial study.

Revised Project Description

In November 2019, the project sponsor revised the project to include 495 residential units, 178 vehicle spaces, and 200 bicycle spaces (referred to as the "revised project" in this errata). **Table 1** summarizes the change in project description between the original project evaluated in the initial study and the revised project.

Table 1: Project Description Comparison

	Residential[1]	Retail[2]	Vehicle Parking Spaces	Bicycle Parking Spaces
Original Proposed Project	462 DU (616 BR)	3,940 GSF	171	192 class I + 25 class II
Revised Project	495 DU (707 BR)	4,000 GSF	178	200 class I + 27 class II
Net Change	***+33 DU (+91 BR)***	*+*	***+7 spaces***	***+8 class I*** ***+2 class II***

Notes:
1. DU = dwelling units; BR = bedrooms
2. GSF = gross square footage

Source: Project Sponsor; Fehr & Peers, 2019

Revised Travel Demand

Travel demand describes the mode of travel and directionality of project trips. Travel demand for the revised project was calculated and compared to that of the original proposed project. All travel demand calculations were performed pursuant to methodologies in the San Francisco Transportation Impact Analysis Guidelines. **Table 2** summarizes the travel demand changes between the original proposed project and the revised project for both daily and PM peak hour trips.

Table 2: Project Travel Demand Comparison

Land Use		Person Trips by Mode					Vehicle Trips[2]			Transit Trips	
		Auto	Transit	Other[1]	Walk	Total	In	Out	Total	In	Out
Daily – Original Proposed Project											
Retail[3]	4,000 sf	95	152	22	329	600	28	31	59	82	71
Residential	462 DU	854	776	80	1,045	2,772	318	251	570	308	468
Total		**949**	**929**	**103**	**1,374**	**3,355**	**347**	**282**	**628**	**390**	**539**
Daily – Revised Project											
Retail[3]	4,000 sf	95	152	22	329	600	28	31	59	82	71
Residential	495 DU	980	891	92	1,199	3,162	365	288	653	353	537
Total		**1,075**	**1,043**	**114**	**1,528**	**3,760**	**393**	**319**	**712**	**435**	**608**
Net Change		***+126***	***+114***	***+11***	***+154***	***+405***	***+46***	***+37***	***+84***	***+45***	***+69***
PM Peak Hour – Original Proposed Project											
Retail[3]	4,000 sf	8	14	2	30	54	2	3	5	6	8

Residential	462 DU	76	69	7	93	245	39	11	50	50	19
Total		**84**	**83**	**9**	**123**	**299**	**41**	**15**	**55**	**56**	**27**
PM Peak Hour – Revised Project											
Retail[3]	4,000 sf	8	14	2	30	54	2	3	5	6	8
Residential	495 DU	87	79	8	107	281	44	13	57	58	22
Total		**95**	**93**	**10**	**137**	**335**	**46**	**16**	**62**	**64**	**30**
Net Change		***+11***	***+10***	***+1***	***+14***	***+36***	***+5***	***+1***	***+7***	***+8***	***+3***

Notes:
Due to rounding, numbers may not add up to 100 percent
1. Other includes biking, skateboarding, etc.
2. Vehicle trips accounts for average vehicle occupancy of private auto trips and vehicles operating as Transportation Network Companies (TNCs) and taxis
3. Includes internal/linked trip reductions as appropriate

Source: SF Guidelines, Fehr & Peers, 2019

Analysis

Construction

The initial study determined that construction of the project would not create potentially hazardous conditions for people walking, bicycling, or driving; or substantially interference with accessibility for people walking or bicycling; or substantially delay public transit, and that this impact would be less than significant.

The revised project would not change this conclusion as the increase in residential units is not expected to substantially change the anticipated construction activities. Construction of the revised project is still expected to last for 36 months with the same road and sidewalk closures discussed in the initial study. Additionally, the number of construction-related trucks and construction worker trips for the revised project are expected to be similar to those anticipated for the original project.

The revised project would not result in any new or more-severe construction-related transportation impacts than were identified in the initial study.

Potentially Hazardous Conditions

The initial study determined that operation of the project would not create potentially hazardous conditions for people walking, bicycling, driving or public transit operations, and that this impact would be less than significant.

The revised project would not change this conclusion as the revised project does not include any new design features that would result in potentially hazardous conditions or include any incompatible uses. The revised project would generate an additional seven peak hour vehicle trips beyond those evaluated in the initial study. The total peak hour and daily added vehicle trips are

expected to be dispersed among multiple streets within the project vicinity and are minimal compared to existing vehicle volumes.

The revised project would not result in any new or substantially more severe effects than those identified in the initial study related to potentially hazardous conditions.

Accessibility and Emergency Access

The initial study determined that operation of the project would not interfere with accessibility of people walking or bicycling to and from the project site, and adjoining areas, or result in inadequate emergency access, and that this impact would be less than significant.

The revised project would not change this conclusion as the project's site plan is the same as that which was analyzed in the initial study. The revised project would also meet its freight loading demand such that vehicles loading on-site would not block people walking or bicycling. Emergency access to the site would remain unchanged from existing conditions. The revised project would generate an additional seven peak hour vehicle trips beyond those evaluated in the initial study; the seven peak hour vehicle trips would be dispersed among multiple streets surrounding the project site and are not expected to substantially delay emergency vehicles.

The revised project would not result in any new or substantially more severe effects than those identified in the initial related to accessibility and emergency access.

Transit

The initial study determined that the proposed project would not substantially delay public transit and that the impact would be less than significant.

The revised project would not change this conclusion as project-generated vehicle trips are not expected to cause substantial delay to transit. The revised project would generate 114 additional daily transit trips and 10 additional peak hour transit trips beyond those analyzed in the initial study. These additional transit trips would be distributed among the multiple transit lines serving the project vicinity.

Similar to the original project, the revised project is estimated to result in fewer than 300 inbound project vehicle trips during the peak hour which represents the San Francisco Planning Department's screening criteria for a quantitative transit delay analysis. With the increase in project-generated vehicle trips, there will still be relatively few added vehicle trips to streets with transit (Market Street, Mission Street, and Fifth Street) and substantial queuing due to the revised project is not expected on those streets.

The revised project would not result in any new or substantially more severe effects than those identified in the initial related to transit.

Vehicle Miles Traveled Assessment

The initial study determined that operation of the project would not cause substantial additional vehicle miles traveled (VMT) and that the impact would be less than significant.

The revised project would not change this conclusion as the project location has not changed. While increases in parking spaces and residential units (and the corresponding vehicle trips) will result in an increase in total VMT, the VMT per capita analysis would remain unchanged as transportation analysis zone 667 (the zone in which the project site is located) has a VMT per capita that is 15 percent below the existing regional average.

The revised project would not result in any new or substantially more severe effects than those identified in the initial study related to VMT.

Loading

The initial study determined that the project would not result in a loading deficit and that the impact would be less than significant.

The revised project would not change this conclusion as the revised project would also meet its loading demand. Freight and passenger loading calculations for the revised project are included in the attached technical appendices.

The revised project would not result in any new or substantially more severe effects than those identified in the initial study related to loading.

Cumulative

Given that the revised project would not result in any new or substantially more severe project-level effects for each of the topic areas identified above, the revised project would also not result in any new or substantially more severe cumulative transportation impacts.

Conclusion

As described above, the revised project would not result in any new or more substantial project-level or cumulative impacts than that of the original project analyzed in the initial study.

Attachments

469 Stevenson Street Revised Project Technical Appendices

469 Stevenson Street Revised Project

Technical Appendices

February 2020

SF18-1002

Case No. 2017.014833ENV

FEHR PEERS

Appendix A

Revised Project Trip Assignment

Generated with PTV VISTRO

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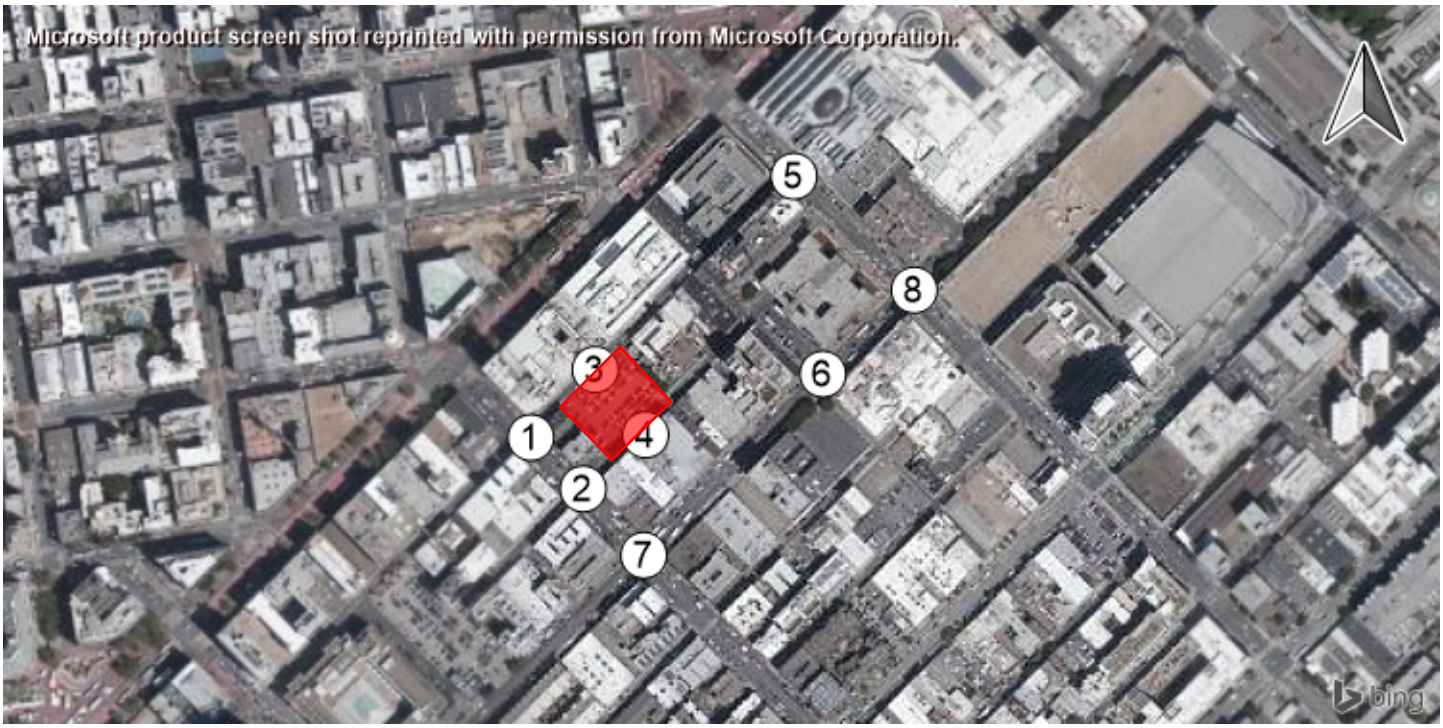
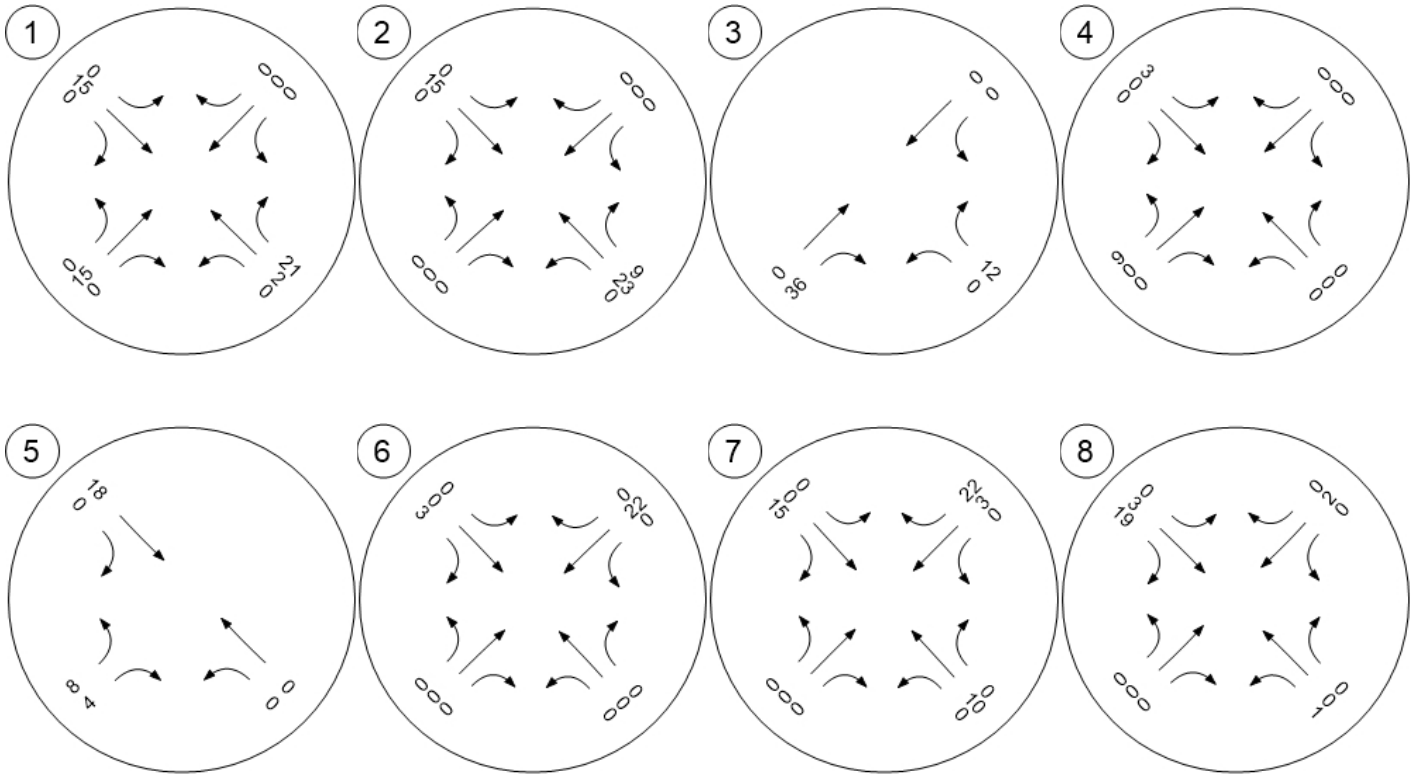
Traffic Volume - Net New Site Trips





Project Site

PM Peak Hour Project Trip Assignment

Appendix B

Revised Project

Freight and Passenger Loading Calculations

Use	GSF Quantity	GSF Quantity (Thousands)	Generation Rate (Thousands)	Truck Trip Generation (Daily)	Truck Trip Generation Rate (peak hour of loading)	Truck Trip Generation (peak hour of loading)	Truck Trip Generation Rate (Average generation per hour)	Truck Trip Generation (Average generation per hour)
Retail	4,000	4.00	0.2	0.9	0.0	0.05	0.0	0.04
Residential	458,400	458.40	0.0	13.8	0.0	0.80	0.0	0.64
TOTAL	**462,400**	**462**		**14.6**		**0.85**		**0.68**

Passenger Loading Calculations

x	TIA ID	469 Stevenson		
x	Name			
x	Address			
x	Land Use	Retail	Residential	TOTAL
x	Geography	Place Type 1	Place Type 1	
	PM Peak Hour Person Trips	54	281	335
	Passenger Loading % (placetype 1)	5.50%	8.80%	
x	Pax Loading Instances (person trips*loading %)	3.0	24.7	27.7
	Pax Loading Duration (min)	1	1	1
x	Delivery Spaces Required (PCEs) (loading instances*duration/60)	0.05	0.41	0.46
x	Pax Loading Spaces Required (rounded up)	1	1	2

Appendix C

Revised Project Garage Queuing Analysis

M/M/1 queuing analysis for Proposed Project

Arrival Rate	37	per hour
Total Capacity	240	per hour
Average Queue	0	cars

In	37	100%
Out		0%
Total	37	100%

%inbound:

100%

Queue*	Probability	Percentile	Minutes					# Vehicles queued INBOUND vehicles
0	85%	85%	50.8		0.845833	1		0.0
1	13%	98%	7.8		0.845833	0.154166667		1.0
2	2%	100%	1.2		0.845833	0.023767361		2.0
3	0%	100%	0.2		0.845833	0.003664135		3.0
4	0%	100%	0.0		0.845833	0.000564887		4.0
5	0%	100.00%	0.0		0.845833	8.70868E-05		5.0
6	0%	100%	0.0		0.845833	1.34259E-05		6.0
7	0%	100%	0.0		0.845833	2.06982E-06		7.0
8	0%	100%	0.0		0.845833	3.19098E-07		8.0
9	0%	100%	0.0		0.845833	4.91942E-08		9.0
10	0%	100%	0.0		0.845833	7.58411E-09		10.0
11	0%	100%	0.0		0.845833	1.16922E-09		11.0
12	0%	100%	0.0		0.845833	1.80254E-10		12.0
13	0%	100%	0.0		0.845833	2.77892E-11		13.0
14	0%	100%	0.0		0.845833	4.28417E-12		14.0
15	0%	100%	0.0		0.845833	6.60476E-13		15.0
16	0%	100%	0.0		0.845833	1.01823E-13		16.0
17	0%	100%	0.0		0.845833	1.56978E-14		17.0
18	0%	100%	0.0		0.845833	2.42007E-15		18.0
19	0%	100%	0.0		0.845833	3.73095E-16		19.0
20	0%	100%	0.0		0.845833	5.75188E-17		20.0
21	0%	100%	0.0		0.845833	8.86748E-18		21.0
22	0%	100%	0.0		0.845833	1.36707E-18		22.0
Total	100%		60					

*Number of cars in queue.

The driveway queuing analysis is based on an M/M/1 queuing model, which describes queuing when there are random (Poisson) arrival and service rates. This allows us to calculate, based on the number inbound vehicles in the PM peak hour (the arrival rate) and the capacity of the parking garage gate (the service rate), queuing characteristics such as the probability of observing a given queue length.

Probability of observing a given queue length:

(1 – arrival/capacity) * (arrival/capacity)^queue

Percent of time of observing a queue shorter than a given number of vehicles (**percentile**):

Cumulative sum of probabilities

Number of **minutes** out of an hour where the queue is shorter than a given number of vehicles:

Percentile * 60 minutes

Appendix D

Revised Project Volume Summary

Int #	Int Name	Movement	2018 Existing	Project Trips	Existing Plus Project	Baseline	Baseline Plus Project	Cumulative No Project	Cumulative Plus Project
1	6th/Stevenson	NBL	4	0	4	4	4	0	0
		NBT	1051	2	1053	1058	1060	940	942
		NBR	31	21	52	31	52	20	41
		SBL	17	0	17	17	17	60	60
		SBT	732	15	747	732	747	540	555
		SBR	1	0	1	1	1	0	0
		EBL	8	0	8	8	8	30	30
		EBT	9	15	24	9	24	30	45
		EBR	43	0	43	43	43	60	60
		WBL	0	0	0	0	0	0	0
		WBT	0	0	0	0	0	0	0
		WBR	3	0	3	3	3	0	0
2	6th/Jessie	NBL	6	0	6	6	6	0	0
		NBT	1105	23	1128	1112	1135	970	993
		NBR	32	9	41	32	41	30	39
		SBL	29	0	29	29	29	20	20
		SBT	751	15	766	751	766	540	555
		SBR	2	0	2	2	2	0	0
		EBL	2	0	2	2	2	20	20
		EBT	0	0	0	0	0	30	30
		EBR	1	0	1	1	1	20	20
		WBL	0	0	0	0	0	0	0
		WBT	0	0	0	0	0	0	0
		WBR	2	0	2	2	2	0	0
3	Stevenson/Driveway	NBL	1	0	1	1	1	0	0
		NBT	0	0	0	0	0	0	0
		NBR	11	12	12	11	23	20	12
		SBL	0	0	0	0	0	0	0
		SBT	0	0	0	0	0	0	0
		SBR	0	0	0	0	0	0	0
		EBL	0	0	0	0	0	0	0
		EBT	64	0	64	64	64	90	90
		EBR	3	36	36	3	39	20	36
		WBL	0	0	0	0	0	0	0
		WBT	1	0	1	1	1	0	0
		WBR	0	0	0	0	0	0	0
4	Jessie/Driveway	NBL	0	0	0	0	0	0	0
		NBT	0	0	0	0	0	0	0
		NBR	0	0	0	0	0	0	0
		SBL	21	3	3	21	24	30	3
		SBT	0	0	0	0	0	0	0
		SBR	0	0	0	0	0	0	0
		EBL	7	9	9	7	16	10	9
		EBT	66	0	66	66	66	80	80
		EBR	0	0	0	0	0	0	0
		WBL	0	0	0	0	0	0	0
		WBT	0	0	0	0	0	0	0
		WBR	0	0	0	0	0	0	0
5	5th/Stevenson	NBL	3	0	3	3	3	0	0
		NBT	694	0	694	694	694	1180	1180
		NBR	0	0	0	0	0	0	0
		SBL	0	0	0	0	0	0	0
		SBT	692	18	710	696	714	1220	1238
		SBR	1	0	1	1	1	0	0
		EBL	15	8	23	15	23	20	28
		EBT	0	0	0	0	0	0	0
		EBR	83	4	87	83	87	100	104
		WBL	0	0	0	0	0	0	0
		WBT	0	0	0	0	0	0	0
		WBR	0	0	0	0	0	0	0

6	Mission/Mint	NBL	9	0	9	9	9	10	10
		NBT	3	0	3	3	3	10	10
		NBR	12	0	12	12	12	20	20
		SBL	56	0	56	56	56	70	70
		SBT	0	0	0	0	0	0	0
		SBR	74	3	77	74	77	90	93
		EBL	30	0	30	30	30	40	40
		EBT	560	0	560	635	635	920	920
		EBR	0	0	0	0	0	0	0
		WBL	2	0	2	2	2	0	0
		WBT	595	22	617	595	617	710	732
		WBR	15	0	15	15	15	20	20
7	6th/Mission	NBL	2	0	2	2	2	0	0
		NBT	853	10	863	860	870	860	870
		NBR	65	0	65	125	125	140	140
		SBL	1	0	1	1	1	0	0
		SBT	717	0	717	717	717	430	430
		SBR	53	15	68	53	68	50	65
		EBL	2	0	2	2	2	0	0
		EBT	509	0	509	524	524	780	780
		EBR	182	0	182	184	184	160	160
		WBL	9	0	9	9	9	0	0
		WBT	432	3	435	432	435	700	703
		WBR	240	22	262	240	262	130	152
8	5th/Mission	NBL	4	1	5	4	5	0	1
		NBT	632	0	632	632	632	1050	1050
		NBR	152	0	152	152	152	250	250
		SBL	1	0	1	1	1	0	0
		SBT	721	3	724	725	728	1280	1283
		SBR	79	19	98	79	98	90	109
		EBL	4	0	4	4	4	0	0
		EBT	459	0	459	485	485	610	610
		EBR	141	0	141	190	190	390	390
		WBL	1	0	1	1	1	0	0
		WBT	546	2	548	546	548	620	622
		WBR	76	0	76	76	76	130	130
9	6th/Market	NBL	0	0	0	0	0	0	0
		NBT	976	2	978	983	985	1020	1022
		NBR	130	0	130	130	130	0	0
		SBL	132	0	132	132	132	210	210
		SBT	997	15	1012	997	1012	490	505
		SBR	8	0	8	8	8	60	60
		EBL	0	0	0	0	0	0	0
		EBT	170	0	170	170	170	0	0
		EBR	113	0	113	113	113	140	140
		WBL	0	0	0	0	0	0	0
		WBT	148	0	148	148	148	190	190
		WBR	0	0	0	0	0	0	0
10	5th/Market	NBL	2	0	2	2	2	0	0
		NBT	559	8	567	559	567	1150	1158
		NBR	149	0	149	149	149	0	0
		SBL	0	0	0	0	0	0	0
		SBT	695	18	713	699	717	1050	1068
		SBR	23	0	23	23	23	0	0
		EBL	0	0	0	0	0	0	0
		EBT	208	0	208	208	208	40	40
		EBR	83	0	83	83	83	170	170
		WBL	2	0	2	2	2	0	0
		WBT	277	0	277	277	277	60	60
		WBR	51	0	51	51	51	20	20

APPENDIX F REVISED NOISE ANALYSIS MEMORANDUM

Stantec

Memo

To:	City and County of San Francisco Planning Department	From:	Stantec Consulting Services
	1650 Mission Street #400650 Mission Street #400 San Francisco, CA 94103		Walnut Creek
File:	469 Stevenson Street Project	Date:	December 20, 2019

Reference: 469 Stevenson Project Revisions - Noise

Revisions were made to the Project Description for the 469 Stevenson Project that may affect previously analyzed noise impacts. Specifically, the number of residential units contained within the Project is being increased from 462 dwelling units to 495 dwelling units. The footprint, overall square footage, retail square footage, and parking spaces within the building will remain the same.

An updated noise impact analysis considering the modifications to the Project is as follows:

- *Daytime Construction Noise*: The building footprint and construction activity with the revised Project will be the same as previously analyzed. Therefore, daytime construction noise impacts will still be less than significant with mitigation.

- *Nighttime Construction Noise*: Construction activity during nighttime hours will not be altered with the revised Project and will be the same as previously analyzed. Therefore, the impact from nighttime construction noise will still be less than significant.

- *Construction Vibration*: Again, construction activity with the revised Project will be the same as previously analyzed and construction vibration impacts will still be less than significant.

- *Traffic Noise*: The increase in residential units is expected to add to peak hour traffic counts by seven (7) total vehicle trips. With the increase of vehicle trips, the project is still expected to minimally increase overall traffic volumes along Sixth Street (a 1 percent increase), Market Street (a 1 percent increase), and Fifth Street (approximately a 2 percent increase). Project-generated traffic would therefore increase noise on these streets by less than 1 dB(A). Peak traffic volumes are expected to increase approximately 47 percent along Stevenson Street between Fifth and Sixth Streets with the implementation of the revised project. Traffic increases of 47 percent only raise noise levels approximately 1.9 dB(A), which is imperceptible. Traffic noise increases of less than 3 dBA are barely perceptible to people, while a 5 dBA increase is readily noticeable. In areas where the existing or existing plus project environmental noise is conditionally acceptable or normally unacceptable per the general plan land use compatibility chart, any noise increase greater than 3 dBA is considered a significant noise impact. As project-generated traffic would increase noise on adjacent roadways by a maximum of 1.9 dBA, permanent noise increases due to project-related traffic with the added residential units would still therefore be less than significant.

- *HVAC and Mechanical Systems Exterior Noise*: The increase in residential units with the revised project would add to the overall number of water-source heat pumps within the units and their associated condensing units on the roof. The main pieces of mechanical equipment would not change and would still also be located on the roof. Therefore, a qualified acoustical consultant shall still be required to conduct a property plane noise analysis for compliance with the noise limits in the

Reference: 469 Stevenson Project Revisions - Noise

San Francisco Police Code and noise impacts from the exterior mechanical systems would still be less than significant.

- *HVAC and Mechanical Systems Interior Noise*: As stated above, the increase in residential units with the revised project would also add to the overall number of water-source heat pumps and their associated condensing units on the roof. The main pieces of rooftop mechanical equipment would not change. A standard HVAC unit would produce sound pressure levels in the range of 70 to 75 dBA at 50 feet[1]. A typical residential condensing unit produces noise levels between 50 to 58 dBA at 3 feet or about 29 to 37 dBA at 50 feet[2]. The logarithmic addition of noise generated from 33 additional condensing units to the noise generated from the standard HVAC unit would result in a total noise level in the range between 70.1 to 75.0 dBA, which is the same noise level as previously analyzed. Therefore, interior noise impacts from exterior mechanical noise generated by the revised project would still be less than significant.

- *Emergency Generators*: The revised project would not affect the emergency generator and noise impacts from the generator would still be less than significant.

Noise generation associated with the revised project will still primarily be attributed to the project construction activities, including site grading, construction of the building, and apparatuses, and the increase traffic related to facility use. Operational noise generation will still be attributed to the slight increase in traffic volumes from residents as well as from typical commercial and residential fixed mechanical equipment. Therefore, the revised Project will not change any noise impacts as previously analyzed.

Stantec Consulting Services Inc

Tracie J. Ferguson

Tracie Ferguson
Senior Associate - Acoustics

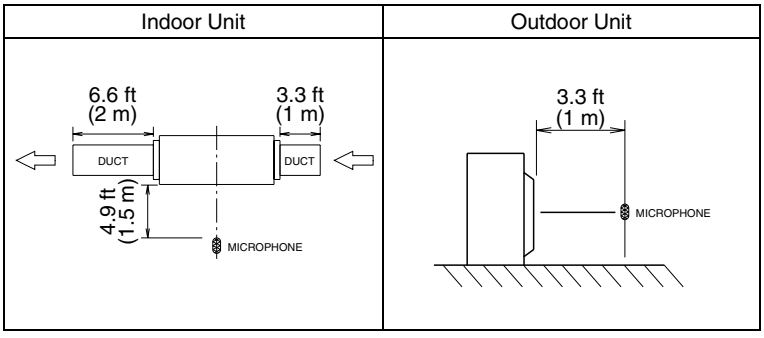
Phone: 415-518-0835
Email: Tracie.Ferguson@stantec.com

Attachment: Daikin RX##RMVJU Publish Sound Pressure Level Data

[1] Hoover and Keith, Noise Control for Buildings, Manufacturing Plants, Equipment, and Products, 2000, Houston, TX.
[2] Noise levels taken from published data from Daikin RX##RMVJU outdoor condensing units.

10. Sound Level

10.1 Measuring Location

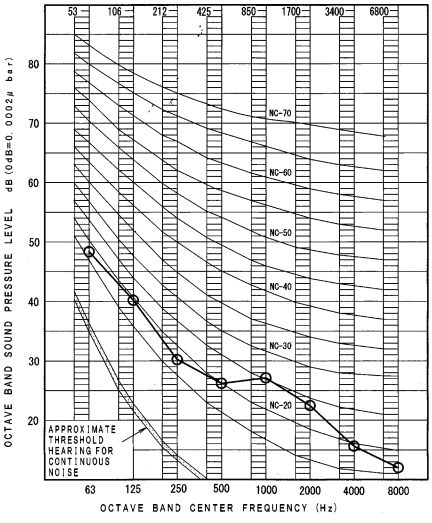


Notes:
1. Operation sound is measured in an anechoic chamber.
2. The data are based on the conditions shown in the table below.

Cooling	Heating	Piping Length
Indoor ; 80°FDB (26.7°CDB) / 67°FWB (19.4°CWB) Outdoor ; 95°FDB (35°CDB) / 75°FWB (24°CWB)	Indoor ; 70°FDB (21°CDB) / 60°FWB (15.6°CWB) Outdoor ; 47°FDB (8.3°CDB) / 43°FWB (6°CWB)	16.4 ft (5 m)

10.2 Indoor Unit

FDMQ09RVJU



OVER ALL (dB)

SCALE	AIR FLOW RATE
	H
A	32.0

(B.G.N IS ALREADY RECTIFIED)

OPERATING CONDITIONS

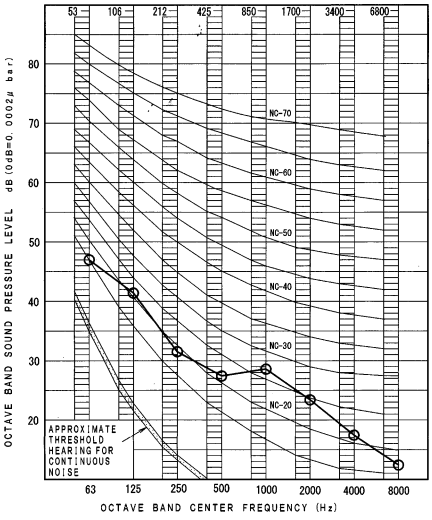
POWER SOURCE 208/230V 60Hz

COOLING	RETURN AIR TEMPERATURE	: 80.0 ° F(26.7 ℃) DB, 67.0 ° F(19.4 ℃) WB
	OUTDOOR TEMPERATURE	: 95.0 ° F(35.0 ℃) DB, 75.0 ° F(23.9 ℃) WB
HEATING	RETURN AIR TEMPERATURE	: 70.0 ° F(21.1 ℃) DB, 60.0 ° F(15.6 ℃) WB
	OUTDOOR TEMPERATURE	: 47.0 ° F(8.3 ℃) DB, 43.0 ° F(6.1 ℃) WB

EXTERNAL STATIC PRESSURE 0.20in.WG(50Pa)

4D113009A

FDMQ12RVJU



OVER ALL (dB)

SCALE	AIR FLOW RATE
	H
A	33.0

(B.G.N IS ALREADY RECTIFIED)

OPERATING CONDITIONS

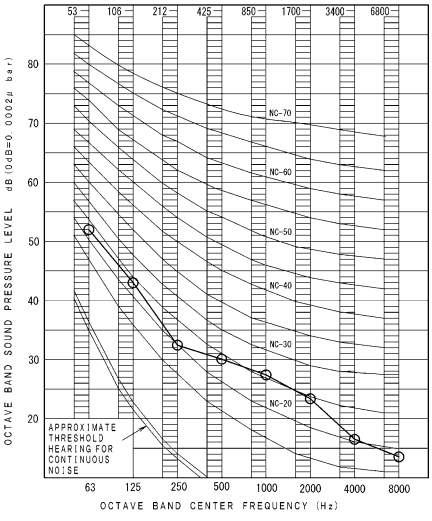
POWER SOURCE 208/230V 60Hz

COOLING	RETURN AIR TEMPERATURE : 80.0 ° F(26.7 ℃) DB, 67.0 ° F(19.4 ℃) WB OUTDOOR TEMPERATURE : 95.0 ° F(35.0 ℃) DB, 75.0 ° F(23.9 ℃) WB
HEATING	RETURN AIR TEMPERATURE : 70.0 ° F(21.1 ℃) DB, 60.0 ° F(15.6 ℃) WB OUTDOOR TEMPERATURE : 47.0 ° F(8.3 ℃) DB, 43.0 ° F(6.1 ℃) WB

EXTERNAL STATIC PRESSURE 0.20in.WG(50Pa)

4D113010A

FDMQ15RVJU



OVER ALL (dB)

SCALE	AIR FLOW RATE
	H
A	34.0

(B.G.N IS ALREADY RECTIFIED)

OPERATING CONDITIONS

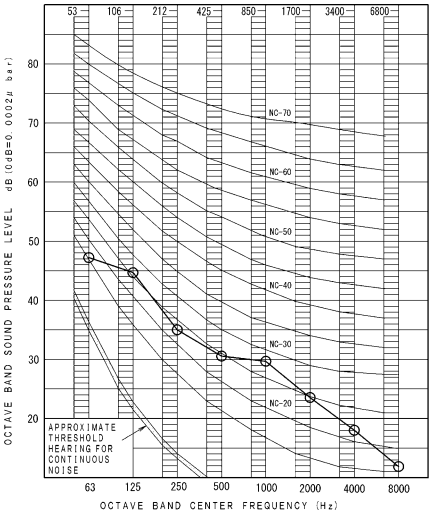
POWER SOURCE 208/230V 60Hz

COOLING	RETURN AIR TEMPERATURE : 80.0 ° F(26.7 ℃) DB, 67.0 ° F(19.4 ℃) WB OUTDOOR TEMPERATURE : 95.0 ° F(35.0 ℃) DB, 75.0 ° F(23.9 ℃) WB
HEATING	RETURN AIR TEMPERATURE : 70.0 ° F(21.1 ℃) DB, 60.0 ° F(15.6 ℃) WB OUTDOOR TEMPERATURE : 47.0 ° F(8.3 ℃) DB, 43.0 ° F(6.1 ℃) WB

EXTERNAL STATIC PRESSURE 0.20in.WG(50Pa)

4D113011

FDMQ18RVJU



OVER ALL (dB)

SCALE	AIR FLOW RATE
	H
A	35.0

(B.G.N IS ALREADY RECTIFIED)

OPERATING CONDITIONS

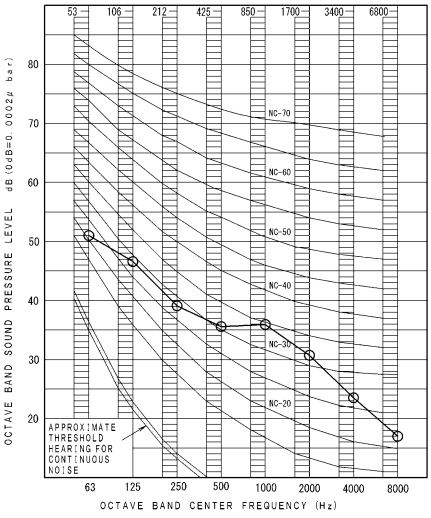
POWER SOURCE 208/230V 60Hz

COOLING	RETURN AIR TEMPERATURE : 80.0 ° F(26.7 ℃) DB, 67.0 ° F(19.4 ℃) WB OUTDOOR TEMPERATURE : 95.0 ° F(35.0 ℃) DB, 75.0 ° F(23.9 ℃) WB
HEATING	RETURN AIR TEMPERATURE : 70.0 ° F(21.1 ℃) DB, 60.0 ° F(15.6 ℃) WB OUTDOOR TEMPERATURE : 47.0 ° F(8.3 ℃) DB, 43.0 ° F(6.1 ℃) WB

EXTERNAL STATIC PRESSURE 0.20in.WG(50Pa)

4D113012

FDMQ24RVJU



OVER ALL (dB)

SCALE	AIR FLOW RATE
	H
A	40.0

(B.G.N IS ALREADY RECTIFIED)

OPERATING CONDITIONS

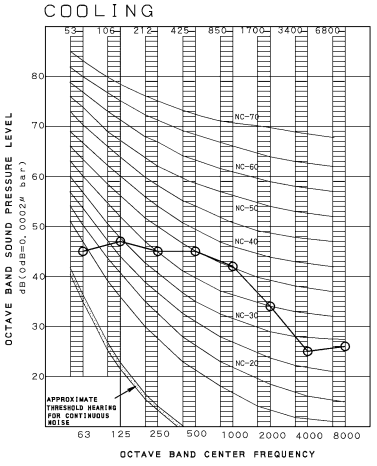
POWER SOURCE	208/230V 60Hz
COOLING	RETURN AIR TEMPERATURE : 80.0 °F(26.7 °C) DB, 67.0 °F(19.4 °C) WB OUTDOOR TEMPERATURE : 95.0 °F(35.0 °C) DB, 75.0 °F(23.9 °C) WB
HEATING	RETURN AIR TEMPERATURE : 70.0 °F(21.1 °C) DB, 60.0 °F(15.6 °C) WB OUTDOOR TEMPERATURE : 47.0 °F(8.3 °C) DB, 43.0 °F(6.1 °C) WB

EXTERNAL STATIC PRESSURE 0.20in.WG(50Pa)

4D113013

10.3 Outdoor Unit

RX09RMVJU



OVER ALL(dB)

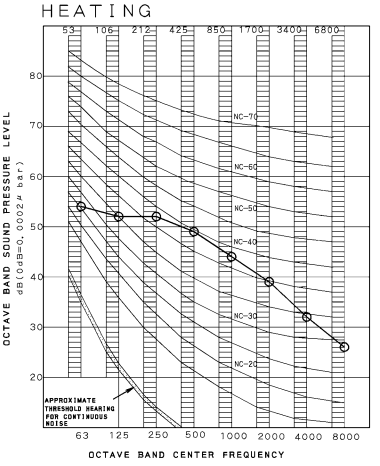
SCALE	208-230V 60Hz
A	46

(B.G.N IS ALREADY RECTIFIED)

OPERATING CONDITIONS

POWER SOURCE 208-230V 60Hz
JIS STANDARD

Cooling



OVER ALL(dB)

SCALE	208-230V 60Hz
A	50

(B.G.N IS ALREADY RECTIFIED)

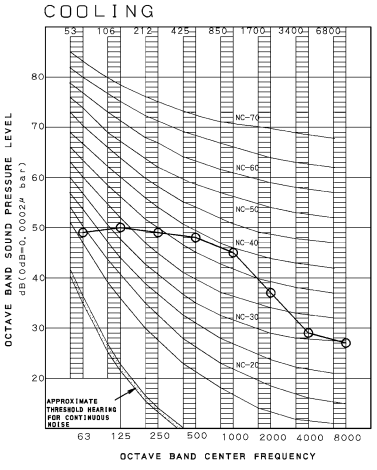
OPERATING CONDITIONS

POWER SOURCE 208-230V 60Hz
JIS STANDARD

Heating

3D106145A

RX12RMVJU



OVER ALL(dB)

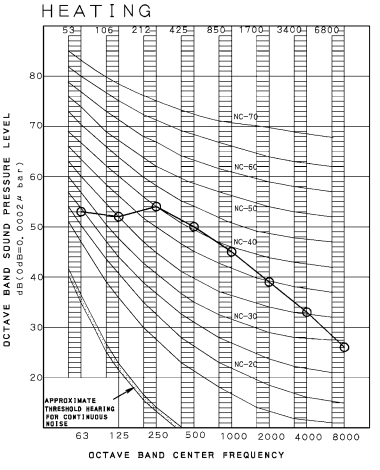
SCALE	208-230V 60Hz
A	49

(B.G.N IS ALREADY RECTIFIED)

OPERATING CONDITIONS

POWER SOURCE 208-230V 60Hz
JIS STANDARD

Cooling



OVER ALL(dB)

SCALE	208-230V 60Hz
A	51

(B.G.N IS ALREADY RECTIFIED)

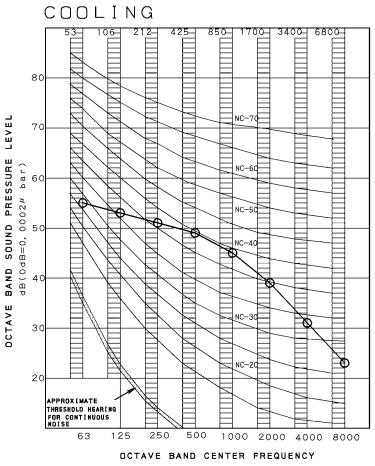
OPERATING CONDITIONS

POWER SOURCE 208-230V 60Hz
JIS STANDARD

Heating

3D106146A

RX15RMVJU



OVER ALL(dB)

SCALE	208-230v 60Hz
A	50

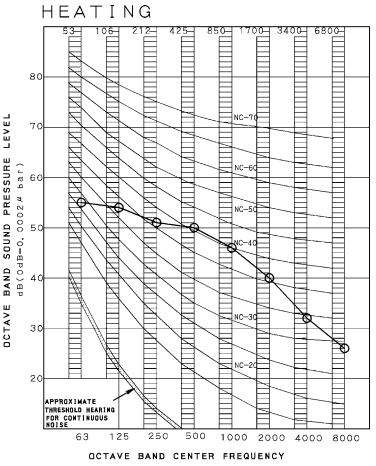
(B.G.N IS ALREADY RECTIFIED)

OPERATING CONDITIONS

POWER SOURCE 208-230v 60Hz

JIS STANDARD

Cooling



OVER ALL(dB)

SCALE	208-230v 60Hz
A	51

(B.G.N IS ALREADY RECTIFIED)

OPERATING CONDITIONS

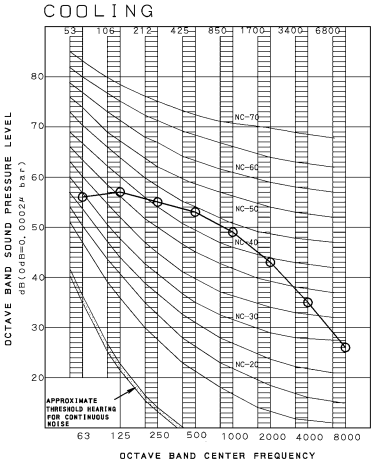
POWER SOURCE 208-230v 60Hz

JIS STANDARD

Heating

3D106147A

RX18RMVJU



OVER ALL(dB)

SCALE	208-230v 60Hz
A	54

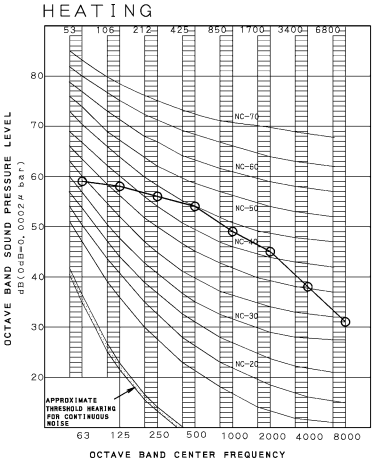
(B.G.N IS ALREADY RECTIFIED)

OPERATING CONDITIONS

POWER SOURCE 208-230v 60Hz

JIS STANDARD

Cooling



OVER ALL(dB)

SCALE	208-230v 60Hz
A	55

(B.G.N IS ALREADY RECTIFIED)

OPERATING CONDITIONS

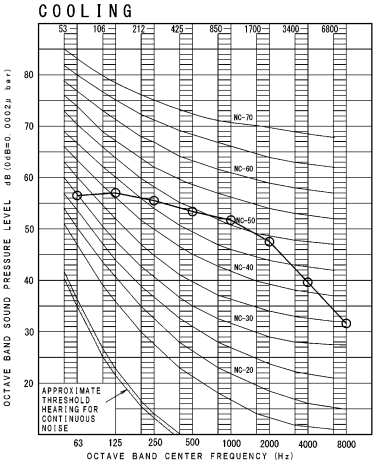
POWER SOURCE 208-230v 60Hz

JIS STANDARD

Heating

3D108255A

RX24RMVJU



OVER ALL (dB)

SCALE	208-230V 60Hz
A	56

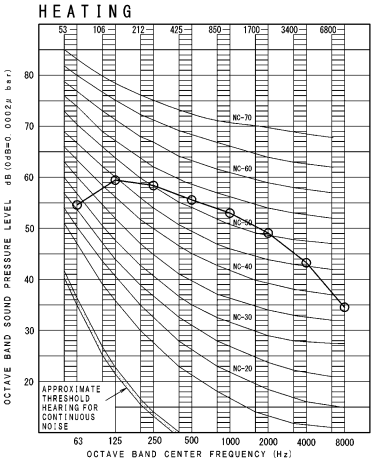
(B.G.N IS ALREADY RECTIFIED)

OPERATING CONDITIONS

POWER SOURCE 208-230V 60Hz

JIS STANDARD

Cooling



OVER ALL (dB)

SCALE	208-230V 60Hz
A	58

(B.G.N IS ALREADY RECTIFIED)

OPERATING CONDITIONS

POWER SOURCE 208-230V 60Hz

JIS STANDARD

Heating

3D113030

APPENDIX G REVISED ENERGY CALCULATIONS MEMORANDUM

Stantec

Memo

To:	City and County of San Francisco Planning Department	From:	Stantec Consulting Services, Inc.
	1650 Mission Street, Suite 400 San Francisco, CA 94103		1340 Treat Boulevard, Suite 300 Walnut Creek, CA 94597
File:	469 Stevenson Street Project	Date:	February 5, 2020

Reference: 469 Stevenson Energy Calculations

Since publication of the Notice of Preparation (NOP) and initial study on October 2, 2019, the project sponsor has made a few changes to the project description for the 469 Stevenson Project (proposed project) that may affect previously analyzed energy calculations. The number of residential units has increased from 462 dwelling units to 495 dwelling units, resulting in an additional 33 dwelling units. The overall footprint, building square footage, and retail square footage would remain the same as what was analyzed in the initial study. This memo addresses the changes to energy usage as a result of the proposed project.

Construction

Construction of the proposed project would not be altered, and the same type of equipment and number of workers would be required to construct the proposed project. As such, there would be no changes to the proposed project's construction energy use and this impact would remain less than significant as determined in the initial study.

Operations

As shown in Table 1, the additional 33 dwelling units would result in a 5.6 to 12.7 percent increase in the proposed project's operational energy use from what was determined in the initial study.

Table 1: Energy Use Changes

Phase	Scenario	Diesel (gallons)	Gasoline (gallons)	Electricity (KWhr/year)	Natural Gas (kBTU/year)
Operations	Previously Proposed Project	17,317	22,920	2,068,157	4,096,431
	Proposed Project	17,317	25,831	2,184,276	4,339,963
Change		NC	+ 2,911	+ 116,119	+ 243,532
Percentage Increase		**NC**	**12.7**	**5.6**	**5.9**

N/A = Not Applicable NC = No Change

Reference: 469 Stevenson Energy Calculations

The additional 33 dwelling units would comply with the city's Transportation Demand Management Programs, Transportation Sustainability Fee, bicycle parking requirements, low emission car parking requirements, and car sharing requirements, which would reduce the proposed project's transportation-related emissions and fuel usage. The additional residential units would also comply with energy conservation measures required to meet the city's Green Building Code and Title 24 energy conservation standards. The above energy conservation measures would make certain that energy use is conducted in a necessary and efficient manner, and not wasteful. The resulting changes would not affect the impact determinations previously identified in the initial study because the increase in energy use would not have a measurable effect on regional energy supplies or on peak energy demand resulting in the need for additional capacity.

Stantec Consulting Services Inc.

Elena Nuno
Senior Air Quality Scientist
Phone: 559.355.0580
Email: Elena.Nuno@stantec.com

Attachment: Revised Energy Calculations

EnergyUseLandUseSubType	Size	Title 24 Electricity Energy Intensity (KWhr/size/year)	Nontitle 24 Electricity Energy Intensity (KWhr/size/year)	Lighting Energy Intensity (KWhr/size/year)	Total Electricity Energy Demand (KWhr/size/year)	Total Electricity Demand (KWhr/year)
Apartments High Rise	495	426.45	3054.1	741.44	4221.99	2,089,885
Enclosed Parking with Elevator	234	3.92	0.19	1.75	5.86	1,371
Strip Mall	4000	2.24	3.36	4.88	10.48	41,920
car stacker					140	51100
						2,184,276

EnergyUseLandUseSubType	Size	Title 24 Natural Gas Energy Intensity (KBTU/size/year)	Nontitle 24 Natural Gas Energy Intensity (KBTU/size/year)	Total Natural Gas Energy Demand (KBTU/size/year)	Total Natural Gas Demand (KBTU/year)
Apartments High Rise	495	6115.43	2615	8730.43	4,321,563
Enclosed Parking with Elevator	234	0	0	0	0
Strip Mall	4000	3.9	0.7	4.6	18,400
car stacker					
					4,339,963

Land Use	Size	Unit	Auto Trip Rate/unit	Total Trips per Day	Daily Vehicle Mileage	Days per Year	Annual VMT	Average Fuel Economy (miles/gallon)	Total Annual Fuel Consumption (gallons)
Retail	4	ksf	14.75	59	1.49	365	32,023.34	34.2	936
Residential	495	du	1.32	653	3.57	365	851,388.11	34.2	24,894
							883,411		25,831

Truck Trips

Land Use	Truck Trip Rate/Day	Daily Vehicle Mileage	Days per Year	Annual VMT	Average Fuel Economy (miles/gallon)	Total Annual Fuel Consumption (gallons)
Retail	0.8					
Residential	13.67					
Total	14.47	20	365	105631	6.1	17,317

Daily Vehile Mileage Calculations (SF TIM)

Existing TAZ VMT Per Capita (Residential):	1.9		
Existing TAZ VMT per retail employee (Retail):	7.3	3.5637306	243532

New Residents:	1086
New Employees	11

Residential Vehicle Trips	578
Retail Vehicle Trips	54

APPENDIX H GREENHOUSE GAS COMPLIANCE CHECKLIST

SAN FRANCISCO
PLANNING DEPARTMENT

Compliance Checklist Table for Greenhouse Gas Analysis:

Table 1. Private Development Projects

A. GENERAL PROJECT INFORMATION:

Date: July 19, 2019; Updated March 2, 2020

Project name: 469 Stevenson **Case No**: 2017-014833ENV

Project address, block, and lot: 469 Stevenson Street, San Francisco. Block/Lot: 3704/045

Standard to be met (Select one)[1]: LEED Silver

Compliance Checklist Prepared By: Stantec Consulting Services Inc.

Date: 7/19/19; Updated 3/2/2020

Brief Project Description:

The project will demolish the existing parking lot and construct a 27-story mixed-use residential project of approximately 535,000 gross square feet total, including residential, ground floor retail, and amenity space. 495 residential units, approximately 4,000 square feet of commercial retail on the ground floor, 178 vehicle parking spaces, and 200 *class 1* and 27 *class 2* bicycle parking spaces are proposed. The project will utilize the State Density Bonus program to provide affordable residential units onsite.

B. COMPLIANCE CHECKLIST TABLE:

Instructions: Complete the following table by determining project compliance with the identified adopted regulations and providing project-level details in the "Remarks" column. Projects that do not comply with an ordinance/regulation may be determined to be inconsistent with San Francisco's Greenhouse Gas Reduction Strategy, although compliance with most ordinances/regulations is not optional. (See next page)

[1] Refers to the standard to be met per the San Francisco Green Building Code. See http://sfdbi.org/administrative-bulletins for latest "AB-093" to determine which standard your project is required to meet, if applicable.

Table 1. Regulations Applicable to Private Development Projects

Regulation	Requirements	Project Compliance	Remarks
Transportation Sector			
Commuter Benefits Ordinance (San Francisco Environment Code, section 427)	All employers of 20 or more employees nationwide must provide at least one of the following benefit programs: (1) A pre-tax election consistent with 26 U.S.C. § 132(f), allowing employees to elect to exclude from taxable wages and compensation, employee commuting costs incurred for transit passes or vanpool charges, or (2) Employer paid benefit whereby the employer supplies a transit or vanpool subsidy for each covered employee. The subsidy must be at least equal in value to the current cost of the Muni and BART monthly pass, or (3) Employer provided transportation furnished by the employer at no cost to the employee in a vanpool or bus, or similar multi-passenger vehicle operated by or for the employer.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	Based on the proposed approximately 4,000 square feet of retail space, the project is anticipated to have 11 employees and therefore is not required to comply with the relevant commuter benefit programs. However, per San Francisco Environment Code section 427, if the retail space employs more than 20 people nationwide the proposed project would be required to comply with the relevant commuter benefit programs.
Transportation Management Programs (San Francisco Planning Code, section 163)	Requires new buildings or additions over a specified size (buildings greater than 25,000 square feet or 100,000 square feet depending on the use and zoning district) within certain zoning districts (including downtown and mixed-use districts in the city's eastern neighborhoods and south of market) to implement a transportation management program and provide on-site transportation management brokerage services for the life of the building.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	The proposed project would construct a building over 100,000 square feet and would implement a transportation management program and provide on-site transportation management brokerage services. The transportation management program will include the following measures: ACTIVE-1: Improve Walking Conditions (Option D): The project would provide streetscape improvements consistent with the Better Streets Plan.

Regulation	Requirements	Project Compliance	Remarks
			ACTIVE-2: Bicycle Parking (Option A). The project would provide class 1 bicycle parking spaces as required by the planning code. ACTIVE-4: Bike Share Membership (Location B). The project would offer one complimentary bike share membership to each dwelling unit and/or employee, at least once annually, for the life of the project. ACTIVE-5A: Bicycle Repair Station: The project would provide an indoor bicycle repair station in the below grade parking level that is equipped with tools and supplies necessary to perform basic bicycle maintenance. ACTIVE-5B: Bicycle Maintenance Services. The property owner shall offer bicycle maintenance services to each dwelling unit and/or employee, at least once annually, for 40 years. ACTIVE-6: Fleet of Bicycles: The project would provide five shared bicycles for building residents, visitors, or employees to use. CSHARE-1: Carshare (Option E): The project would provide one car-share membership for each dwelling unit and reserve three parking spaces for car-share services.

Regulation	Requirements	Project Compliance	Remarks
			DELIVERY-1: Delivery Supportive Amenities: The project would facilitate delivery support amenities by providing an area for receipt of deliveries that offers one of the following: (1) clothes lockers for delivery services; (2) temporary storage for package deliveries, laundry deliveries, and other deliveries; or, (3) providing temporary refrigeration for grocery deliveries to reduce vehicle miles traveled (VMT). FAMILY-1: Family TDM – Amenities (Option A + B): The project would provide family amenities that include onsite storage for family gear, utility carts, and cargo bicycles. FAMILY-3: Family TDM Package. The project would include CSHARE-1 Option E and FAMILY-1, Options A and B. HOV-1: Contributions or Incentives for Sustainable Transportation (Option A). The project would offer contributions or incentives to each dwelling unit and employee, at least once annually, for the Life of the Project. The project would provide at least 25 percent contribution or incentive. INFO-1: Multimodal Wayfinding Signage. The project would provide multimodal wayfinding signage that can withstand weather elements in key locations. That is, the signs shall be located externally and/or internally so that the residents, tenants, employees, and visitors are directed to

Regulation	Requirements	Project Compliance	Remarks
			transportation services and infrastructure, including: transit, bike share, car-share, bicycle parking and amenities, showers and lockers, taxi stands, and carpool/shuttle/vanpool pick-up/drop-off locations. INFO-2: Real Time Transportation Information Displays. The project would provide real time transportation information on displays in prominent locations on the project site to highlight sustainable transportation options and support informed trip-making. INFO-3: Tailored Transportation Marketing Services (Option C). The project would provide individualized, tailored marketing and communication campaigns, including incentives to encourage the use of sustainable transportation modes. LU-2: On-site Affordable Housing (Option B). The project proposed to use the Individually Requested State Density Bonus Program and must provide at least 11 percent of the base[2] project's residential units as very low affordable dwelling units onsite in order to qualify for a 35 percent increase in density. The project proposes to provide 19 percent of the base project's

[2] In order to determine how much of a density bonus state law will allow, the density allowed by current controls ("base density" or "base project") must first be calculated. The base density is the maximum gross residential density allowed pursuant to the site's zoning requirements.

Regulation	Requirements	Project Compliance	Remarks
			residential units as affordable dwelling units onsite. PKG-1: Unbundle Parking (Location E). The project would lease or sell all parking spaces separately from the rental for the life of the project, so that tenants have the option of renting or buying a parking space at an additional cost, and would, thus, experience a cost savings if they opt not to rent or purchase parking. PKG-4: Parking Supply (Option A). The project would provide off-street private vehicular parking (Accessory Parking) in an amount no greater than the off-street parking rate for the neighborhood (neighborhood parking rate), based on the transportation analysis zone for the project site.
Transportation Sustainability Fee (San Francisco Planning Code, section 411A)	Establishes citywide fees for all new development. Fees based on a proportion of the gross area of the project based on the type of use. The Transportation Sustainability Fee applies to the following development projects that result in: (1) More than 20 new dwelling units (2) New group housing facilities, or additions of 800 gross square feet or more to existing group housing (3) New construction of a non-residential use greater than 800 gross square	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	The proposed project would construct 495 dwelling units and would be required to pay the Transportation Sustainability Fee.

Regulation	Requirements	Project Compliance	Remarks
	feet, or additions greater than 800 gross square feet to an existing Non-Residential use (4) New construction of a PDR use greater than1,500 gross square feet, or additions of greater than1,500 gross square feet to an existing PDR (5) Change or replacement of use, such that the rate charged for the new use is higher than the rate charged for the existing use (6) Change or replacement of use from a hospital or a health service to any other use Fees are paid to the Department of Building Inspection and provided to the San Francisco Municipal Transportation Agency and regional providers to improve transit services.		
Jobs-Housing Linkage Program (San Francisco Planning Code, section 413)	The Jobs-Housing Program found that new large scale developments attract new employees to the city who require housing. The program is designed to provide housing for those new uses within San Francisco, thereby allowing employees to live close to their place of employment. The program requires a developer to pay a fee or contribute land suitable for housing to a housing developer or pay an in-lieu fee.	☐ Project Complies ☒ Not Applicable ☐ Project Does Not Comply	The proposed project is a mixed-use housing project that provides affordable housing on-site. The proposed project is not subject to Planning Code section 413.

Regulation	Requirements	Project Compliance	Remarks
Bicycle Parking, Showers, and Lockers in New and Expanded Buildings (San Francisco Planning Code, sections 155.1-155.4)	Requires bicycle facilities for new and expanded buildings, new dwelling units, change of occupancy, increase of use intensity, and added parking capacity/area. Refer to sections 155.2 and 155.3 for requirements by use. Non-residential projects that add 10 or more parking spaces: must meet Planning Code section 155 and CalGreen 5.106.4 (provide short and long-term [secure] bicycle parking for at least 5% of motorized vehicle capacity), whichever is stricter.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	Bicycle parking will be provided at a minimum, 200 *class 1* spaces and 27 *class 2* spaces as required by the Planning Code. The project would include less than 10,000 square feet of retail space and would not be required to provide shower facilities and lockers per Planning Code section 155.4.
Bicycle parking in parking garages (San Francisco Planning Code, section 155.2)	Garages with more than 500 automobile spaces shall provide 25 spaces plus one additional space for every 40 automobile spaces over 500 spaces, up to a maximum of 50 bicycle parking spaces. Where parking capacity is increased by 10 or more spaces, CalGreen 5.106.4 applies (see above).	☐ Project Complies ☒ Not Applicable ☐ Project Does Not Comply	The proposed project does not propose to add more than 500 automobile spaces.
Bicycle parking in Residential Buildings (San Francisco Planning Code, section 155.2)	Class 1 Bicycle Parking Spaces: For dwelling units on lots with 3 units of less, no Class 1 racks are required. Project sponsor must provide secure, weather protected space, one per unit, easily accessible to residents and not otherwise used for automobile parking.	☒ Project Complies ☐ Not Applicable	Bicycle parking will be provided at a minimum, 200 *class 1* spaces and 27 *class 2* spaces as required by the Planning Code.

Regulation	Requirements	Project Compliance	Remarks
	For dwelling units on lots with more than 3 units, one Class 1 space is required for each dwelling unit. For buildings containing more than 100 dwelling units, 100 Class 1 spaces plus one Class 1 space for every four dwelling units over 100. Dwelling units that are also considered student housing must provide 50 percent more spaces than would otherwise be required. Class 2 Bicycle Parking Spaces: For dwelling units on lots with 3 units or less, no Class 2 spaces are required. For dwelling units on lots with more than 3 units, 1 Class 2 space is required for every 20 dwelling units. Dwelling units that are also considered student housing shall provide 50 percent more spaces than would otherwise be required.	☐ Project Does Not Comply	
San Francisco Green Building Requirements for Fuel Efficient Vehicle and Carpool Parking (CalGreen sections 5.106.5 and 5.710.6.3)	Requires new large commercial projects, new high-rise residential projects and commercial interior projects to provide designated parking for low-emitting, fuel efficient, and carpool/van pool vehicles. Mark 8 percent of parking stalls for such vehicles. For non-residential additions and interior alterations to existing buildings, the regulation applies for projects that would add 10 or more parking spaces to the project site. (Refer to Table 5.106.5.2).	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	The proposed project will provide at least 8 percent of the total parking spaces to be designated for low-emitting, fuel efficient, and carpool/van pool vehicles. The exact locations within the parking garage will be further refined.

Regulation	Requirements	Project Compliance	Remarks
Car Sharing Requirements (San Francisco Planning Code, section 166)	New residential projects or renovation of buildings being converted to residential uses within most of the city's mixed-use and transit-oriented residential districts are required to provide car share parking spaces.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	The proposed project will comply with car sharing requirements pursuant to the planning code and will provide 3 carshare spaces
Energy Efficiency Sector *(includes water use reduction regulations)*			
Alternate water sources for non-potable applications (San Francisco Health Code, article 12C)	Requires large development projects (a single building, or multiple buildings on one or more parcels of 250,000 square feet or more of gross floor area) to be constructed, operated, and maintained using available alternate water sources for toilet and urinal flushing and irrigation. Requires small development projects (a single building, or construction of multiple buildings on one or more parcels of 40,000 square feet or more of gross floor area) prepare water budget calculations; and that subdivision approval requirements include compliance with article 12C.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	The proposed project would construct a building greater than 250,000 square feet. Therefore, the proposed project will use alternate water sources for toilet and urinal flushing and irrigation.

Regulation	Requirements	Project Compliance	Remarks
San Francisco Green Building Requirements for Energy Efficiency (San Francisco Green Building Code, sections 4.101, 4.103, 5.103)	Demonstrate compliance with Title 24 Part 6 (2016) energy standards, and additionally meet energy efficiency prerequisites of the applicable green building rating system: • GreenPoint Rated: demonstrate a 10 percent compliance margin • LEED for Homes (including midrise): demonstrate a 10 percent compliance margin • LEED BD+C 2009: No compliance margin requirement. Wherever reference is made to the LEED or GreenPoint Rated systems, a comparable equivalent rating system may be used if approved by the Director. LEED prerequisites or credits references are to LEED v4 BD+C.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	The proposed project is LEED Silver and will comply with the Green Building requirements for energy efficiency.
San Francisco Green Building Requirements: Commissioning of Building Energy and Water Systems (San Francisco Green Building Code, sections 5.103.1.4, CalGreen 5.410.2 and 5.410.4)	New non-residential buildings and alterations to non-residential buildings must conduct design and construction commissioning to verify energy and water using components meet the owner's or owner representative's project requirements. Commissioning requirements apply to all building operating systems covered by Title 24 Part 6, as well as process equipment and controls, and renewable energy systems. • New non-residential projects greater than or equal to 25,000 square feet: complete enhanced commissioning of building energy systems (meeting LEED EAc3 – SFGBC 5.103.1.4 and CalGreen 5.410.) • Non-residential new buildings and alterations less than 25,000 square feet and greater than	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	The proposed project is proposed to be a mixed-use development with the majority of the development being residential. The proposed project would comply with the San Francisco Green Building requirements: Commissioning of Building Energy and Water Systems by meeting all of the Commissioning requirements stated in San Francisco Green Building Code, Section 5.103.1.4. The Project Sponsor would submit documentation verifying that the facility has been or will meet the criteria necessary to achieve CalGreen, Section 5.410.2 and Option 1 of LEED EA credit, in addition to LEED EA Prerequisite and Verification. Per CalGreen, Section 5.410.2, the building commissioning would be included in the design and construction process of the proposed project to verify that the building

Regulation	Requirements	Project Compliance	Remarks
	or equal to10,000 square feet: commission all energy systems • Non-residential new buildings and alterations less than 10,000 square feet, must complete testing and adjusting of energy systems. • New residential high rise, new commercial interior, and major alterations to residential buildings must each commission building energy systems, meeting the LEED prerequisite EAp1 (fundamental commissioning of building energy systems).		systems and components meet the Project Sponsor's project requirements. Commissioning would be performed by trained personnel with experience on projects of comparable size and complexity.
San Francisco Stormwater Management Ordinance (Public Works Code, article 4.2)	All projects disturbing more than 5,000 square feet of ground surface must manage stormwater on-site using low impact design. Comply with the Stormwater Management Ordinance, including SFPUC Stormwater Design Guidelines.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	The proposed project would disturb more than 5,000 square feet of ground surface. Therefore, a Stormwater Control Plan would be designed for review and approval by the San Francisco Public Utilities Commission. The proposed project would be required to manage stormwater onsite using low impact design strategies.
San Francisco Green Building Requirements for Water Use Reduction (San Francisco Green Building Code, sections 4.103.2.2 and 5.103.1.2, CalGreen sections 4.303.1 and 5.303.2-5.303.6)	All new buildings must comply with current California water fixture and fitting efficiency requirements. All fixtures and fittings within areas of alteration, or serving areas of alteration, must be upgraded to current California and San Francisco fixture and fitting water efficiency requirements. (For local requirements applicable to alterations, see Commercial Water Conservation Ordinance and	☒ Project Complies ☐ Not Applicable	The proposed project would comply with the current California water fixture and fitting efficiency requirements by incorporating fixtures and fittings that would reduce domestic water consumption by 30%.

Regulation	Requirements	Project Compliance	Remarks
	Residential Water Conservation Ordinance below.) Additionally: • New large commercial and high-rise residential projects must verify that project meets maximum fixture flow rates in accordance with the CA Plumbing Code. Projects must also achieve the LEED WE Prerequisite Indoor Water Use Reduction (WEp2) and a minimum 30% reduction in the use of indoor potable water, to meet the LEED WE credit Indoor Water Use Reduction (WEc2).	☐ Project Does Not Comply	
Commercial Water Conservation Ordinance (San Francisco Building Code, chapter 13A)	Requires all alterations to existing commercial properties to achieve the following: 1. If showerheads have a maximum flow greater than 2.5 gallons per minute (gpm), replace with less than or equal to 2.0 gpm. 2. All showers have no more than one showerhead per valve 3. If faucets and faucet aerators have a maximum flow rate greater than 2.2 gpm, replace with unit meeting current code: • Non-residential lavatory: less than or equal to 0.4 gpm • Kitchen faucet: less than or equal to 0.8 gpm • Metering faucet: less than or equal to 0.2 gal/cycle 4. If toilets have a maximum rated water consumption greater than1.6 gallons per flush (gpf), replace with less than or equal to1.28 gpf toilet	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	The retail/commercial portion of the proposed project would comply with requirements for water use reduction by meeting at least the minimum standards specified in the ordinance as applicable and/or required.

Regulation	Requirements	Project Compliance	Remarks
	5. If urinals have a maximum flow rate greater than 1.0 gpf, replace with less than or equal to 0.5 gpf unit 6. Repair all water leaks.		
Residential Water Conservation Ordinance (San Francisco Housing Code, chapter 12A)	Requires all residential properties (existing and new), prior to sale, to upgrade to the following minimum standards: 1. If showerheads have a maximum flow greater than 2.5 gallons per minute (gpm), replace with less than or equal to 2.0 gpm. 2. All showers have no more than one showerhead per valve 3. If faucets and faucet aerators have a maximum flow rate greater than 2.2 gpm, replace with unit meeting current code: • Non-residential lavatory: less than or equal to 0.4 gpm • Residential lavatory: less than or equal to 1.5 gpm • Kitchen faucet: less than or equal to 0.8 gpm • Metering faucet: less than or equal to 0.2 gal/cycle 4. If toilets have a maximum rated water consumption greater than 1.6 gallons per flush (gpf), replace with less than or equal to1.28 gpf toilet 5. If urinals have a maximum flow rate greater than1.0 gpf, replace with less than or equal to 0.5 gpf unit 6. Repair all water leaks.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	The proposed project would comply with all standards in the Residential Water Conservation Ordinance by meeting at least the minimum standards specified in the ordinance as required.

Regulation	Requirements	Project Compliance	Remarks
	Although these requirements apply to existing buildings, compliance must be completed through the Department of Building Inspection, for which a discretionary permit (subject to CEQA) would be issued.		
San Francisco Water Efficient Irrigation Ordinance (San Francisco Administrative Code, chapter 63)	Projects that include 500 square feet or more of new or modified landscape are subject to this ordinance, which requires that landscape projects be installed, constructed, operated, and maintained in accordance with rules adopted by the SFPUC that establish a water budget for outdoor water consumption. Tier 1: All commercial and residential landscape rehabilitation projects equal to or greater than 1,000 square feet and less than 2,500 square feet Tier 2: (A) New project landscape area is greater than or equal to 500 square feet or; (B) the project's modified landscape area is greater than or equal to 2,500 square feet. Note: Tier 2 compliance requires the services of landscape professionals. See the SFPUC website for exemptions to this requirement.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	The proposed project would construct more than 500 square feet of new landscaped area. The landscaping plans would comply with the Water Efficient Irrigation Ordinance as required.
Residential Energy Conservation Ordinance (San Francisco Housing Code, chapter 12)	Prior to transfer of title as a result of sale (including condominiums), residential properties that received a building permit prior to July 1978 the seller must provide the buyer a certificate of compliance, and the certificate must be recorded with the San Francisco Recorder's	☐ Project Complies ☒ Not Applicable	The proposed project does not contain residential properties that received a building permit prior to 1978.

Regulation	Requirements	Project Compliance	Remarks
	Office. To comply, install the following measures as applicable: • Attic insulation; weather-stripping all doors leading from heated to unheated areas; insulating hot water heaters and insulating hot water pipes; installing low-flow showerheads; caulking and sealing any openings or cracks in the building's exterior; and insulating accessible heating and cooling ducts.. Apartment buildings and hotels are also required to insulate steam and hot water pipes and tanks, clean and tune their boilers, repair boiler leaks, and install a time-clock on the burner. • Maximum required expenditure: $1300 for one to two unit dwellings, and for buildings with three or more units, one percent of the assessed value or purchase price as applicable. Although these requirements apply to existing buildings, compliance must be completed through the Department of Building Inspection, for which a discretionary permit (subject to CEQA) would be issued.	☐ Project Does Not Comply	
San Francisco Existing Commercial Buildings Energy Performance Ordinance (San Francisco Environment, Code chapter 20)	Owners of nonresidential buildings in San Francisco with greater than or equal to10,000 square feet that are heated or cooled must conduct energy efficiency audits, as well as to annually measure and disclose energy performance. Certain exceptions apply for new construction or if specified performance criteria are met. (Refer to section 2008 for exceptions).	☐ Project Complies ☒ Not Applicable	The proposed project would not develop more than 10,000 square feet of nonresidential uses.

Regulation	Requirements	Project Compliance	Remarks
		☐ Project Does Not Comply	
Light pollution reduction (CalGreen, section 5.106.8)	For nonresidential projects, comply with lighting power requirements in California Energy Code, CCR Part 6. Meet California Energy Code minimum for lighting zones 1 through 4 with backlight/uplight/glare ratings meeting CalGreen Table 5.106.8 requirements.	☐ Project Complies ☒ Not Applicable ☐ Project Does Not Comply	The proposed project is a mixed-use project with the majority devoted to residential uses. The lighting plan for the project will comply with applicable standards and regulations.
Renewable Energy *(includes on-site renewable energy generation regulations)*			
San Francisco Green Building Requirements for Renewable Energy (San Francisco Green Building Code, section 4.201.2 and San Francisco Planning Code, section 149)	Newly constructed residential and non-residential buildings of 10 occupied floors or less shall install solar photovoltaic systems and/or solar thermal systems in the solar zone required by California Code of Regulations, Title 24, Part 6 section 110.10, i.e., the 15 percent of roof area designated as Solar Ready Area. With Planning Department approval, projects subject to SFPUC stormwater requirements may substitute living roof for all or a portion of solar energy systems.	☐ Project Complies ☒ Not Applicable ☐ Project Does Not Comply	The proposed project will be constructed on a podium deck with 27 occupied floors above.

Regulation	Requirements	Project Compliance	Remarks
San Francisco Green Building Requirements for Renewable Energy (San Francisco Green Building Code, section 5.103.1.5)	New commercial buildings of greater than or equal to 25,000 square feet must either generate 1 percent of energy on-site with renewables (LEED EAc2), or purchase renewable energy credits equal to 35 percent of total electricity use for at least 2 years (LEED EAc6), or achieve at least a 10 percent compliance margin beyond Title 24 (2016).	☐ Project Complies ☒ Not Applicable ☐ Project Does Not Comply	The proposed project will not develop more than 25,000 square feet of commercial uses.
Waste Reduction Sector			
Mandatory Recycling and Composting Ordinance (San Francisco Environment Code, chapter 19 and CalGreen section 5.410.1)	All persons in San Francisco are required to separate their refuse into recyclables, compostables, and trash, and place each type of refuse in a separate container designated for disposal of that type of refuse. All new construction, renovation and alterations must provide for the storage, collection, and loading of recyclables, compost and solid waste in a manner that is convenient for all users of the building.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	The proposed project will comply with the Mandatory Recycling and Composting Ordinance and includes the provision of storage, collection, and loading of recyclables and composting that will be convenient for users.
San Francisco Construction and Demolition Debris Recovery Ordinance (San Francisco Environment Code, chapter 14, San Francisco Building Code, chapter 13B, and San	Applies to all projects: No construction and demolition material may be taken to landfill or placed in the garbage. All (100 percent of) mixed debris must be transported by a registered hauler to a registered facility to be processed for recycling. Source separated material must be taken to a facility that recycles or reuses those materials.	☒ Project Complies ☐ Not Applicable	Demolition activities associated with the project's construction will be required to comply with the San Francisco Green Building Requirements for Construction and Demolition Debris Recovery.

Regulation	Requirements	Project Compliance	Remarks
Francisco Health Code, section 288)	Additionally, projects that include full demolition of an existing structure must submit a waste diversion plan to the Director of the Department of Environment and the plan must provide for a minimum of 65 percent diversion from landfill of construction and demolition debris, including materials source separated for reuse or recycling.	☐ Project Does Not Comply	
San Francisco Construction and Demolition Debris Recycling Requirements (San Francisco Green Building Code, sections 5.103.1.3 and 4.103.2.3, Environment Code, chapter 14, Building Code, chapter 13B)	In addition to complying with the Construction and Demolition Debris Recovery Ordinance, new commercial buildings of greater than 25,000 square feet and new residential buildings of four or more occupied floors must develop a plan to divert a minimum of 75 percent of construction and demolition debris from landfill, and meet LEED v4 MRc1 (building life-cycle impact reduction).	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	The proposed project will develop a plan to divert the minimum 75 percent of construction and demolition debris from landfill and meet the LEED v4 MRc1 standard.
Environment/Conservation Sector			
Street Tree Planting Requirements (San Francisco Public Works Code, section 806(d))	Public Works Code section 806(d) requires projects that include new construction, significant alterations, new curb cuts, a new garage, or new dwelling units to plant a 24-inch box tree for every 20 feet along the property street frontage.	☒ Project Complies ☐ Not Applicable	The proposed project would comply by planting eight new street trees along Jessie Street. Due to the narrow sidewalk width along Stevenson Street, street trees cannot be planted. Therefore, seven vegetated landscape strips would be

Regulation	Requirements	Project Compliance	Remarks
		☐ Project Does Not Comply	planted along Stevenson Street. The project would not remove any existing trees.
Construction Site Runoff Pollution Prevention for New Construction (San Francisco Public Works Code, article 4.2)	Construction site runoff pollution prevention requirements depend upon project size, occupancy, and the location in areas served by combined or separate sewer systems. Any project disturbing greater than or equal to 5,000 square feet of ground surface is required to submit and receive approval of an erosion and sediment control plan prior to commencing any construction-related activities. The plan must be site-specific, and details the use, location, and emplacement of the sediment and erosion control devices at the project site. All construction sites, regardless of size, must implement BMPs to prevent illicit discharge into the sewer system.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	The proposed project will disturb more than 5,000 square feet of ground surface. The proposed project will comply with all Construction Site Runoff Pollution Prevention for New Construction requirements.
Enhanced Refrigerant Management (CalGreen, sections 5.508.1.2 and 5.508.2)	Commercial buildings must not install equipment that contains chlorofluorocarbons or halons. Applies to new construction and all alterations. New commercial refrigeration systems containing refrigerants with global warming potential of 150 times that of carbon dioxide or greater, installed in food stores with 8,000 square feet or more of refrigerated display cases, walk-in coolers or freezers connected to	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	The proposed project is a mixed-use project with the majority devoted to residential uses. The proposed project will comply with all standards pursuant to enhanced refrigerant management as applicable and/or required for the non-residential component of the proposed project.

Regulation	Requirements	Project Compliance	Remarks
	remote compressor units or condensing units: Piping shall meet all requirements of 5.508.2 (all sections), and shall undergo pressure testing during installation prior to evacuation and charging. System shall stand unaltered for 24 hours with no more than a one pound pressure change from 300 psig.		
Low-emitting adhesives, sealants, caulks, paints, coatings, composite wood, and flooring (CalGreen section 4.504)[3]	Adhesives, sealants, and caulks - Comply with VOC limits in SCAQMD Rule 1168 VOC limits and California Code of Regulations Title 17 for aerosol adhesives. (Refer to CalGreen tables 4.504.1 and 4.504.2). Paints and coatings -. Comply with VOC limits in the Air Resources Board Architectural Coatings Suggested Control Measure and California Code of Regulations Title 17 for aerosol paints. (Refer to CalGreen Table 4.504.3 for details). Aerosol paints and coatings - Meet BAAQMD VOC limits (Regulation 8, Rule 49) and Product-Weighted MIR Limits for Reactive Organic Compound. (CCR Title 17, Section 94520) Carpet - All carpet must meet one of the following: 1. Carpet and Rug Institute Green Label Plus Program, 2. California Department of Public Health	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	The proposed project will comply with all standards for low emitting adhesives, sealants, caulks, paints, and coatings as required in CALGreen 4.504.

[3] While not a GHG, VOCs are precursor pollutants that form ground level ozone. Increased ground level ozone is an anticipated effect of future global warming that would result in added health effects locally. Reducing VOC emissions would reduce the anticipated local effects of global warming.

Regulation	Requirements	Project Compliance	Remarks
	Standard Practice for the testing of VOCs (Specification 01350), 3. NSF/ANSI 140 at the Gold level, 4. Scientific Certifications Systems Sustainable Choice, OR California Collaborative for High Performance Schools EQ 2.2 and listed in the CHPS High Performance Product Database Carpet cushion must meet Carpet and Rug Institute Green Label, and indoor carpet adhesive & carpet pad adhesive must not exceed 50 g/L VOC content. (Refer to Table 4.504.1). Composite wood - Meet CARB Air Toxics Control Measure for Composite Wood, including meeting the emission limits in CalGreen Table 5.504.4.5. Resilient flooring systems - For 80 percent of floor area receiving resilient flooring, install resilient flooring complying with: 1. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore Program, 2. Compliant with the VOC-emission limits and testing requirements of California Department of Public Health 2010 Standard Method for the Testing and Evaluation Chambers v.1.1, 3. Compliant with the Collaborative for High Performance Schools (CHPS) EQ2.2 and listed in the CHPS High Performance Product Database, OR		

Regulation	Requirements	Project Compliance	Remarks
	4. Certified under the Greenguard Children & Schools Program to comply with California Department of Public Health criteria.		
Wood Burning Rule (Bay Area Air District Regulation 6, Rule 3: Wood-Burning Devices)	Bans the construction of wood-burning devices in new buildings constructed in the Bay Area since November 1, 2016. Gas-fueled fireplaces and logs, gas inserts, and electrical fireplaces are acceptable.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	The proposed project will not include wood burning fireplaces.